



EARTH ENVIRONMENTAL
& GEOTECHNICAL

GeoEnvironmental Investigation

Stairfoot

Barnsley

May 2021

On behalf of



Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business & Arts Centre
Houldsworth Street
Stockport
SK5 6DA

Tel : 0161 975 6088

Email info@earthenvironmental.co.uk
www.earthenvironmental.co.uk

SITE INVESTIGATION

STAIRFOOT

BARNESLEY

Report Ref: A3520/21/SI

MAY 2021

Prepared on Behalf of:

Noriker Power Ltd

By:

Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business & Arts Centre
Houldsworth Street
Stockport
SK5 6DA

DISTRIBUTION:

1 electronic copy Noriker Power Ltd

SITE INVESTIGATION

STAIRFOOT, BARNSELEY

Report Reference: A3520/21/SI

Version B.0

Date: 13th May 2021

Prepared for: Noriker Power Ltd

Prepared by: Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business & Arts Centre
Houldsworth Street
Stockport
SK5 6DA

Definition of Version Code:

- D. Applied during initial drafting of the report before it has been reviewed.
- C. Applied after the report has been reviewed but before it has been approved by the Project Manager.
- B. Applied after the Project Manager has approved the report ready for issue to the client.
- A. Applied to reports after external/internal review.

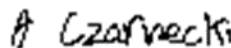
The version number starts at "0" and is raised by "1" at each re-type.

Written by:



Luke Glover
Principal GeoEnvironmental Consultant

Approved by:



Adam Czarnecki
Managing Director

TABLE OF CONTENTS

1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION.....	1
2.1	BACKGROUND.....	2
2.2	PREVIOUS DESK STUDY REPORTS.....	2
2.3	TERMS OF REFERENCE.....	2
2.4	REPORT SCOPE.....	3
2.5	LIMITATIONS OF THE STUDY.....	3
3.0	SITE LOCATION & DESCRIPTION	3
3.1	PROPOSED DEVELOPMENT	5
4.0	SITE INVESTIGATION	7
4.1	EXPLORATORY FIELDWORK	7
4.2	LABORATORY TESTING.....	9
4.2.1	<i>Geotechnical Testing</i>	9
4.2.2	<i>Environmental Testing</i>	10
5.0	GROUND CONDITIONS ENCOUNTERED.....	11
5.1	SOIL PROFILE ENCOUNTERED	11
5.2	OBSERVABLE INDICATIONS OF CONTAMINATION.....	11
5.3	OBSTRUCTIONS	12
5.4	GROUNDWATER.....	12
5.5	LAND GAS.....	12
6.0	ENGINEERING PROPERTIES OF SOILS ENCOUNTERED.....	13
6.1	GENERAL	13
6.2	MADE GROUND.....	13
6.3	OAK ROCK SANDSTONE.....	13
7.0	SOIL CONTAMINATION RISK ASSESSMENT	15
7.1	TIER I HUMAN HEALTH SOIL RISK ASSESSMENT – GROUNDWORKERS DURING DEVELOPMENT	15
7.2	TIER I HUMAN HEALTH SOIL RISK ASSESSMENT – FUTURE SITE USERS.....	15
7.3	SOIL WASTE ASSESSMENT	17
8.0	GROUND GAS AND RADON GAS CONTAMINATION RISK ASSESSMENT	18
9.0	COAL MINING REGIME	20
10.0	CONCLUSIONS & RECOMMENDATIONS	22
10.1	SOIL CONTAMINATION.....	22
10.2	ASBESTOS	22
10.3	SOIL DISPOSAL.....	22
10.4	LAND GAS.....	22
10.5	RISK TO BURIED (WATER) SERVICES.....	22
10.6	COAL MINING REGIME.....	23
10.7	SITE PERSONNEL	23
10.8	OTHER MATTERS	23

LIST OF FIGURES

Figure 1	Site Location Plan
Figure 2	General Site Photographs
Figure 3	Proposed Development Plan
Figure 4	Exploratory Hole Location Plan
Figure 5	SPT v Depth Plot
Figure 6	Extract from Coal Authority Mining Report
Figure 7	Rotary Borehole Exploration Plan

TABLES

Table 1	Shear Strength Definitions
Table 2	Summary of Exploratory Holes Undertaken
Table 3	Summary of Laboratory Geotechnical Tests Undertaken
Table 4	Summary of Ground Conditions Encountered (Window Sampling)
Table 5	Summary of Ground Conditions Encountered (Rotary Open Drilling)
Table 6	Summary of Laboratory Geotechnical Test Results
Table 7	Summary of Guideline Values for Protection of Workers and the General Public During Development of Contaminated Land
Table 8	Soil Results Comparison with C4SL/S4UL Values
Table 9	Waste Classification of Soils
Table 10	Modified Ground Gas Classification Table

APPENDICES

Appendix 1	Exploratory Hole Logs
Appendix 2	Monitoring Results
Appendix 3	Geotechnical Testing Results
Appendix 4	Chemical Testing Results
Appendix 5	Soil Waste Assessment
Appendix 6	Report Limitations

1.0 EXECUTIVE SUMMARY

Appointment	A site investigation has been commissioned by Noriker Power (the 'Client') to examine ground conditions for a proposed battery storage facility on the land adjacent to Oaks Lane in Cundy Cross, Barnsley, Yorkshire.
The Investigation	The investigation comprised 5no. windowless sampling boreholes with associated sampling and in situ testing, ground gas monitoring, laboratory geotechnical and contamination testing. 6 no. rotary open boreholes were drilled to identify the location of a recorded abandoned mine shaft.
The Site	The site is located 1.1km north west of Stairfoot on Oaks Lane, Cundy Cross. The approximate National Grid Reference for this site is SE 36641 06107 (X: 436638 Y: 406109) with the closest postcode being S70 3ES. The site is recorded to be underlain by Made Ground consisting of colliery spoil. This is underlain by the Oaks Rock Sandstone.
Site History	Historically, the site has been used for mining purposes with a historical coal pit shaft present on the site.
Ground Conditions Encountered	The exploratory holes encountered Made Ground (to a maximum depth of 22.50m in a mineshaft) overlying weathered sandstone. Groundwater monitoring recorded groundwater levels between 4.54m and 4.55m bgl.
Contamination Assessment	Risk from contamination to groundworkers during development – Moderate Risk from soil contamination to future commercial end users – Low Soil Waste Assessment: 5 samples tested, 3 Hazardous, 2 Non-Hazardous Asbestos was not identified in any sample tested. Risk to groundwater – Moderate to Low Land Gas & Radon protection measures not required
Abandoned Coal Mineshaft	Rotary open hole drilling has proved the location of a coal mine shaft. The mineshaft should either be treated or a building standoff adopted.
<i>This sheet is intended to provide a summary only of the report. It does not provide a definitive engineering analysis for the purposes of costing or construction and is subject to the limitation of the agreed brief.</i>	

2.0 INTRODUCTION

2.1 Background

A site investigation has been commissioned by Noriker Power (the 'Client') to examine ground conditions for a proposed battery storage facility on the land adjacent to Oaks Lane in Cundy Cross, Barnsley, Yorkshire.

2.2 Previous Desk Study Reports

2.2.1 Earth Environmental & Geotechnical Ltd, Phase I GeoEnvironmental Desk Study (A3520/20), dated June 2020

A previous Coal Mining Risk Assessment (CMRA) concluded that based upon the available information, there are proven records of past underground mining and probable shallow coal mineworkings.

The shallowest proven record is for the mining of the Barnsley Main, a 0.91m thick coal seam last mined in 1897 at a depth of 147m.

The probable unrecorded shallow workings are associated with a coal mineshaft on site.

The coal mineshaft is an air shaft and is not recorded to have been treated. The record has a departure of 5m with the centre of the shaft at grid reference 436628 406089.

A mine gas incident is located 114.4m to the west of the site.

The published geological mapping records no superficial deposits under the site. Instead, the site is recorded to be located in an area of made ground associated with colliery spoil and landfill. The solid geology beneath the site is recorded to be the Oaks Rock Sandstone.

2.2.2 Earth Environmental & Geotechnical Ltd, Phase I GeoEnvironmental Desk Study (A3891/21), dated February 2021

The desk study highlighted that, historically, the site has previously been used for mining purposes with a historical coal pit shaft present on the site. The desk study also highlights that the site was temporarily used to for the storage of colliery spoil. A road has also been present in the south of the site.

At the time of the desk study, the site was an area of asphalt hardstanding.

The risk from soil contamination to commercial end users was considered to be **LOW**. The risk to controlled waters was concluded to be **LOW**. The risk from ground gas to end users was considered to be **LOW**.

An intrusive investigation was recommended in order to carry out geotechnical and contamination testing.

2.3 Terms of Reference

Earth Environmental and Geotechnical Ltd (EEG) have been commissioned by the Client, to undertake a Site Investigation of the site in accordance with proposal A3520/19 dated 9th March 2021. The objectives of this investigation are as follows:

- *Provide factual information on the work undertaken including sampling location plan, borehole logs, chemical and geotechnical testing.*
- *Tier 1 (semi-quantitative) risk assessment will be undertaken. This will compare the concentrations of soil, water and ground gas contaminants identified against current and appropriate published guidelines, in relation to identified receptors, e.g. existing/ future end users and site neighbours.*
- *Classification of soils for offsite disposal purposes.*
- *Assessment of shallow coal mining regime.*

2.4 Report Scope

This report presents a summary of the previous Phase I desk study information, full factual records of the site work carried out, the ground conditions encountered in the boreholes, the in situ and laboratory test results and the results of monitoring of ground installations. All information collected has been used to provide an interpretation of the ground conditions, with recommendations on geotechnical design and potential ground contamination risks for the proposed development.

2.5 Limitations of the Study

The report is written in the context of an agreed scope of work and budget and should not be used in a different context. New information, improved practices or changes in legislation may require a reinterpretation of the report in whole or in part. EEG reserve the right to amend either conclusions or recommendations in light of any further information that may become available. The report is provided for the sole use by the client and is confidential to them.

Recommendations within this report are also based on exploratory records and examination of samples and, where applicable, laboratory tests. No liability can be accepted for conditions not revealed by the boreholes and trial pits particularly at intervening locations. Whilst every effort is made to ensure accuracy of data supplied, all opinions expressed as to the spatial distribution of strata between sampling locations is for guidance only and no responsibility is accepted as to its accuracy.

3.0 SITE LOCATION & DESCRIPTION

The site is located 1.1km north west of Stairfoot on Oaks Lane, Cundy Cross. The approximate National Grid Reference for this site is SE 36641 06107 (X: 436638 Y: 406109) with the closest postcode being S70 3ES.

The site is approximately rectangular in shape with approximate maximum dimensions of 78m north to south by 38m east to west. Access was gained via Oaks Lane to the south of the site. The site encompasses an area 0.3hectares.

At the time of the investigation, the site was covered in hardstanding with markings for a car park.

Areas of fly-tipped materials were present across the site.

The surrounding area comprises of a business park consisting of several units including a steel construction works northwest and a building merchants to the north. The eastern side of the site is bound by a wooded area defined by a metal beam fence.

The site location is shown in Figure 1, below.

Figure 1: Site Location Plan



Site photographs are presented in Figure 2, below.

Figure 2: General Site Photographs

View across the site, looking north east



View across the site, looking south west



3.1 Proposed Development

It is understood that the client intends to construct a battery storage facility including substations,

transformers and engines alongside other energy features and welfare facilities.

The proposed development layout details are shown in Figure 3, below.

Figure 3: Proposed Development Plan



4.0 SITE INVESTIGATION

4.1 Exploratory Fieldwork

The fieldwork was carried out by EEG across two phases on the 26th March 2021 as well as the 27th to 28th April 2021 and comprised:

- Five window sample boreholes (designated WS01 to WS05 inclusive) were each sunk to a maximum depth of 5.00m below existing ground level). Window sampler boring is carried out with a small, track-mounted rig, which uses a chain-driven trip hammer to drive sampling tubes or penetrometers into the ground. These tools are coupled to the anvil of the hammer by solid drill rods. Sampling tubes comprise “windowless samplers”, which are plain sampler tubes in which a continuous disturbed sample is recovered within a semi-rigid plastic liner. In order to reduce friction within the borehole, sampling tubes of progressively smaller diameter are used as the borehole depth increases. Sampler diameters generally range from between approximately 90mm to 50mm. Standard Penetration Tests (SPTs) were undertaken in the boreholes in accordance with BS EN ISO 22476-3. Groundwater observations were noted where possible. These observations relate to the time of the investigation only, and do not necessarily reflect seasonal fluctuations. Window sample borehole logs are included in Appendix 1.
- 50mm diameter standpipes were installed in all window sample boreholes to depths of between 2.00m and 5.00m below ground level. Installation and backfill details are shown with the appropriate borehole log sheet. EEG carried out groundwater/ground gas monitoring in standpipes after the fieldwork period, the results of which are presented in Appendix 2.
- Six rotary boreholes (designated RO1 to RO6) were drilled to depths of between 6.30m and 22.5m below existing ground level, using a track-mounted rotary open holing rig. The boreholes were initially drilled through overburden using a rock roller down the hole hammer, producing a 112mm nominal diameter hole. Water was used as the flushing medium. Exploratory Hole logs are included in Appendix 1.

Exploratory hole locations were chosen prior to the ground investigation by EEG based on the proposed development layout and avoiding known services.

Each exploratory location was scanned using a Cable Avoidance Tool (CAT) in order to locate unrecorded underground services, and the exploratory locations were repositioned if necessary.

On completion, samples recovered from the site were taken to specialist laboratories for chemical and geotechnical testing.

Soil samples of approximately 1.25kg were recovered in amber jars for volatile analysis and plastic tubs for general analysis. All the samples were labelled and stored in cool boxes prior to being collected by courier at the end of the day for delivery to the Eurofins Chemtest laboratory.

If collection was not possible the same day then samples were stored in the sample storage fridge at the EEG offices below 4°C.

Samples were tracked using appropriate Chain of Custody forms provided by Eurofins Chemtest.

It should be noted that hexavalent chromium soil is analysed using the USEPA recommended method of alkaline leach. This method limits chromium (VI) reduction to chromium (III).

All site investigation work was supervised full time by a representative of EEG. The logging of soils and rocks has been carried out in accordance with BS5930^(2015+A1:2020) except where superseded by the soil and rock description methodology in BS EN14688-1⁽²⁰⁰²⁾, BS EN 14688-2⁽²⁰⁰⁴⁾ and BS EN 14689-1⁽²⁰⁰³⁾.

All sampling locations were surveyed by use of a hand held Trimble GeoXH GPS instrument that is capable of surveying to an accuracy of less than 10mm depending on satellite coverage, proximity to trees and building structures.

The descriptive terminologies such as firm, etc formerly used within older versions of BS5930 to describe strength now solely relate to consistency. Shear strength is now defined related to results obtained in the field (using a hand vane for example) or in the laboratory (from triaxial tests), as detailed in Table 1, below.

Table 1: Shear Strength Definitions

Term based on measurement	Undrained Strength (c_u) definition in kN/m ² (from BS EN ISO 14688-2: 2004, 5.3, Table 5)
Extremely Low Strength	<10
Very Low Strength	10 to 20
Low Strength	20 to 40
Medium Strength	40 to 75
High Strength	75 to 150
Very High Strength	130 to 300
Extremely High Strength	300 to 600

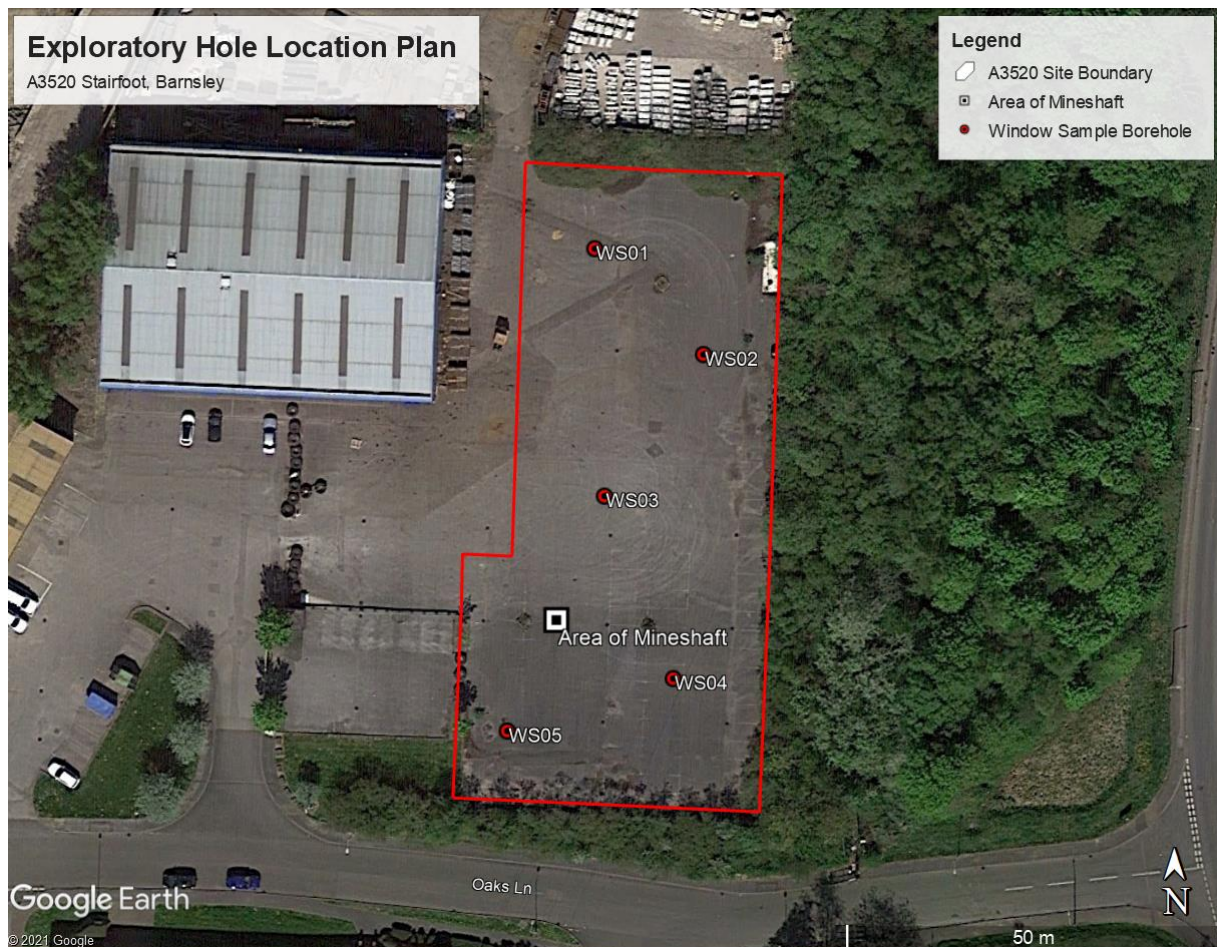
A summary of exploratory holes undertaken during the investigation are presented in Table 2, below.

Table 2: Summary of Exploratory Holes Undertaken

Hole	Type*	Depth (m)	Date Started	Date Finished	Easting (m)	Northing (m)	Backfill Details**
WS01	WS	2.00	26/03/2021	26/03/2021	436633	406137	SP
WS02	WS	5.00	26/03/2021	26/03/2021	436647	406123	SP
WS03	WS	2.00	26/03/2021	26/03/2021	436634	406105	SP
WS04	WS	2.00	26/03/2021	26/03/2021	436643	406081	SP
WS05	WS	5.00	26/03/2021	26/03/2021	436622	406075	SP
RO1	RO	7.70	27/04/2021	27/04/2021	436628	406089	BG
RO2	RO	9.30	27/04/2021	27/04/2021	436627	406089	BG
RO3	RO	22.50	27/04/2021	28/04/2021	436627	406090	BG
RO4	RO	10.50	28/04/2021	28/04/2021	436627	406091	BG
RO5	RO	6.30	28/04/2021	28/04/2021	436627	406092	BG
RO6	RO	9.00	28/04/2021	28/04/2021	436627	406093	BG
*WS = Window Sample Borehole, RO = Rotary Open Borehole							
**SP = Standpipe, BG = Bentonite Grout							

An Exploratory Hole Location Plan is presented as Figure 4, below. A detailed plan of the rotary boreholes can be found in Section 9 as Figure 7.

Figure 4: Exploratory Hole Location Plan



4.2 Laboratory Testing

4.2.1 Geotechnical Testing

A programme of laboratory testing was carried out on samples taken from the various strata to assist in classification and determine the engineering properties of the materials underlying the site. The tests were scheduled by EEG and carried out by Murray Rix. The test procedures used were generally in accordance with the methods described in BS1377:1990. Details of the specific tests used in each case are given below:

Table 3: Summary of Laboratory Geotechnical Tests Undertaken

TEST	STANDARD	No.
Sulphate content of 2:1 soil: water extract	BS1377:1990 Part 3, Clause 5	4
pH value	BS1377:1990 Part 3, Clause 9	4

The results of the laboratory geotechnical tests are discussed in Section 6 and included in Appendix 3.

4.2.2 Environmental Testing

The environmental chemistry of the ground was investigated by specialist chemical analysis of selected samples, scheduled by EEG and carried out by Eurofins Chemtest a UKAS and MCERTS accredited laboratory.

Chemical analyses were carried out on five soil samples and were submitted for the following suite of determinants:

Asbestos Screen, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc, Cyanide, Phenol, Sulphate (SO₄), Sulphide, pH, Soil Organic Matter, Extractable Petroleum Hydrocarbons (EPH), Speciated Petroleum Hydrocarbons (TPH) and Speciated Polyaromatic Hydrocarbons (PAH).

The results of the laboratory contamination tests are discussed in Section 7 and included in Appendix 4.

5.0 GROUND CONDITIONS ENCOUNTERED

5.1 Soil Profile Encountered

BGS digital mapping shows the site is underlain by artificial deposits of Made Ground, associated with colliery spoil. No superficial deposits are recorded. The solid geology beneath the site is recorded to be Oaks Rock Sandstone, comprising sandstone. The sequence of strata encountered beneath the site was as follows:

- **Made Ground (Colliery Spoil)** – Variable Made Ground was encountered in all exploratory hole locations, comprising:
 - Clayey gravelly sand containing gravel of carbonaceous fragments, ash, sandstone and mudstone.
 - Sandy gravel of brick, limestone, asphalt, plastic, metal, carbonaceous fragments, sandstone, mudstone.
- **Oaks Rock Sandstone Formation** - was encountered in exploratory holes WS01, WS03, WS04, RO1, RO2 and RO6. Comprising:
 - Light brown, yellowish brown and dark grey weathered sandstone.

The depths of the various materials encountered in the exploratory holes are summarised in Tables 4 and 5, overleaf.

5.2 Observable Indications of Contamination

During the ground investigation, variable Made Ground gravels were observed in the exploratory holes.

No other visual or olfactory evidence of contamination was observed.

Table 4: Summary of Ground Conditions Encountered (Window Sampling)

Hole	Depth to Stratum (m)				Ground-water (m bgl)
	MADE GROUND			OAKS ROCK SANDSTONE	
	Asphalt	Sand	Gravel	Weathered Sandstone	
WS01	GL – 0.10	-	0.10-2.00	2.00+	-
WS02	GL – 0.10	-	0.10-5.00+	-	-
WS03	GL – 0.10	1.10-1.97	0.10-1.10	1.97-2.00+	-
WS04	GL – 0.10	0.95 – 1.90	0.10-0.95	1.90 – 2.00	-
WS05	GL – 0.07	1.00 – 5.00+	0.07-1.00	-	4.00

Table 5: Summary of Ground Conditions Encountered (Rotary Open Drilling)

Hole	Depth to Stratum (m)		Ground-water (m bgl)
	MADE GROUND	OAKS ROCK SANDSTONE	
RO1	GL – 7.20	7.20 – 7.70	-
RO2	GL – 7.80	7.80 – 9.30	-
RO3	GL – 22.50	-	-
RO4	GL – 10.50	-	-
RO5	GL – 6.30	-	-
RO6	GL – 8.40	8.40-9.00	-

5.3 Obstructions

The borehole RO5 was terminated due to a refusal while drilling on a possible metal obstruction.

5.4 Groundwater

Groundwater was encountered during the fieldwork in WS05 at 4.00m.

Subsequent monitoring in standpipes indicate ground water levels between 4.54m and 4.55m bgl (WS05).

5.5 Land Gas

Ground gas monitoring was undertaken using a Geotechnical Instruments GA5000 in accordance with the monitoring protocol outlined in CIRIA C665.

Results obtained during two monitoring visits on 1st and 8th April 2021 indicated an absence of Methane (CH₄), Carbon Dioxide (CO₂) levels ranging from 0.1% to 5.3% by volume, and Oxygen (O₂) levels ranging from 13.0% to 20.3% by volume. An absence of gas flow rates were recorded, together with atmospheric pressures of 1018mb and 1021mb.

It should be noted that the concentrations and levels of mobile liquid and gaseous materials are likely to vary with time. The results obtained may therefore be representative of the conditions only at the time of sampling.

6.0 ENGINEERING PROPERTIES OF SOILS ENCOUNTERED

6.1 General

The following sections discuss the engineering properties of the strata encountered, based on results of in situ testing and laboratory testing obtained during this investigation.

The results of laboratory geotechnical testing are summarised in Table 6, below.

Table 6: Summary of Laboratory Geotechnical Test Results

Location	Depth (m)	Strata*	CLASSIFICATION											STRENGTH	CHEMICAL	
			Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	PSD Cobbles (%)	PSD Gravel (%)	PSD Sand (%)	PSD Silt (%)	PSD Clay (%)	Bulk Density Mg/m ³	Dry Density (Mg/m ³)	Shear Strength (kN/m ²)	pH Value	Water Soluble Sulphate SO ₄ (mg/l)
WS01	1.70	MG	-	-	-	-	-	-	-	-	-	-	-	-	7.2	300
WS02	3.00	MG	-	-	-	-	-	-	-	-	-	-	-	-	6.9	430
WS03	1.50	MG	-	-	-	-	-	-	-	-	-	-	-	-	7.1	370
WS04	1.20	MG	-	-	-	-	-	-	-	-	-	-	-	-	7.0	360
WS05	1.90	MG	-	-	-	-	-	-	-	-	-	-	-	-	7.1	410

MG = Made Ground

6.2 Made Ground

Made Ground was encountered in all exploratory hole locations between ground level and a maximum depth of 22.50m below ground level (RO3) and varied between exploratory hole locations.

Due to the depths encountered, SPT tests were carried out in the Made Ground material. The tests resulted in SPT N values of between 5 and 43, as shown on the SPT v Depth Plot, in Figure 5 (overleaf). These results suggest the Made Ground is loose to dense.

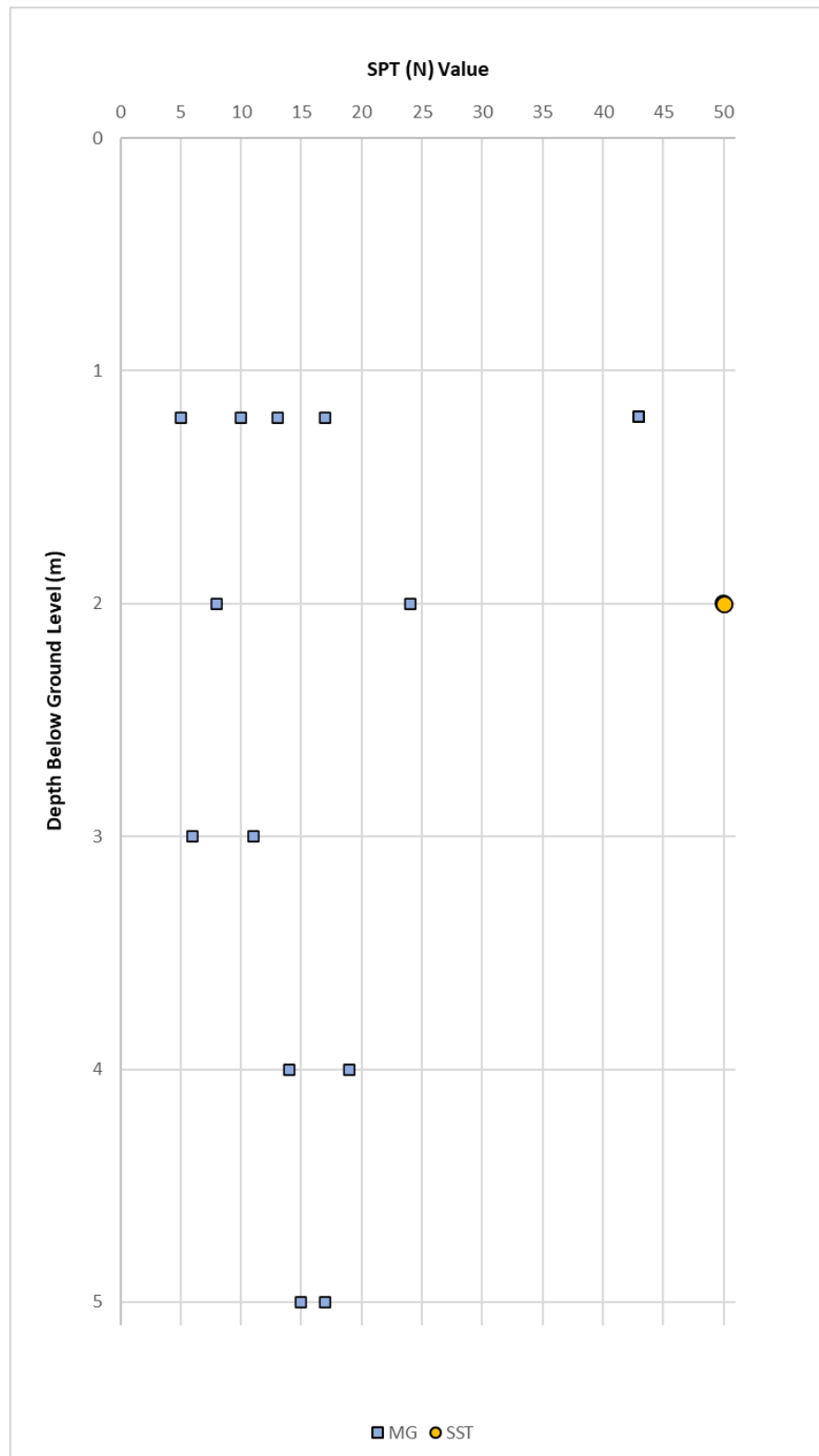
The **water-soluble sulphate** content of four Made Ground samples ranged from 300 - 430mg/l SO₄, with a **pH value** of 6.9 - 7.2.

6.3 Oak Rock Sandstone

Sandstone was encountered in exploratory holes WS01, WS03, WS04, RO1, RO2 and RO6.

SPT tests carried out in the clay resulted in **SPT N values** of 50, as shown on the SPT v Depth Plot, in Figure 5 (overleaf).

Figure 5: SPT v Depth Plot



7.0 SOIL CONTAMINATION RISK ASSESSMENT

7.1 Tier I Human Health Soil Risk Assessment – Groundworkers During Development

To assess the risk of soil contamination to construction and ground workers during development, guidelines from the HSE Document 'Protection of workers and the general public during development of contaminated land'⁽¹⁹⁹¹⁾ are used. The document assesses soil contamination test results and classifies the site as being uncontaminated or contaminated with varying degrees of contamination from 'slight' to 'unusually heavy'. The guideline values and laboratory test results are summarised in the following table:

Table 7: Summary of Guideline Values for Protection of Workers and the General Public During Development of Contaminated Land

Contaminant	Typical Values* for:					Test Results	Class
	Uncontaminated Soils	Slight Contamination	Contaminated	Heavy Contamination	Unusually Heavy Contamination		
	Class A	Class B	Class C	Class D	Class E		
pH (alkaline)	7 - 8	8 - 9	9 - 10	10 - 12	12	8.7 - 11.1	B - D
Arsenic	0 - 30	30 - 50	50 - 100	100 - 500	500	23 - 65	A - C
Cadmium	0 - 1	1 - 3	3 - 10	10 - 50	50	0.93 - 4.7	A - C
Chromium	0 - 100	100 - 200	200 - 500	500 - 2500	2500	63 - 1200	A - D
Copper	0 - 100	100 - 200	200 - 500	500 - 2500	2500	40 - 170	A - B
Lead	0 - 500	500 - 1000	1000 - 2000	2000 - 1%	1.0%	180 - 1800	A - C
Mercury	0 - 1	1 - 3	3 - 10	10 - 50	50	0.32 - 1.40	A - B
Nickel	0 - 20	20 - 50	50 - 200	200 - 1000	1000	57 - 430	C - D
Zinc	0 - 250	250 - 500	500 - 1000	1000 - 5000	5000	240 - 620	A - C
Boron	0 - 2	2 - 5	5 - 50	50 - 250	250	0.80 - 4.0	A - B
Selenium	0 - 1	1 - 3	3 - 10	10 - 50	50	< 0.20 - 1.2	A - B
Barium	0-500	500-1000	1000-2000	2000-1.0%	1.0%	160 - 450	A
Beryllium	0 - 5	5 - 10	10 - 20	20 - 50	50	< 1.0 - 1.4	A
Vanadium	0 - 100	100 - 200	200 - 500	500 - 2500	2500	65 - 490	A - C
Sulphate	0 - 2000	2000 - 5000	5000 - 1%	1% - 5%	5.05%	180 - 930	A
Sulphide	0 - 10	10 - 20	20 - 100	100 - 500	500	7.9 - 98	A - C
Cyanide (free)	0 - 1	1 - 5	5 - 50	50 - 100	100	< 0.50	A
Phenol	0 - 2	2 - 5	5 - 50	50 - 250	250	< 0.30	A

Based on the above results the soils are ranging from uncontaminated to heavily contaminated. Therefore, there is a **MODERATE** potential risk from soil contamination to construction workers, ground workers and members of the public during construction. Appropriate measures, such as PPE, site health plans, and appropriate disposal of material arisings will be required to mitigate this risk.

7.2 Tier I Human Health Soil Risk Assessment – Future Site Users

The following section provides a Human Health Soil Assessment for future site users. Based on the proposed development type, the following section compares the results of contamination analyses to commercial types of end development as specified by Defra/LQM/CIEH. As part of the contamination assessment, the chemical results obtained by EEG have been screened against accepted compliance criteria, namely:

- Defra C4SL Health Criteria Values (March 2014), where available; and
- Tier 1 assessment values - based on LQM/CIEH Sutable 4 Use Levels⁽²⁰¹⁵⁾ (S4ULs).

The contaminated land guidance has recently changed the evaluation of risk from 'minimal' (SGVs) to 'low' (referred to as Lowest Level of Toxicological Concern (LLTCs)). The policy

companion document and supporting letter by DEFRA, states that C4SLs 'could be used under the planning regime, as well as within Part 2A'.

Based on these comments EEG considers the justifications and assumptions used to generate 'low' risk are suitable for the planning regime.

Where no C4SLs have been generated EEG will use the LQM S4ULs. Similar assumptions and land uses to C4SLs have been used. However, toxicological information has been based on 'minimal risk' as per previous guidelines and assumptions. If contaminants are not present as C4SLs or S4ULs then LEEG will use CL:AIRE GACs. These follow the 'minimal' risk principal and more stringent exposure parameters and will be conservative.

EEG consider the main risk drivers for PAHs are benzo(a)pyrene (B(a)P) and naphthalene. This is due to B(a)P possibly being a carcinogen and most toxic of the PAHs and naphthalene the most volatile and soluble. The new C4SLs indicate B(a)P as a surrogate marker for carcinogenic PAHs, since the risk from other non-carcinogenic PAHs are considered negligible. Naphthalene will be treated separately using the LQM S4ULs.

The soil chemical testing results are summarised in Table 8, below.

Table 8: Soil Results Comparison with C4SL/S4UL Values

Determinand	C4SL/S4UL Levels Commercial (mg/kg)	WS01 0.40m MG	WS02 0.60m MG	WS03 0.25m MG	WS04 0.70m MG	WS05 0.50m MG	No of Exceedances
Metals							
Arsenic	640	41	65	38	27	23	0
Beryllium	12	< 1.0	1.4	< 1.0	< 1.0	< 1.0	0
Boron	240000	0.80	2.2	0.95	4.0	3.1	0
Cadmium	410	3.1	1.4	4.7	0.93	3.3	0
Chromium	8600	600	63	290	320	1200	0
Chromium VI	49	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
Copper	68000	170	110	40	49	100	0
Lead	2300	400	180	270	400	1800	0
Mercury	58	1.2	0.64	0.32	0.75	1.4	0
Nickel	980	190	57	79	110	430	0
Selenium	12000	< 0.20	1.2	< 0.20	0.38	< 0.20	0
Vanadium	9000	320	65	82	180	490	0
Zinc	730000	500	260	310	240	620	0
Petroleum Hydrocarbons							
Benzene	98	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0
Toluene	56000	0.0075	0.013	0.0063	0.009	0.0055	0
Ethylbenzene	5700	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0
o-xylenes	6600	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0
m-xylenes	62000	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0
p-xylenes	5900	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0
Aliphatic EC >5-6	3200	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0
Aliphatic EC >6-8	7800	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0
Aliphatic EC >8-10	2000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0
Aliphatic EC >10-12	9700	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0
Aliphatic EC >12-16	59000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0
Aliphatic EC >16-21	1600000	< 1.0	13	< 1.0	4.7	< 1.0	0
Aliphatic EC >21-35	1600000	44	78	240	30	9.0	0
Aromatic EC >5-7	26000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0
Aromatic EC >7-8	56000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0
Aromatic EC >8-10	3500	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0
Aromatic EC >10-12	16000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0
Aromatic EC >12-16	26000	< 1.0	42	< 1.0	< 1.0	< 1.0	0
Aromatic EC >16-21	28000	< 1.0	120	95	22	< 1.0	0
Aromatic EC >21-35	28000	250	670	970	190	39	0

Determinand	C4SL/S4UL Levels Commercial (mg/kg)	WS01 0.40m MG	WS02 0.60m MG	WS03 0.25m MG	WS04 0.70m MG	WS05 0.50m MG	No of Exceedances
Polycyclic Aromatic Hydrocarbons							
Naphthalene	190	< 0.10	1.8	< 0.10	14	< 0.10	0
Acenaphthylene	83000	< 0.10	0.60	< 0.10	10	< 0.10	0
Acenaphthene	84000	< 0.10	0.19	< 0.10	2.5	< 0.10	0
Fluorene	63000	< 0.10	0.48	< 0.10	9.5	< 0.10	0
Phenanthrene	22000	0.35	4.5	0.20	58	0.85	0
Anthracene	520000	0.11	1.0	< 0.10	14	0.24	0
Fluoranthene	23000	0.88	6.5	0.21	44	1.2	0
Pyrene	54000	0.91	5.6	0.17	35	1.0	0
Benzo(a)anthracene	170	0.56	3.1	< 0.10	14	0.52	0
Chrysene	350	0.50	2.9	< 0.10	12	0.64	0
Benzo(a)pyrene	76	0.62	3.1	< 0.10	12	0.58	0
Benzo(b)fluoranthene	44	0.87	4.1	< 0.10	15	0.73	0
Benzo(k)fluoranthene	1200	0.35	1.6	< 0.10	5.4	0.32	0
Indeno(1,2,3-cd)pyrene	500	0.53	2.4	< 0.10	8.6	< 0.10	0
Dibenz(a,h)anthracene	3.5	0.15	0.51	< 0.10	1.4	< 0.10	0
Benzo(ghi)perylene	3900	0.52	2.0	< 0.10	7.8	< 0.10	0
Phenols							
Phenol	760	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	0
MG = Made Ground							
Concentrations in red are above the assessment criteria based on Commercial End Use.							

Based on the above table, no samples tested contained concentrations of contaminants in exceedance of assessment criteria values relevant to a commercial end use.

Asbestos fibres and fragments were not identified in any of the samples tested during this investigation.

See Appendix 4 for full chemical testing details.

7.3 Soil Waste Assessment

An assessment of the disposal characteristics of the soil in accordance with Environment Agency guidance WM3.1, edition of June 2018, "Guidance on the classification and assessment of waste" has been carried out on soils recovered from the site, using HazWasteOnline. The results are summarised in Table 9, below and presented in full in Appendix 5.

Table 9: Waste Classification of Soils

Location	Depth (m bgl)	WM3.1 Classification	Comments
WS01	0.60	Hazardous	Elevated Zinc
WS02	0.30	Non-Hazardous	Elevated TPH
WS03	1.00	Hazardous	-
WS04	2.30	Non-Hazardous	-
WS05	0.20	Hazardous	Elevated Chromium, Lead, Nickel and Zinc

Table 9 above shows that two of the soil samples collected from the window sample boreholes were classified as **Non-Hazardous** in accordance with WM3.1. Further Waste Acceptance Criteria (WAC) testing may prove that this material is acceptable as inert waste.

The other three soil samples collected from the window sample boreholes were classified as **Hazardous** in accordance with WM3.1 due to elevated concentrations of Chromium, Lead, Nickel and Zinc.

8.0 GROUND GAS AND RADON GAS CONTAMINATION RISK ASSESSMENT

8.1 Radon Gas

The site is located within multiple Radon Affected Areas as defined by the Health Protection Agency, as between >1% and 3% of properties are above the Action Level of exposure. However, radon protection measures are not necessary.

8.2 Analyses of Monitoring Results

The potential risk associated with gases being generated in the ground (whether from natural or man-made sources) depends on the concentrations of gas and its flow rate to the surface. These factors are assessed by monitoring of the gas installations in the boreholes. The variable nature of gas generation and the effect of barometric pressure on gas flow, means that the volume of gas potentially reaching the ground surface is normally inconsistent over time.

Results obtained during two monitoring visits on 1st and 8th March 2021 indicated an absence of Methane (CH₄), Carbon Dioxide (CO₂) levels ranging from 0.1% to 5.3% by volume, and Oxygen (O₂) levels ranging from 13.0% to 20.3% by volume. Gas flows of 0.0l/hr to 18.7l/hr were recorded, together with atmospheric pressures of 1018mb and 1021mb.

Two gas monitoring visits have been completed by Earth Environmental & Geotechnical Ltd. The monitoring visits were conducted on the 1st and 8th April 2021. The results recorded an absence of methane (CH₄) and carbon dioxide (CO₂) levels of 0.1% to 5.3% v/v. Oxygen concentrations of between 13.0% to 20.3% v/v were also recorded.

An absence of gas flow rates were recorded. Due to the limit of detection of the flow meter a flow rate of 0.1l/hr has been adopted for the below calculations. Atmospheric pressure was recorded to be between 1018mb and 1021mb.

Full results of the monitoring visits are presented in Appendix 2.

Table 10 overleaf, adapted from Table 1 of the technical paper Risk and Reliability in Gas Protection Design by Card et al. 2019, shows a summary of the current UK practice with respect to appropriate gas protection measures based upon a Gas Screening Value (GSV).

A GSV for the site has been obtained by multiplying the maximum concentration of gas by the maximum flow rate, which represents worst-case scenario conditions.

- Carbon dioxide: maximum flow rate = 0.1l/hr, max concentration = 5.3%
- Methane: maximum flow rate = 0.1l/hr, max concentration = 0.0%.

Based on the above figures, the GSV is calculated as:

- **Carbon dioxide:** $GSV = 0.1 \times 0.3 / 100 = 0.0053 \text{ litres/hr}$
- **Methane:** $GSV = 0.1 \times 0.0 / 100 = 0.0000 \text{ litres/hr}$

The above results suggest the site can be given a Gas Regime A classification, i.e. '**NEGLIGIBLE to VERY LOW risk**', in accordance with Table 10, overleaf.

Table 10: Modified Ground Gas Classification Table (Risk and Reliability in Gas Protection Design, 2019)

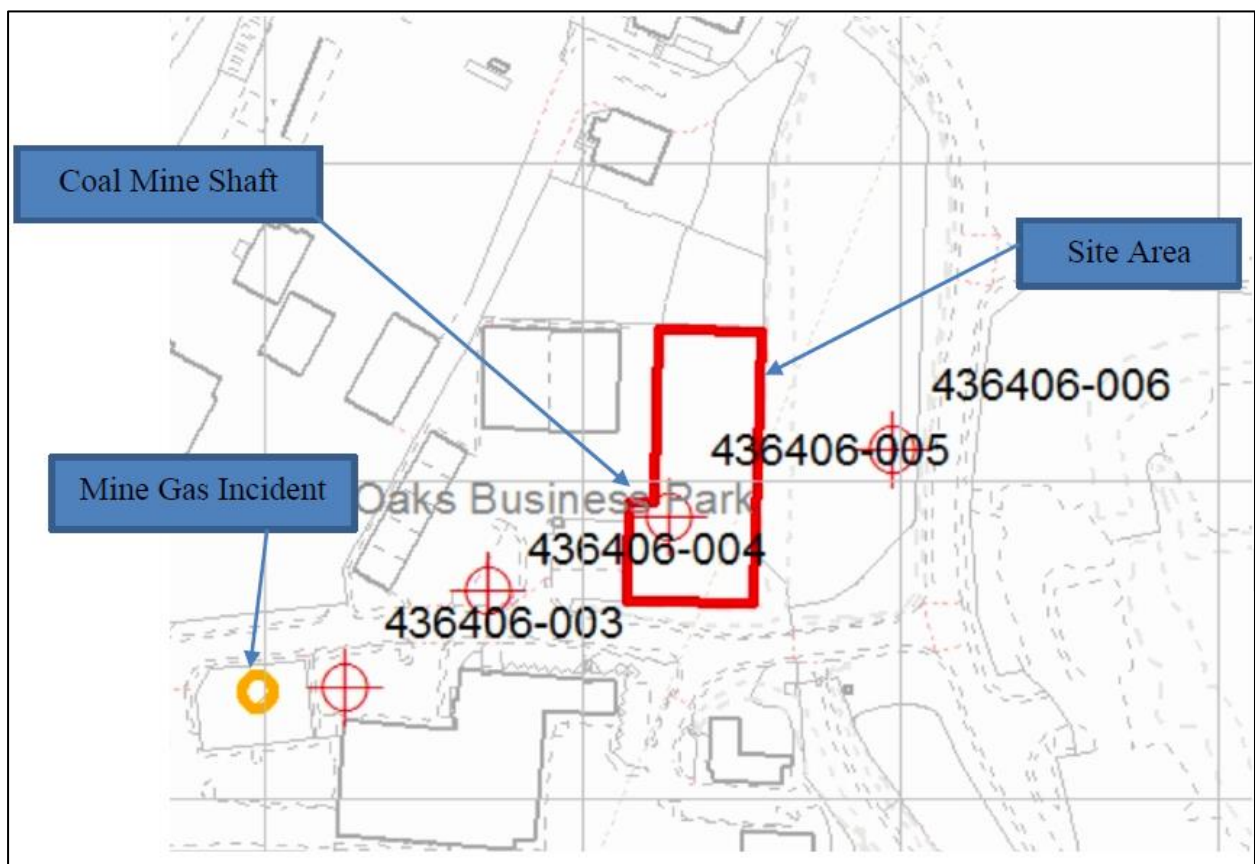
Characteristic Situation	Pathway vertical permeability (m/s)	GSV CH ₄ (l/hr)	GSV CO ₂ (l/h)	GSV oxygen deficient gas (Nitrogen) (l/h)	Maximum borehole gauge pressure (Pa)	Limiting sustained gas concentrations in unsaturated zone within 10m of surface	Limitations	Risk level
Gas Regime A	$\leq 1 \times 10^{-7}$ $1 \times 10^{-7} < k < 1 \times 10^{-5}$ $\geq 1 \times 10^{-5}$	< 2 < 1.5 < 1.3	< 12 < 9 < 7	< 217 for all permeability (care when using this value. Usually oxygen deficient gas emissions are sporadic, and monitoring should cover suitable conditions)	500 (50mm water) – ASTM (2016)	$< 30\%$ methane $< 21\%$ carbon dioxide Not applicable where municipal solid waste landfills, mine workings or similar credible sources with credible pathways for migration are present. Not applicable where potential ground gas reservoirs are connected to buildings.	No limit on oxygen depletion because it is widespread in natural soils and fill materials due chemical and biological processes Consider whether pressurisation could realistically occur and over what timescales where potential ground gas reservoirs are connected to buildings.	Negligible to very low
Gas Regime B	$\leq 1 \times 10^{-7}$ $1 \times 10^{-7} < k < 1 \times 10^{-5}$ $\geq 1 \times 10^{-5}$	≤ 10 ≤ 7.5 ≤ 6	< 140 < 100 < 85	No Limit	No limit	-		Low to moderate
Gas Regime C	$\leq 1 \times 10^{-7}$ $1 \times 10^{-7} < k < 1 \times 10^{-5}$ $\geq 1 \times 10^{-5}$	≤ 100 ≤ 75 ≤ 60	No limiting values	No Limit	No limit	No limit	Where oxygen deficient ground gas or carbon dioxide is likely to be emitted from shafts, fractured rock or ground where $k > 1 \times 10^{-4}$ m/s undertake DQRA	Moderate to high
Gas Regime D	-	N/A	N/A	N/A	-	-	DQRA required	Very high

9.0 COAL MINING REGIME

Six rotary open hole boreholes were drilled in an attempt to locate an abandoned mine shaft that is recorded to be located on site. The shaft in question was 436406-005, recorded by the Coal Authority to have a departure of 5m and to have not been treated. It has an estimated diameter of 2.5m.

Figure 6 (below) presents an extract from the Coal Authority Mining Report that shows the locations of the on-site and nearby shafts.

Figure 6: Extract from Coal Authority Mining Report

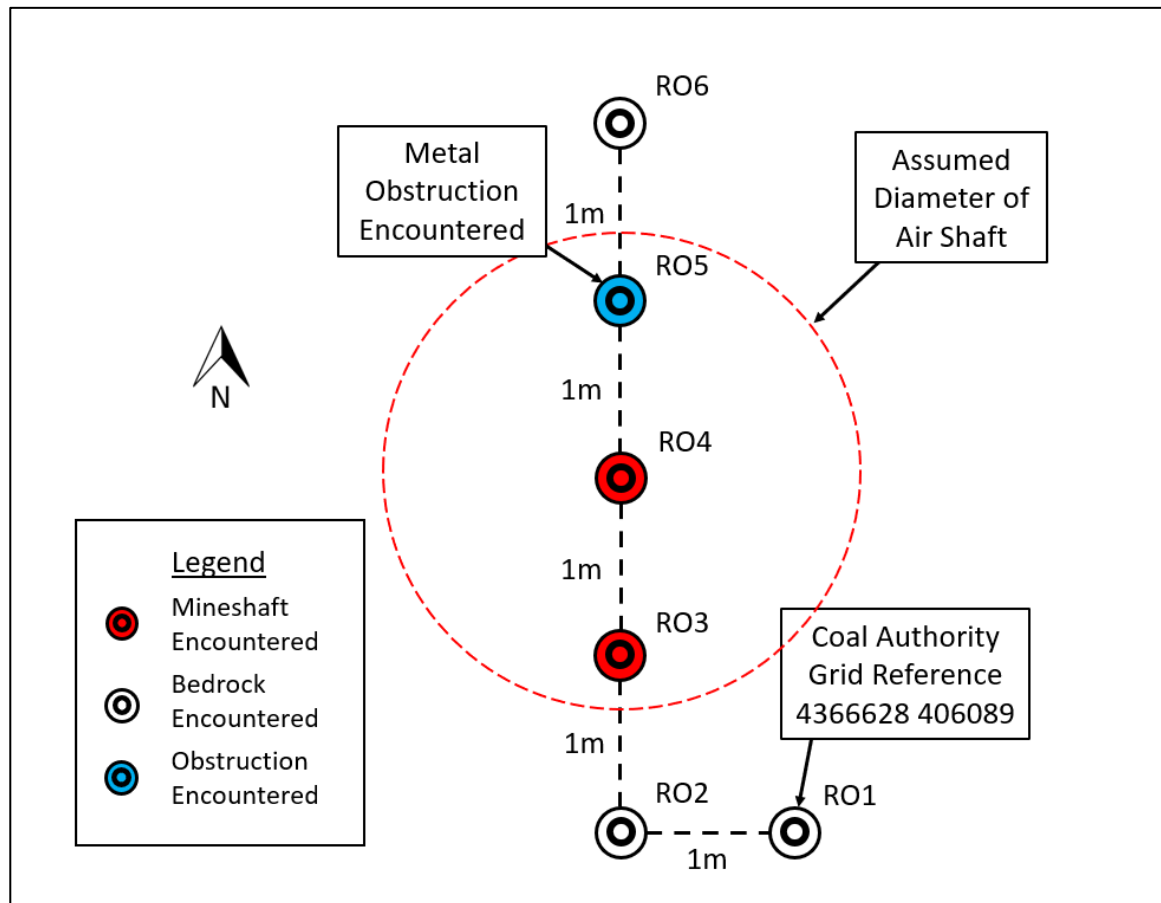


In general, a sequence of Made Ground was encountered from ground level until bedrock was encountered in this area of the site at 7.20m (RO1) to 8.40m bgl (RO6). The mineshaft was encountered in RO3 and RO4 with RO5 encountering a probable metal obstruction at 6.30m. The locations of the boreholes are summarised in Figure 7 overleaf.

The boreholes proved that the air shaft is located within the 5m departure of the recorded grid reference, with RO3 encountering the shaft only 1m north and 1m west of the grid reference. The diameter of the shaft appears to be similar to the estimated diameter given by the Coal Authority of 2.5m. The air shaft was proved by the presence of Made Ground much deeper (to 22.50m bgl) than the surrounding bedrock depths. The deep borehole (RO3) had to be terminated due

the loss of drilling flush into Made Ground causing the drilling rods to become tight from the build-up of chippings in the borehole.

Figure 7: Rotary Borehole Exploration Plan



10.0 CONCLUSIONS & RECOMMENDATIONS

10.1 Soil Contamination

There is a moderate potential risk from soil contamination to construction workers and ground workers during development, and appropriate measures such as PPE, site health plans, appropriate disposal of material arisings will be required to mitigate this risk. The groundworks contractor must provide a soil management plan including methods of dealing with unanticipated soil contamination encountered during groundworks.

As discussed in the above sections, the contamination tests indicate generally low concentrations of the potential contaminants in relation to a commercial end use.

It is therefore considered that, based on the information available, remedial action should not generally be required at this site.

10.2 Asbestos

Asbestos fibres and fragments were not detected in any of the samples tested during this investigation.

10.3 Soil Disposal

Soils should be disposed of at a suitable site, registered to take the levels of contamination encountered.

Three of the soil samples collected have been classified as Hazardous (See Table 13) for the purpose of off-site disposal in accordance with Environment Agency guidance WM3.1.

The remainder of the soils collected from the site have been classified as Non-Hazardous.

Further Waste Acceptance Criteria testing may prove that these materials are acceptable as inert waste.

10.4 Land Gas

Based on results of the gas monitoring, the risk of ground gas is considered to be negligible to very low and protection against the ingress of ground gas will not be required at the site.

10.5 Risk to Buried (Water) Services

It is considered that, due to the absence of any significant hydrocarbon, VOC and BTEX contamination, standard materials should be acceptable for new water pipes. Further advice should be sought from the local water company.

Previous guidance on buried water pipes was contained in Water Regulations Advisory Scheme (WRAS) Guidance Note No. 9-04-03⁽²⁰⁰²⁾, however this has been superseded by the UK Water Industry Research Report 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' Ref 10/WM/03/21 (January 2011).

10.6 Coal Mining Regime

Six rotary open boreholes were drilled to a maximum depth of 22.50m bgl in an attempt to locate a recorded abandoned mine shaft. The shaft was located 1m north and 1m west of the recorded grid reference and was proven to a depth of 22.50m. with the surrounding bedrock being encountered at 7.20m to 8.40m bgl. Boreholes were also drilled across the diameter of the shaft which proved the shaft to be of a similar diameter to that of the Coal Authorities estimated diameter of 2.50m.

Depending on the final site layout it may be necessary to treat the mineshaft. Alternatively it could be possible to incorporate a building structure standoff from the mineshaft. The standoff should be approximately 15m in diameter and is dependent on the depth to rockhead.

10.7 Site Personnel

As with all construction sites, personnel working on the site during the construction period should be encouraged to maintain a high standard of personal hygiene and on-site washing facilities should be available.

10.8 Other Matters

Due diligence is required during the construction period, and should any further evidence of contamination be found, appropriate investigation and / or action should be taken. The significance of any contamination not discovered by this investigation is outside the scope of this report.

APPENDIX 1

EXPLORATORY HOLE LOGS

APPENDIX 2

MONITORING RESULTS

APPENDIX 3

GEOTECHNICAL TESTING RESULTS

APPENDIX 4

CHEMICAL TESTING RESULTS

APPENDIX 5

SOIL WASTE ASSESSMENT

APPENDIX 6

REPORT LIMITATIONS

REPORT LIMITATIONS

This contract was completed by Earth Environmental & Geotechnical Ltd on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget and staff resources allocated to the project.

Other than that, expressly contained in the above paragraph, Earth Environmental & Geotechnical Ltd provides no other representation or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Earth Environmental & Geotechnical Ltd.

If a third party relies on this report, it does so wholly at its own and sole risk and Earth Environmental & Geotechnical Ltd disclaims any liability to such parties.

It is Earth Environmental & Geotechnical Ltd understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was an important factor in determining the scope and level of the services. Should the purpose for which the report is used, or the proposed use of the site change, this report will no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without Earth Environmental & Geotechnical Ltd review and advice shall be at the client's sole and own risk.

The report was written in 2021 and should be read in light of any subsequent changes in legislation, statutory requirements and industry best practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Earth Environmental & Geotechnical Ltd. In the absence of such written advice of Earth Environmental & Geotechnical Ltd, reliance on the report in the future shall be at the client's own and sole risk. Should Earth Environmental & Geotechnical Ltd be requested to review the report in the future, Earth Environmental & Geotechnical Ltd shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between Earth Environmental & Geotechnical Ltd and the client.

The observations and conclusions described in this report are based solely upon the services that were provided pursuant to the agreement between the client and Earth Environmental & Geotechnical Ltd. Earth Environmental & Geotechnical Ltd has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report.

Earth Environmental & Geotechnical Ltd is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, Earth Environmental & Geotechnical Ltd did not seek to evaluate the presence on or off the site of electromagnetic fields, lead paint, radon gas or other radioactive materials.

The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified.

No responsibility can be accepted for errors within third party items presented in this report. Further Earth Environmental & Geotechnical Ltd was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Earth Environmental & Geotechnical Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to Earth Environmental & Geotechnical Ltd and including the doing of any independent investigation of the information provided to Earth Environmental & Geotechnical Ltd save as otherwise provided in the terms of the contract between the client and Earth Environmental & Geotechnical Ltd.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and Earth Environmental & Geotechnical Ltd] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site.