Cavalry Arms Junction, Huddersfield

Ground Investigation Report

Our Scheme Ref: 446368

Date: February 2020

City Development

Geotechnical Section

Table of Contents

1 Introduction

Leeds City Council (LCC) Geotechnical Section (GS) was requested by Kirklees Council to carry out a ground investigation for the proposed Cavalry Arms Junction highway improvement works. The site is approximately 3km north-west from Huddersfield town centre and at approximately OS National Grid Reference E: 412260 N: 418520. See Figure 1.

The site is occupied by areas of existing highway, footways and retaining walls. The proposed highway improvement works comprise widening the existing highway (Birkby Road) into an area of landscaped gardens associated with The Church of Jesus Christ of Latter-day Saints and the construction of a new retaining wall to the north of Birkby Road. The proposed development also includes minor modifications to footways to the west and south of the junction.

A desk study has previously been compiled by GS, the findings of which are summarised in Section 2 below.

2 Existing/Desk Study Information

Site History

The current highway layout appears to have been established before 1854 however, at this time there are no buildings shown around the junction. East Street and Birkby Road are marked as Long Lane and the site area appears to be open fields. The next available map of 1892 shows several buildings around the junction including the Royd Steam Brewery. The site area appears to be gardens associated with a property labelled Laurel Bank to the north. No significant changes are shown within the site area until 1975 when Laurel Bank was demolished and a church was constructed. Between the maps of 1993 and 2002, the church was demolished and reconstructed. Between 2004 and 2009, an additional residential property (no. 402) was built immediately north of the site.

Geology

No superficial (drift) deposits or artificial deposits are shown within the site. Surface soils are expected to be residual, formed by in-situ weathering of bedrock. Given the site history, made ground is expected to be present at the surface associated with the existing highway and retaining wall construction.

The site is underlain by Soft Bed Flags (sandstone) of the Carboniferous Lower Coal Measures dipping at approximately 3 to 4 degrees to the east and south-east. The Soft Bed Flags is reported to be a fine-grained, thinly-bedded and cross-bedded to flaggy sandstones with interbedded mudstone layers.

Hydrology and Hydrogeology

The underlying geological sequence is classified as a Secondary A aquifer, with the soils classified as having an assumed high leaching potential.

The site is not recorded as being within a groundwater Source Protection Zone and no recorded water abstractions are present within 250m of the site.

The site has a very low probability of flooding according to Environment Agency data.

Mines, Quarries and Mineral Deposits

The Coal Authority Mining Report states there has been no past mining recorded, no probable unrecorded shallow workings are present and no mine entries are recorded within 100m of the site.

There are no recorded quarries within the site area. However, a quarry was shown on the historical and geological maps to west and north-west of the site. The presence of unrecorded quarries within the site cannot be ruled out.

3 Previous Ground Investigations

There are no archive exploratory hole records available from within the site area or its immediate locality.

4 Ground Investigation

Sitework

An intrusive ground investigation was carried out by GS Contractor Allied Exploration & Geotechnical Ltd (AEG) in June 2019. The exploratory hole records and in-situ test results are included in the AEG Ground Investigation Report extracts (see Appendix 2).

The investigation comprised seven window sample boreholes (ref: WS001, WS002, WS003, WS003A, WS004, WS004A and WS005) carried out to depths of between 0.60m and 3.80m below ground level (bgl). For each borehole, an inspection pit was hand excavated to 1.20m bgl to confirm the absence of services.

The locations of the exploratory holes are shown on the site layout plan, see Figure 2.

Laboratory Testing

Geotechnical testing was undertaken at AEG laboratory. Selected samples were sent to Derwentside Environmental Testing Services Ltd (DETS) for environmental testing. The laboratory test results included in the AEG Ground Investigation Report extracts (see Appendix 2).

5 Ground Conditions

Introduction

The ground investigation generally confirmed the expected ground conditions on site comprising made ground over cohesive (clay) residual soils over weathered bedrock. The weathered bedrock was found to consist of sandstone and siltstone. An interpretative section have been produced; Geological Section A (see Figure 3). The approximate line of section is shown on Figure 2.

Made Ground

Made ground was found at the surface throughout the site to depths of between 0.30m and 1.40m bgl. This was reported to comprise reworked topsoil, sandy clay and clayey sand with variable proportions of gravel to boulder sized fragments of sandstone and brick. The made ground represents landscaping fill and the existing wall backfill.

No visual or olfactory evidence of contamination was observed in the made ground soils.

A single Standard Penetration Test (SPT) was attempted in the made ground in WS004A at 0.70m bgl, a refusal is reported (100 blows for 0mm penetration).

A single particle size distribution test was carried out on a sample of the made ground soil at 0.60m bgl. The test reports 14% fines (clay and silt), 61% sand and 25% gravel sized fragments. A single plasticity test was carried out on the fine fraction of the same sample of and the reports modified plasticity index of 13.5% (low volume change potential). The moisture content of the sample was reported to be 28% with a respective plastic limit of 29%.

Residual Soil

Natural residual soils were found beneath the surface made ground in the majority of the exploratory holes. The exceptions were at the locations of WS004 and WS004A where the window samples refused on obstructions within the surface made ground. It is also unclear whether WS005, at the eastern end of the site, has positively identified natural residual soils below 0.30m bgl (see Figure 3).

Where proven (WS001 and WS002 only), the thickness of the residual soils was reported to be between 2.20m and 2.65m. The residual soils generally consist of firm and stiff sandy gravelly clay with occasional cobble sized fragments. Gravel and cobbles are reported to be of sandstone.

Five Standard Penetration Tests (SPTs) were carried out in the residual soil at depths of between 1.20m and 3.20m bgl and report corrected N values from 13 to 28.

A single particle size distribution test was carried out on a sample of the residual soil at 0.40m bgl. The test reports 16% fines (clay and silt), 36% sand, 38% gravel and 10% cobble sized fragments. A single plasticity test was carried out on the natural soil and reports a modified plastic index of 8.6% (very low volume change potential). A moisture content of 28% is reported; 5.3% above (wet of) the plastic limit.

Bedrock

Weathered bedrock was positively identified at depths of between 2.95m and 3.60m bgl. Weathered bedrock was found to comprise very weak brown siltstone and weak brown sandstone, recovered in the window samples as slightly clayey slightly sandy gravel.

SPTs carried out in the weathered bedrock report all report refusals (N=>50).

Groundwater

During the intrusive investigation groundwater was not encountered. Post site-work groundwater monitoring recorded a groundwater levels of 3.67m bgl in WS002 (see Appendix 3).

6 Contamination Assessment

Introduction

The most plausible source of contamination for this site is the made ground. Chemical testing therefore focused on the near surface made ground soils.

Ground contamination is of concern for proposed development in terms of:

- Risk to construction workers and adjacent land users during construction;
- Disposal implications for excavated soils generated during construction; and
- The risk to future site users and maintenance workers following development.

The near surface made ground has been determined to be the primary source of potential contamination. Exposure pathways for the made ground comprise inhalation of fibres, dermal contact, ingestion of soil and dust and leaching of mobile contamination. Potential receptors are construction workers, adjacent land users, future site users and maintenance workers.

Contamination screening tests, including asbestos identification, were carried out throughout the site on the made ground soils.

Contamination

The test results have been compared against the Generic Assessment Criteria (GAC) Values. Although the majority of the site is proposed to be covered with hardstanding, soft landscaping areas may be present, therefore GAC values for Public Park (POS_{park}) end use have been used for initial risk assessment purposes. A soil organic matter content of 6% has been employed where appropriate. The GAC values used for assessment along with a summary of the test results are presented in Table 1. The laboratory test certificates are presented in Appendix 2.

No concentrations of potential contaminants were reported to be above their GAC values. Therefore there does not appear to be any significant contamination within the made ground soils.

Ground Gas

Two gas and groundwater monitoring wells were constructed in window samples WS002 and WS005. The wells were monitored on a single occasion in July 2019. It was not possible to access the church grounds during subsequent monitoring visits.

The gas monitoring did not reveal any significant methane (>1%) or carbon dioxide (>5%) and no gas flow was recorded.

Remediation Recommendations

The assessment has revealed no significant contamination is present. No remediation works are required.

Asbestos

No asbestos fibres or asbestos containing material was found in any of the samples tested.

Waste Disposal

Four Waste Acceptance Criteria (WAC) tests were carried out to assess the disposal implications for the made ground and natural soils. All samples showed elevated Total Organic Carbon (TOC) between 3.9% and 9.9%. The made ground samples from WS003 and WS0003A also showed a corresponding elevated Loss On Ignition (LOI) between 19% and 21%. The TOC and LOI results are not of concern and expected to relate to organic material (e.g. topsoil, plant debris) within the samples tested. The slightly elevated PAHs reported for WS001 are likely associated with cross-contamination of the sample with the surface made ground. Note, the AEG log states “Laboratory notes glass fragments - possible fall in from above” for this stratum.

It is considered likely that soils removed from the site would be classified as Inert Waste.

7 Geotechnical Assessment

Mining and Quarrying

The site is not at risk from past coal mine workings.

There is no evidence of former quarrying beneath the site area although the possibility of unrecorded quarries cannot be entirely ruled out.

Excavations and Earthworks

Difficulties in excavation should not be encountered using conventional plant within the surface made ground and underlying natural soils and weathered bedrock. However, difficulties may be encountered if deep excavations within the bedrock are proposed.

The ground investigation data indicates that groundwater may be encountered in the excavations below approximately 2.00m bgl. Perched groundwater may also be locally encountered within the surface made ground.

Excavations within the surface made ground and natural residual soils are likely to be unstable and may require full support.

Concrete

Ten soil samples from depths of between 0.20m and 2.20m bgl were analysed for water soluble sulphate and pH. Concentrations of water soluble sulphate ranged from <10 mg/l to 470 mg/l. pH values are reported to vary between 5.0 and 8.3.

In accordance with BRE SD1, the characteristic value for sulphate is taken to be 400 mg/l (the mean of the highest 20% rounded to nearest 100 mg/l) and the characteristic value for pH as 5.7. The groundwater is considered to be mobile. Design Sulfate Class DS-1 ACEC Class AC-1 should be employed for below ground concrete.

Proposed Retaining Wall

To accommodate the proposed highway widening a new retaining wall is proposed on the north side of Birkby Road. No proposed ground loadings or sections were available for the retaining wall at the time of the ground investigation.

The ground investigation found between 0.30m and 1.40m of made ground above the existing wall including reworked topsoil. The made ground is reported to overlie natural residual soils comprising firm to stiff sandy clay. Weathered sandstone and siltstone bedrock (suspected Soft Bed Flags) was encountered at depths of between 2.95m and 3.60m bgl.

The proposed highway widening will remove the surface made ground (see Figure 3) and the proposed retaining wall will be founded on natural residual soils. Although there are some large trees within the site area, the modified plastic index of the soil is <10% and there are less than 35% fines reported by the laboratory tests, therefore volume change potential is not of concern.

The proposed retaining wall appears to vary in height up to 1.20m maximum. A conventional mass gravity reinforced concrete foundation is appropriate and there should be adequate bearing capacity available on the natural residual soils.

Highways

Non-engineered made ground cannot be left untreated in-situ beneath the proposed highways. However, the proposed highway widening will remove the surface made ground and the new highway pavement foundation will be constructed on natural residual soils.

For preliminary design purposes the natural residual soils should be assumed to have a CBR of 3%. The highway pavement foundation shall therefore comprise either 450mm of subbase only (Type 1 or similar approved) or 325mm subbase over 250mm capping (Class 6F5 or similar approved) as a minimum.

Surface Water Drainage

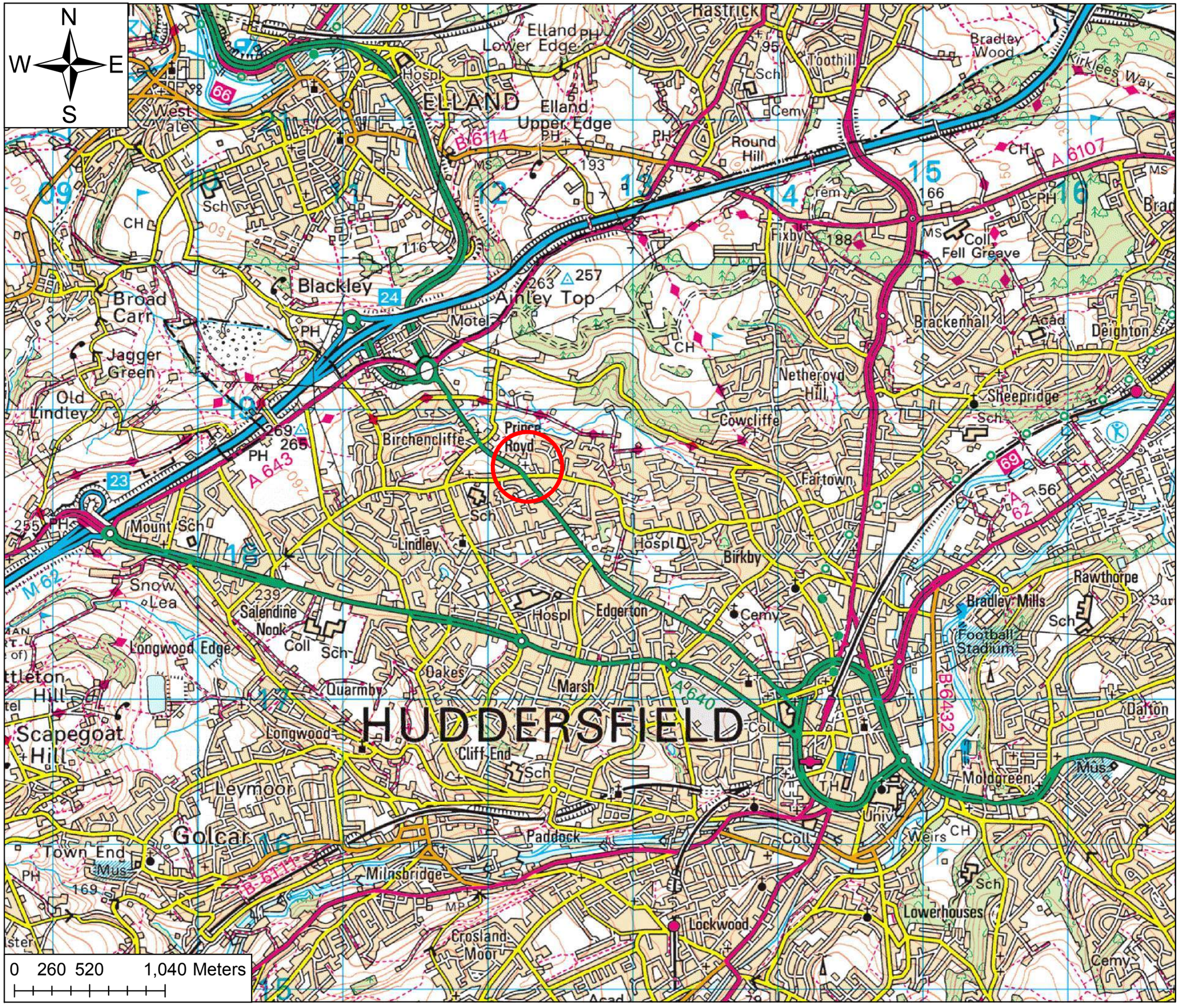
Infiltration drainage is not considered feasible for the proposed development due to presence of low permeability soils beneath the site and insufficient space.

Tables

Figures

Appendices

TABLE 1: CONTAMINATION TESTING SUMMARY						
Analyte	**No. of Samples**	**Maximum Concentration (mg/kg)**	**No. of samples >GAC**	**GAC (mg/kg)**	**GAC Source**	
Arsenic	10	56	0	170	CLEA	**Inorganics**
Boron	10	0.9	0	46000	CLEA	
Cadmium	10	1.9	0	532	CLEA	
Chromium	10	130	0	3300	LQM	
Chromium VI	10	0.0	0	220	LQM	
Copper	10	120	0	44000	LQM	
Lead	10	270	0	1300	CLEA	
Mercury	10	1.1	0	120	CLEA	
Nickel	10	26	0	3400	CLEA	
Selenium	10	1.8	0	1800	CLEA	
Vanadium	10	49	0	5000	LQM	
Zinc	10	340	0	170000	LQM	
Naphthalene	10	1.6	0	3000	LQM	**Organics**
Acenaphthylene	10	1.0	0	30000	LQM	
Acenaphthene	10	2.4	0	30000	LQM	
Fluorene	10	2.7	0	20000	LQM	
Phenanthrene	10	18.0	0	6300	LQM	
Anthracene	10	3.9	0	150000	LQM	
Fluoranthene	10	22.0	0	6400	LQM	
Pyrene	10	21.0	0	15000	LQM	
Benzo(a)anthracene	10	9.5	0	62	LQM	
Chrysene	10	10.0	0	120	LQM	
Benzo(b)fluoranthene	10	6.8	0	16	LQM	
Benzo(k)fluoranthene	10	4.4	0	440	LQM	
Benzo(a)pyrene	10	9.1	0	13	LQM	
Indeno(1,2,3-cd)pyrene	10	5.3	0	180	LQM	
Dibenzo(a,h)anthracene	10	1.2	0	1.40	LQM	
Benzo(g,h,i)perylene	10	4.6	0	1600	LQM	
Organic Matter (%)	10	13.0	n/a	n/a	n/a	
Notes:	GAC = Generic Assessment Criteria based on Public Park (POSpark) End Use. LQM values based on Organic Matter at 6% (mean=6.4%)					



Leeds CITY COUNCIL

CITY DEVELOPMENT GEOTECHNICAL SECTION

Cavalry Arms Junction, A629 Halifax Road, Huddersfield

Site Location Plan

KEY:

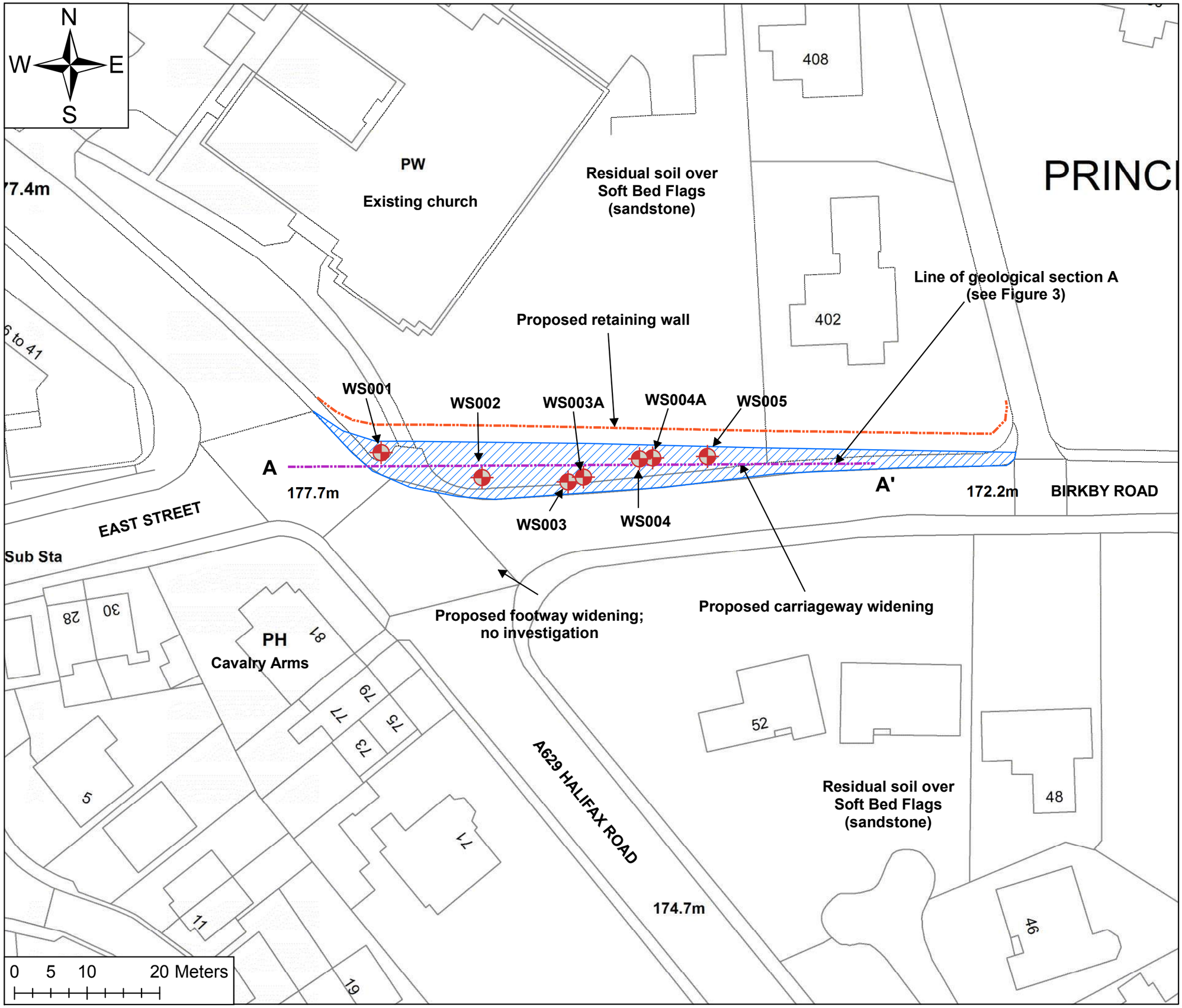
= THE SITE

SCALE @ A3: 1:25,000

DATE: February 2020

SCHEME NO: 446368

FIGURE: 1



Leeds CITY COUNCIL

CITY DEVELOPMENT
GEOTECHNICAL SECTION

Cavalry Arms Junction, A629 Halifax Road, Huddersfield

Site Layout Plan

KEY:

- = Proposed retaining wall (approximate)
- = Proposed new carriageway widening (approximate)
- = Window samples
- = Line of geological section (see Figure 3)

SCALE @ A3: 1:500

DATE: February 2020

SCHEME NO: 446368

FIGURE: 2

SECTION ALONG PROPOSED RETAINING WALL ON NORTH SIDE OF BIRKBY ROAD

WEST (A)

EAST (A')

Reduced Level (approx m AOD)

0 10 20 30 40 50 60 70

182 181 180 179 178 177 176 175 174 173 172 171 170

WS001

WS002

WS003

WS003A

WS004

WS004A

WS005

Existing ground level (approximate); in church grounds above existing retaining wall

Existing Birkby Road highway levels (approximate)

Made ground

Residual soil

Very weak siltstone bedrock reported below 2.95m bgl

Soft Bed Flags (sandstone) of the Carboniferous Lower Coal Measures

Weak sandstone bedrock reported below 3.60m bgl

WS003 terminated at 1.20m bgl determined as unsafe

Possible made ground?

WS003A terminated at 1.30m bgl due to refusal on sandstone obstruction

Geological bedrock level (approximate)

WS004 annd WS004A terminated at 0.60m to 0.70m bgl due to refusal on boulder obstruction

Base of made ground not proven

Soft Bed Flags (sandstone) of the Carboniferous Lower Coal Measures

Made ground

Residual soil

Possible made ground?

Existing Birkby Road highway levels (approximate)

WS005 terminated at 1.20m bgl due to refusal on sandstone obstruction

VERTICAL SCALE = 1:50;
HORIZONTAL SCALE = 1:200
(VERTICAL EXAGGERATION = X4)

CITY DEVELOPMENT
Geotechnical Section
3rd Floor
St George's House
40 Great George Street
Leeds LS1 3DL

Leeds CITY COUNCIL

KEY:

Instrument response zone

Highest recorded groundwater level

Groundwater strike

Groundwater rise

Groundwater seepage

N= Standard penetration test, blow count for 300mm test zone

50/100 Standard penetration test refusal (blow count/mm penetration)

Sandstone

Mudstone

Siltstone

(Also see Key Sheet in Appendix 1)

Date
February 2020

Sheet Size
A3

FIGURE 3 / GEOLOGICAL SECTION A

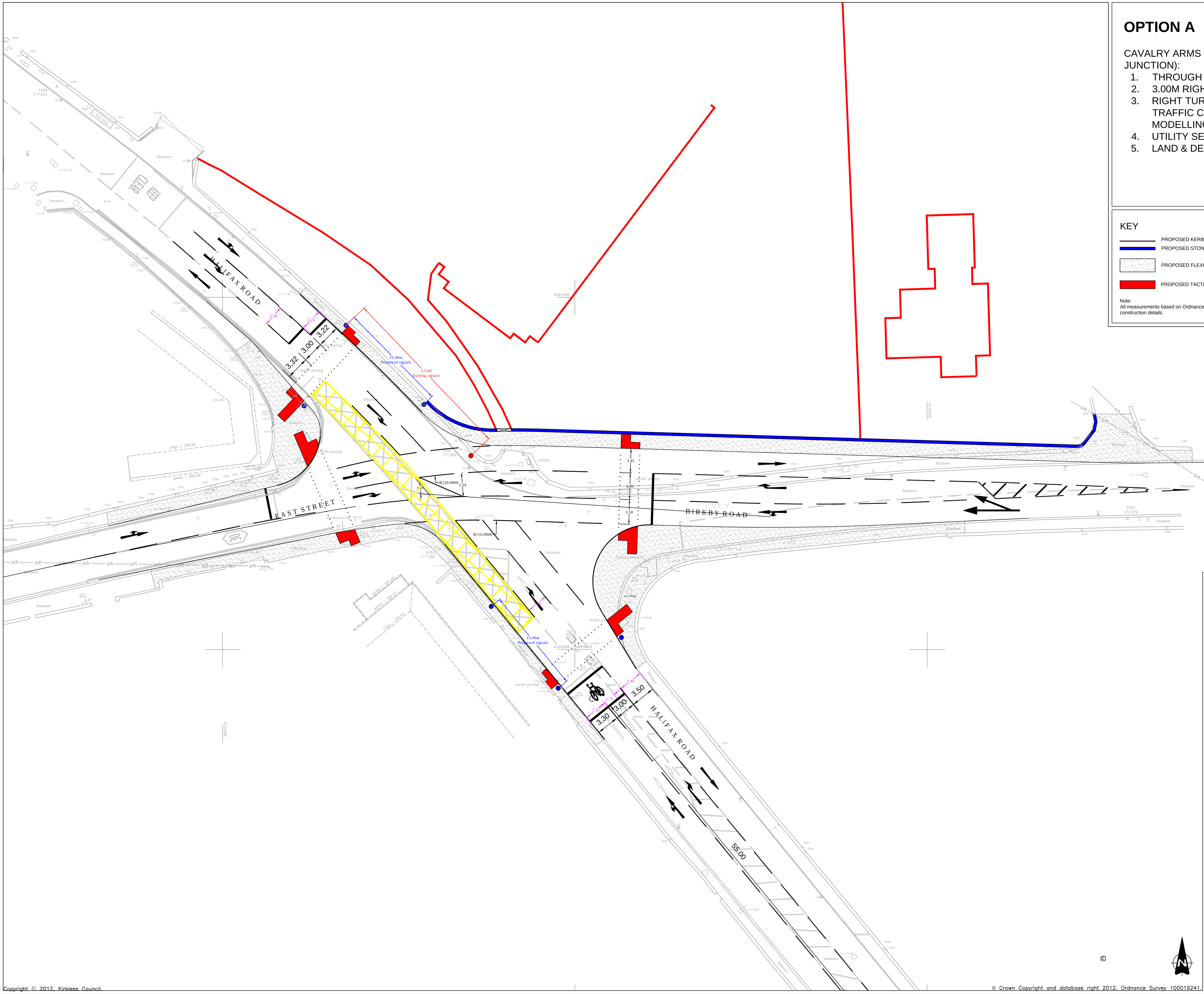
Client: Kirklees Council

Project: Cavalry Arms Junction, A629 Halifax Road

Number: 446368

APPENDIX 1

PROPOSED DEVELOPMENT



OPTION A

CAVALRY ARMS (HALIFAX ROAD/BIRKBY ROAD JUNCTION):

1. THROUGH LANE WIDTH VARIES.
2. 3.00M RIGHT TURNING LANE WIDTH.
3. RIGHT TURN QUEUING LENGTH SUBJECT TO TRAFFIC CAPACITY CALCULATION OR MODELLING.
4. UTILITY SERVICE DIVERSION REQUIRED.
5. LAND & DEMOLITION WORKS REQUIRED

KEY

- PROPOSED KERBS
- PROPOSED STONE WALLS TO MATCH THE EXISTING
- PROPOSED FLEXIBLE FOOTWAY CONSTRUCTION
- PROPOSED TACTILE PAVING (RED COLOUR)

Note:
All measurements based on Ordnance Survey Map, topographic survey or site measurements required for construction details.

REF.	DATE	REVISIONS

Kirklees COUNCIL

Directorate of Place
Civic Centre 3, Market Street
Huddersfield, HD1 2TG

SECTION: INVESTMENT AND REGENERATION		
DRAWN: HM	CHECKED:	
SCALE: 1:250	PROJECT NO.: TF5	DATE: 20/11/2017

PROJECT: WYTF – A629 HALIFAX ROAD CORRIDOR IMPROVEMENTS

TITLE: CAVALRY ARMS JUNCTION OPTION A DRAFT LAYOUT

DRAWING No. TF5/WP1/2/A/RSA1-2A

CAD No.

APPENDIX 2

GROUND INVESTIGATION REPORT EXTRACTS

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Cavalry Arms Jct			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:412237.866 N:418527.802		**WS001**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 178.155	**Start Date:** 25/06/2019	**Sheet:** 1 of 2

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.20	J1			177.855		0.30	MADE GROUND (Black grey sandy gravelly clay. Gravel is fine to medium angular to subrounded and includes sandstone).	
0.40	B2						Firm and stiff yellow brown sandy gravelly CLAY. Gravel is fine to coarse angular and subangular and includes sandstone. (Possible Made Ground).	
0.60	ES3						at c.0.40m BGL ... clayey very sandy gravel with clay pockets and cobbles noted. Clay fines are of intermediate plasticity.	
1.00	J4						Laboratory notes glass fragments - possible fall in from above.	
1.10	B5							
1.20	ES6							
1.20-2.00	U8	(120)						
1.20-1.65	SJ7	N19				(2.65)		
2.00-3.00	U10	(120)						
2.00-2.45	SJ9	N28						
				175.205		2.95		
3.00	SJ11	50/33mm		175.055		3.10	Very weak brown SILTSTONE. (Recovered as slightly sandy slightly clayey gravel. Gravel is fine to coarse angular and tabular).	
							Terminated at 3.10m BGL - due to refusal.	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
25/06/2019	0.00	0.00	116	
25/06/2019	3.10	3.10	116	Dry

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled
1.20 - 2.00	110	80	No
2.00 - 3.00	87	100	No

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Rees	Contract No. **4208L(d)**

Print Date and Time: 09/10/2019 12:04:04

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
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WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Cavalry Arms Jct			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:412237.866 N:418527.802		**WS001**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 178.155	**Start Date:** 25/06/2019	**Sheet:** 2 of 2

Figure WS001.1
WS001 1.20-2.20m BGL

Figure WS001.2
WS001 2.20-3.20m BGL

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Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Cavalry Arms Jct			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:412251.693 N:418524.390		**WS002**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 177.767	**Start Date:** 25/06/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.00	J1			177.567		0.20	MADE GROUND (Black grey sandy slightly gravelly clay. Gravel is fine to medium angular to subrounded and includes sandstone).	
0.10	B2							
0.20	ES3							
0.60	J4					(1.20)	MADE GROUND (Yellow brown slightly gravelly sand with rootlets. Gravel is fine to medium angular to subrounded and includes sandstone and brick).	
0.90	B5							
1.20	ES6			176.367		1.40		
1.20-2.20	U8	(91)					Firm yellow brown sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone.	
1.20-1.65	SJ7	N15				(0.55)		
				175.817		1.95		
2.20-3.20	$U10_{(SS)}$	(102)					Firm brown sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone.	
2.20	$ES14_{(U8)}$							
2.20-2.65	SJ9	N14				(1.65)		
3.20-3.80	U12	(120)						
3.20-3.65	SJ11	N28						
				174.167		3.60		
				173.967		3.80	Weak brown SANDSTONE. (Recovered as slightly sandy slightly clayey gravel. Gravel is fine to coarse angular to tabular).	
3.80	SJ13	100/2mm					*Terminated at 3.80m BGL - due to refusal.*	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
25/06/2019	0.00	0.00	116	
25/06/2019	3.80	3.80	116	Dry

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled
1.20 - 2.20	101	100	No
2.20 - 3.20	87	100	No
3.20 - 3.80	77	80	No

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 2.20-2.70m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Rees	Contract No. **4208L(d)**

Print Date and Time: 09/10/2019 12:04:14

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Cavalry Arms Jct			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:412251.693 N:418524.390		**WS002**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 177.767	**Start Date:** 25/06/2019	**Sheet:** 2 of 3

Figure WS002.1
WS002 1.20-2.20m BGL

Figure WS002.2
WS002 2.20-3.20m BGL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 177.767	**Start Date:** 25/06/2019	**Sheet:** 3 of 3

Figure WS002.3
WS002 3.20-3.80m BGL

ALLIED EXPLORATION & GEOTECHNICS LIMITED

Head Office: Unit 25 Stella Gill Industrial Estate, Pelton Fell, Chester-le-Street, Co. Durham, DH2 2RG **Tel:** 0191 387 4700 **Fax:** 0191 387 4710
Regional Office: Unit 20 Business Development Centre, Eanam Wharf, Blackburn, BB1 5BL **Tel:** 01772 735 300 **Fax:** 01772 735 999

WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Cavalry Arms Jct		**Exploratory Hole No.** WS003
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:412263.706 N:418523.976	
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 177.118 / **Start Date:** 25/06/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.10 0.20 0.30 0.60 0.90	J1 B2 ES3 J4 B5					(1.00)	MADE GROUND (Black grey sandy slightly gravelly clay. Gravel is fine to medium angular to subrounded and includes sandstone).	
				176.118		1.00		
1.20	ES6			175.918		1.20	Firm yellow brown sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone. *Terminated at 1.20m BGL - unsafe setup.*	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
25/06/2019	0.00			
25/06/2019	1.20			

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Rig setup determined as unsafe - relocated to WS003A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Rees	Contract No. **4208L(d)**

Print Date and Time: 09/10/2019 12:04:20

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WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Cavalry Arms Jct			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:412265.605 N:418524.602		**WS003A**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 176.921	**Start Date:** 25/06/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.30	J1					(1.00)	MADE GROUND (Black grey sandy slightly gravelly clay. Gravel is fine to medium angular to subrounded and includes sandstone).	
0.60	B2							
0.90	ES3			175.921		1.00		
1.00	J4						Firm yellow brown sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone.	
1.10	B5			175.621		1.30	at c.1.30m BGL ... driller notes sandstone obstruction.	
1.20	ES6						*Terminated at 1.30m BGL - due to refusal.*	
1.20	SJ7	48/155mm						

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
25/06/2019	0.00			
25/06/2019	1.30			

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Relocated from WS003.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Rees	Contract No. **4208L(d)**

Print Date and Time: 09/10/2019 12:04:21

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WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Cavalry Arms Jct			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:412273.362 N:418527.161		**WS004**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 176.116	**Start Date:** 25/06/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.10 0.30	J1 B2					(0.60)	MADE GROUND (Black grey sandy slightly gravelly clay. Gravel is fine to medium angular to subrounded and includes sandstone).	
0.60	ES3			175.516		0.60	at c.0.60m BGL ... firm yellow brown sandy gravelly clay with boulder noted. *Terminated at 0.60m BGL - due to boulder obstruction.*	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
25/06/2019	0.00			
25/06/2019	0.60			

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Relocated to WS004A.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Rees	Contract No. **4208L(d)**

Print Date and Time: 09/10/2019 12:04:21

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WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Cavalry Arms Jct			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:412275.261 N:418527.219		**WS004A**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 175.679	**Start Date:** 25/06/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
				175.479		0.20	MADE GROUND (Black grey sandy slightly gravelly clay. Gravel is fine to medium angular to subrounded and includes sandstone).	
0.20	J1					(0.50)		
0.50	ES2			174.979		0.70	MADE GROUND (Yellow brown slightly organic clayey/silty very gravelly sand with occasional rootlets. Gravel is fine to coarse angular to subangular and includes sandstone). at c.0.60m BGL ... clay/silt fines are of high plasticity.	
0.60	B3							
0.70	S4	100/0mm					*Terminated at 0.70m BGL - due to refusal.*	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
25/06/2019	0.00	0.00	116	
25/06/2019	0.70	0.70	116	Dry

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) Relocated from WS004.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Rees	Contract No. **4208L(d)**

Print Date and Time: 09/10/2019 12:04:22

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WINDOW/WINDOWLESS SAMPLE HOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Cavalry Arms Jct			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:412282.853 N:418527.450		**WS005**
Method (Equipment): Windowless Sampling (PC Tracker S110)	**Ground Level (m):** 175.679	**Start Date:** 26/06/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.00	J1						MADE GROUND (Black grey sandy slightly gravelly clay. Gravel is fine to medium angular to subrounded and includes sandstone).	
0.10	B2			175.379		0.30		
0.30	ES3						Firm yellow brown sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone.	
0.60	J4					(0.90)		
0.90	B5							
				174.479		1.20		
1.20	ES6						at c.1.20m BGL ... (1) Driller notes sandstone obstruction.	
1.20	SJ7	50/3mm					*Terminated at 1.20m BGL - due to refusal.*	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
26/06/2019	0.00	0.00	116	
26/06/2019	1.20	1.20	116	Dry

Liner Sample Information

From - To	Internal Dia (mm)	Recovery (%)	Subsampled

General Remarks

(1) Description derived from drillers daily report.
(2) Inspection pit dug prior to drilling.
(3) 50mm diameter slotted standpipe installed between 0.70-1.20m BGL.

All dimensions in metres Scale 1:50	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Rees	Contract No. **4208L(d)**

Print Date and Time: 09/10/2019 12:04:22

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STANDARD PENETRATION TEST RESULTS

(BS EN ISO 22476-3: 2005)

Exploratory Hole No.	Test Depth (Reduced Level)	Water Depth (Casing)	Rod Length	SPT Hammer Ref.	Energy Ratio E_m	SEATING DRIVE						TEST DRIVE										Rod Length Corr. C_R	Energy Ratio Corr. C_E	Pen (mm)/Blow	SPT'N' Value	SPT'N' Value (Corr.) N_{60}	Shoe or Cone	Remarks
						Pen	Blows	Pen	Blows	Total Pen	Total Blows	Pen	Blows	Pen	Blows	Pen	Blows	Pen	Blows	Total Pen	Total Blows							
	m	m	m		%	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.	mm	No.						S/C	
WS001	1.20 (176.96)	Dry (1.20)	1.20	DP04	81	75	3	75	3	150	6	75	4	75	3	75	5	75	7	300	19	0.65	1.35	15.79	19	17	S	
WS001	2.00 (176.16)	Dry (2.00)	2.00	DP04	81	75	6	75	5	150	11	75	6	75	7	75	5	75	10	300	28	0.68	1.35	10.71	28	26	S	
WS001	3.00 (175.16)	Dry (3.00)	3.00	DP04	81	75	9	75	23	150	32	26	25	7	25					33	50	0.72	1.35	0.66	-	-	S	
WS002	1.20 (176.57)	Dry (1.20)	1.20	DP04	81	75	2	75	3	150	5	75	3	75	4	75	3	75	5	300	15	0.65	1.35	20.00	15	13	S	
WS002	2.20 (175.57)	Dry (2.20)	2.20	DP04	81	75	2	75	2	150	4	75	3	75	4	75	4	75	3	300	14	0.69	1.35	21.43	14	13	S	
WS002	3.20 (174.57)	Dry (3.20)	3.20	DP04	81	75	5	75	5	150	10	75	5	75	6	75	8	75	9	300	28	0.73	1.35	10.71	28	28	S	
WS002	3.80 (173.97)	Dry (3.80)	3.80	DP04	81	8	50			8	50	2	100							2	100	0.75	1.35	0.02	-	-	S	
WS003A	1.20 (175.72)	Dry (1.20)	1.20	DP04	81	75	5	75	6	150	11	75	9	75	25	5	14			155	48	0.65	1.35	3.23	-	-	S	
WS004A	0.70 (174.98)	Dry (0.70)	0.70	DP04	81	0	50			0	50	0	100							0	100	0.63	1.35	0.00	-	-	S	
WS005	1.20 (174.48)	Dry (1.20)	1.20	DP04	81	25	14			25	14	50	3							50	3	0.65	1.35	16.67	-	-	S	

NOTE: Please refer to calibration certificate for additional information and corresponding Exploratory Hole record for sampling details. Uncorrected and corrected SPT'N' values are presented on the attached graphical plot relative to each Exploratory Hole.

Contract Title :-	Client :-	AEG Contract No :-
A629 Halifax Road Cavalry Arms Jct	Leeds City Council	4208L(d)

Date of Issue :-	Page No. :-	Checked By :-	Approved By :-	Certificate No. :-
27/09/2019	1 of 1	LC	NW	SPT/4208L(d)/1

UKAS TESTING 1367

Allied Exploration & Geotechnics Ltd.

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Unit 25 Stella Gill Industrial Esatate
Pelton Fell
Chester-le-Street
DH2 2RG

SPT Hammer Ref:	DP04
Test Date:	19/07/2019
Report Date:	07/08/2019
File Name:	DP04.spt
Test Operator:	BP

QUALITY CONTROL CHECKED
07 AUG 2019
Signed

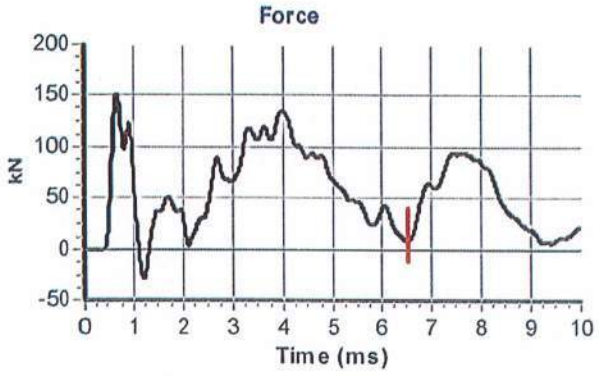
Instrumented Rod Data

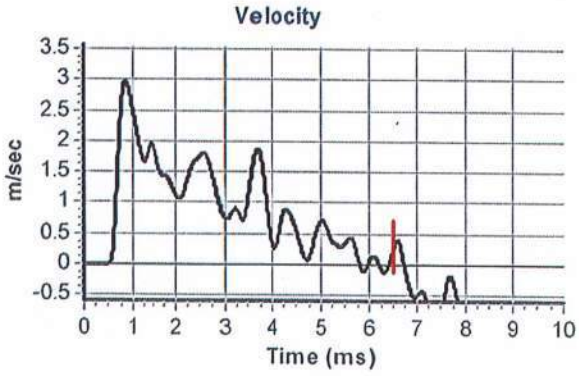
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.3
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	5991
Accelerometer No.2:	5990

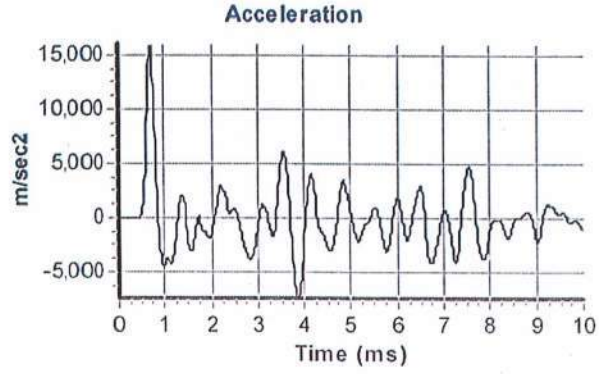
SPT Hammer Information

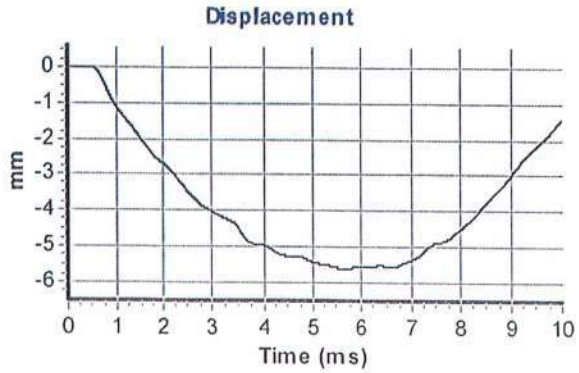
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	944
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	375

Energy Ratio E_r (%): **79**

B Proctor

Signed: Brian Proctor
Title: Technician

The recommended calibration interval is 12 months

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LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
WS001	0.40	B2	MADE GROUND (Dark brown black clayey very sandy gravel with medium cobble content,occasional rootlets and clay pockets. Gravel includes glass and sandstone. (Clay of intermediate plasticity)).	MC PI PSD SED
WS004A	0.60	B3	MADE GROUND (Dark brown black slightly organic clayey/silty very gravelly sand with occasional rootlets. Gravel includes sandstone. (Clay/silt of high plasticity)).	MC PI PSD

Contract Title :- A629 Halifax Road Cavalry Arms Jct

Client :- Leeds City Council

Signed :-

Name :- M. SELKIRK

Page 1 of 1

Date of issue :- 13/09/2019

Certificate No :- SD/4208L(d)/1

AEG Contract No. :- 4208L(d)

UKAS TESTING 1367

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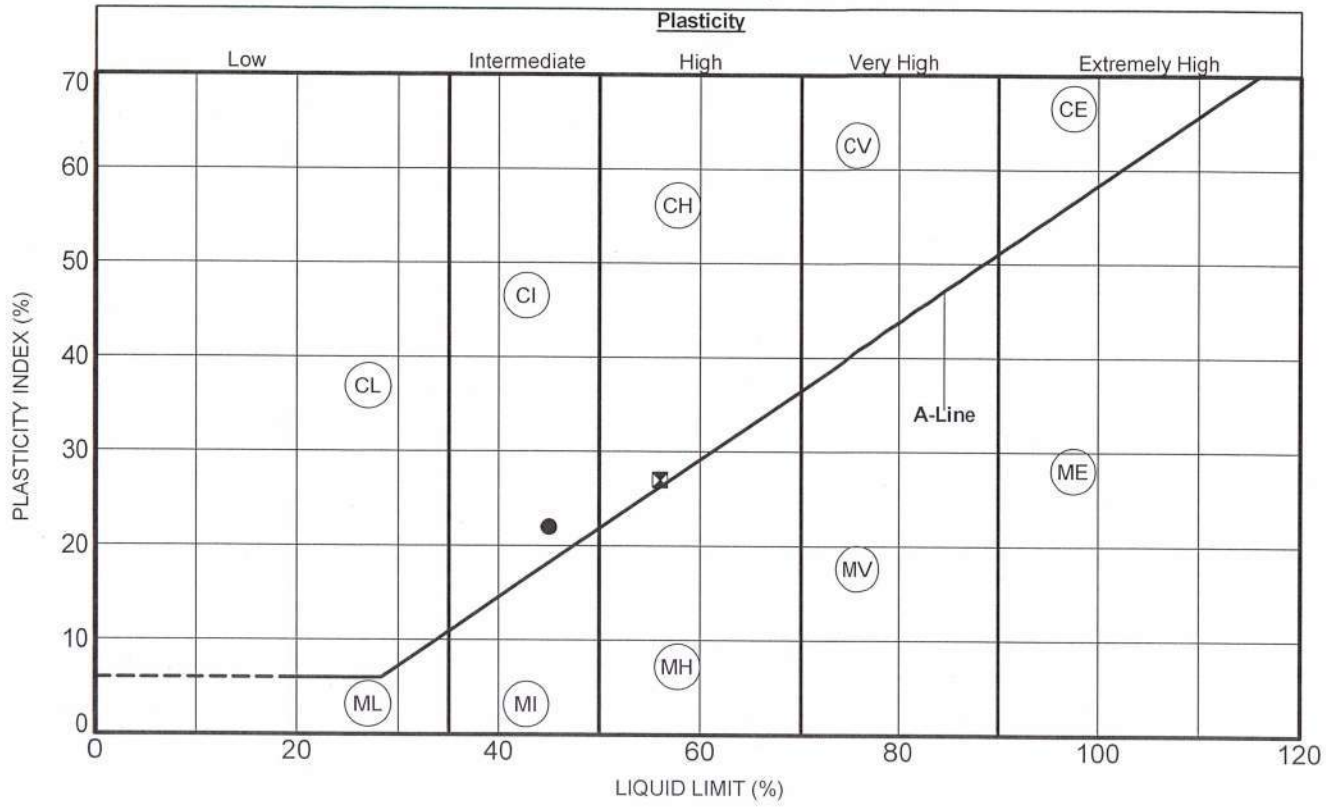
ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

Test Method :- BS 1377 : Part 2 : Clause 3.2, 4.1 to 4.4 & 5 : 1990



Exploratory Hole No.	Depth (m)	Sample Type/Ref.	Specific Depth (m)	LL	PL	PI	I_c	Preparation Method	<0.425mm (%)	m/c (%)	Date Tested
●WS001	0.40	B2	0.40	45	23	22	0.24	Natural	39.0	28.3	03/09/2019
⧓WS004A	0.60	B3	0.60	56	29	27	-0.02	Natural	50.0	28.4	03/09/2019

For description of sample please refer to the Laboratory Sample Description Sheet. # = Insufficient for 4 point PI
If sample is prepared in the natural state we are unable to determine % retained on the 0.425mm test sieve.

Contract Title :-	Client :-
A629 Halifax Road Cavalry Arms Jct	Leeds City Council

Signed :- msene	Name :- M. SELKIRK		Page 1 of 1
Date of issue :- 12/09/2019	Certificate No :- PI/4208L(d)/1	AEG Contract No. :- 4208L(d)	UKAS TESTING 1367

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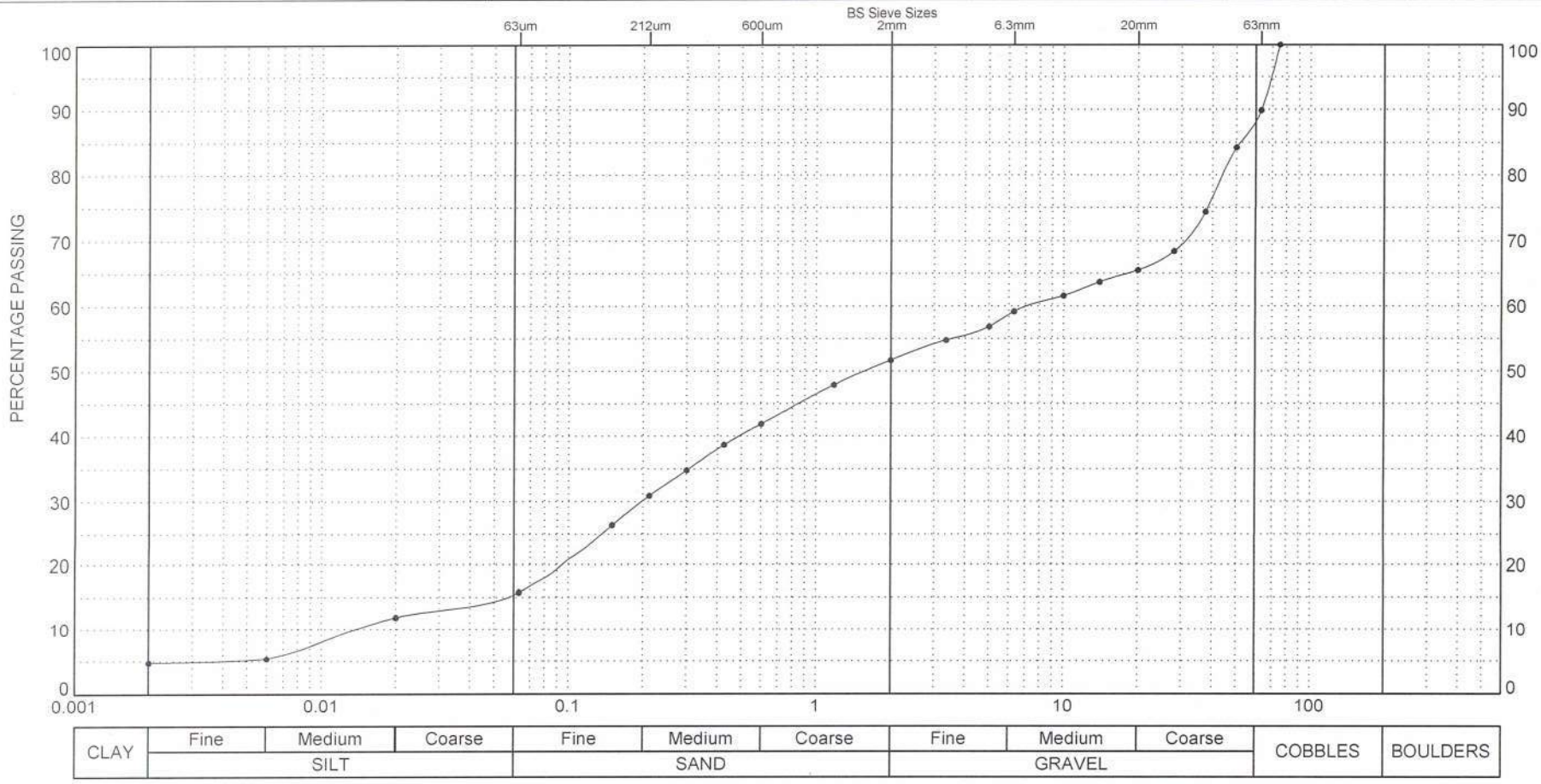
PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- **WS001**	Depth (m) :- **0.40**	Sample Type & No :- **B2**	Specific Depth (m) :- **0.40**	Date Tested :- **03/09/2019**



Sieve Size (mm)	Passing (%)
75	100.0
63	89.9
50	84.2
37.5	74.4
28	68.4
20	65.5
14	63.7
10	61.6
6.3	59.2
5	56.9
3.35	54.8
2	51.7
1.18	47.9
0.6	41.9
0.425	38.7
0.3	34.8
0.212	30.9
0.15	26.4
0.063	15.7
0.02	11.8
0.006	5.4
0.002	4.8

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
12/09/2019	PSD/4208L(d)/WS001/B2/0.40		M. SELKIRK	

Client :-	Contract Title :-	AEG Contract No :-
Leeds City Council	A629 Halifax Road Cavalry Arms Jct	4208L(d)

UKAS TESTING 1367

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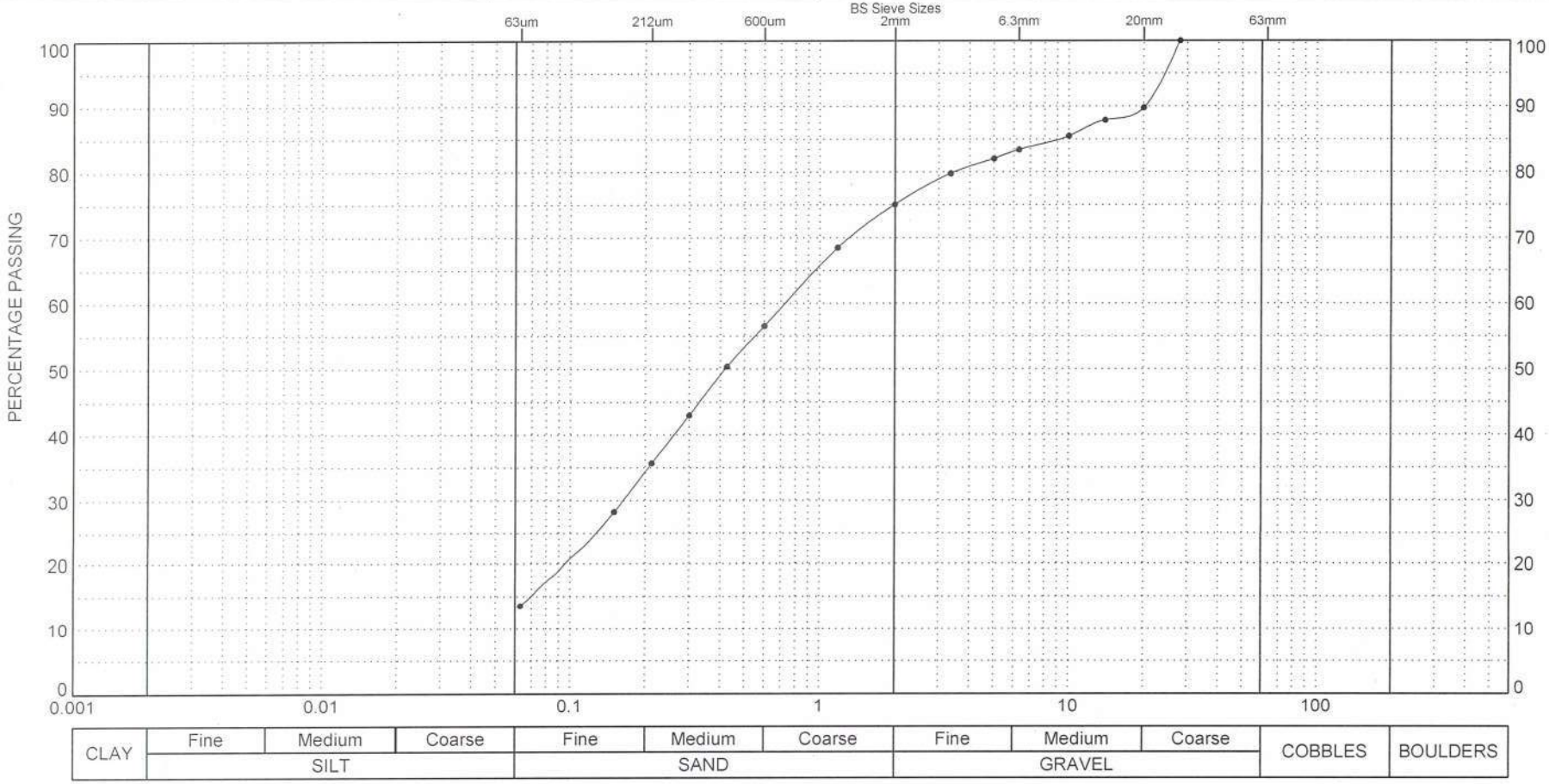
PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- **WS004A**	Depth (m) :- **0.60**	Sample Type & No :- **B3**	Specific Depth (m) :- **0.60**	Date Tested :- **03/09/2019**



Sieve Size (mm)	Passing (%)
28	100.0
20	89.8
14	87.9
10	85.5
6.3	83.4
5	82.1
3.35	79.8
2	75.1
1.18	68.5
0.6	56.6
0.425	50.4
0.3	43.0
0.212	35.7
0.15	28.3
0.063	13.5

For description of sample please refer to the Laboratory Sample Description Sheet

Date of issue :-	Certificate No :-	Signed :-	Name :-	Page 1 of 1
12/09/2019	PSD/4208L(d)/WS004A/B3/0.60		M. SELKIRK	

Client :-	Contract Title :-	AEG Contract No :-
Leeds City Council	A629 Halifax Road Cavalry Arms Jct	4208L(d)

UKAS TESTING 1367

Certificate of Analysis

Certificate Number 19-12789-1

17-Jul-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-12789-1

Client Reference 4208L(d)

Order No CH1527

Contract Title A629 Halifax Road Cavalry Arms Jct

Description 7 Soil samples, 6 Leachate samples.

Date Received 05-Jul-19

Date Started 05-Jul-19

Date Completed 17-Jul-19

Test Procedures Identified by prefix DETSn (details on request).

Notes **This report supersedes 19-12789, amendments.**

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Approved By

Adam Fenwick
Contracts Manager

2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-12789-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
WS001	3	0.6	1527728	15/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets
WS002	3	0.2	1527729	15/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets
WS002	6	1.2	1527730	15/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets
WS002	14	2.2	1527731	15/07/2019	Brown sandy CLAY
WS003	3	0.3	1527732	15/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets
WS003A	3	0.9	1527733	15/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets
WS003A	6	1.2	1527734	15/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets

Summary of Chemical Analysis
Soil Samples

Our Ref 19-12789-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct

			Lab No	1527728	1527729	1527730	1527731
			Sample ID	WS001	WS002	WS002	WS002
			Depth	0.60	0.20	1.20	2.20
			Other ID	3	3	6	14
			Sample Type	ES	ES	ES	ES
			Sampling Date	25/06/19	25/06/19	25/06/19	25/06/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	15	20	7.2	5.3
Barium	DETSC 2301#	1.5	mg/kg	90	95	42	35
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.5	0.9	0.2	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.4	< 0.1	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	17	22	13	21
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	41	53	22	25
Lead	DETSC 2301#	0.3	mg/kg	92	110	80	15
Mercury	DETSC 2325#	0.05	mg/kg	0.34	0.27	0.16	< 0.05
Nickel	DETSC 2301#	1	mg/kg	14	19	14	13
Selenium	DETSC 2301#	0.5	mg/kg	0.9	0.7	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	26	34	21	24
Zinc	DETSC 2301#	1	mg/kg	71	130	52	39
Inorganics							
pH	DETSC 2008#			8.3	6.7	6.3	5.0
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	3.5	7.4	3.1	0.5
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	< 10	12	13	57
Sulphide	DETSC 2024*	10	mg/kg	< 10	< 10	< 10	< 10
Sulphur (free)	DETSC 3049#	0.75	mg/kg	4.5	< 0.75	1.9	< 0.75
Petroleum Hydrocarbons							
EPH (C10-C25)	DETSC 3311	10	mg/kg	180	47	< 10	< 10
EPH (C25-C40)	DETSC 3311	10	mg/kg	170	35	< 10	< 10

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis

Soil Samples

Our Ref 19-12789-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct

			Lab No	1527728	1527729	1527730	1527731
			Sample ID	WS001	WS002	WS002	WS002
			Depth	0.60	0.20	1.20	2.20
			Other ID	3	3	6	14
			Sample Type	ES	ES	ES	ES
			Sampling Date	25/06/19	25/06/19	25/06/19	25/06/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	1.6	0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.5	0.2	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	2.4	0.5	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	2.7	0.4	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	18	3.1	0.2	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	3.9	0.7	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	22	5.3	0.2	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	21	5.0	0.3	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	9.5	2.3	0.2	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	10	2.6	0.2	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	6.8	2.0	0.2	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	4.4	1.2	0.2	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	9.1	2.6	0.3	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	5.3	1.9	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	1.2	0.4	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	4.6	1.6	< 0.1	< 0.1
Coronene	DETSC 3301*	0.1	mg/kg	0.9	0.3	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	120	31	1.9	< 1.6
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis

Soil Samples

Our Ref 19-12789-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct

			Lab No	1527732	1527733	1527734
			Sample ID	WS003	WS003A	WS003A
			Depth	0.30	0.90	1.20
			Other ID	3	3	6
			Sample Type	ES	ES	ES
			Sampling Date	25/06/19	25/06/19	25/06/19
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Metals						
Arsenic	DETSC 2301#	0.2	mg/kg	56	37	16
Barium	DETSC 2301#	1.5	mg/kg	210	180	65
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.6	0.4	0.4
Cadmium	DETSC 2301#	0.1	mg/kg	1.9	1.5	0.4
Chromium	DETSC 2301#	0.15	mg/kg	86	130	25
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	120	100	28
Lead	DETSC 2301#	0.3	mg/kg	270	190	55
Mercury	DETSC 2325#	0.05	mg/kg	0.80	1.1	0.12
Nickel	DETSC 2301#	1	mg/kg	26	24	13
Selenium	DETSC 2301#	0.5	mg/kg	1.8	1.3	1.7
Vanadium	DETSC 2301#	0.8	mg/kg	48	32	34
Zinc	DETSC 2301#	1	mg/kg	340	230	150
Inorganics						
pH	DETSC 2008#			7.8	6.9	7.5
Cyanide, Total	DETSC 2130#	0.1	mg/kg	1.8	4.1	0.1
Organic matter	DETSC 2002#	0.1	%	11	13	3.3
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	250	170	470
Sulphide	DETSC 2024*	10	mg/kg	12	20	< 10
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75	< 0.75	< 0.75
Petroleum Hydrocarbons						
EPH (C10-C25)	DETSC 3311	10	mg/kg	74	88	25
EPH (C25-C40)	DETSC 3311	10	mg/kg	78	100	17

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Summary of Chemical Analysis
Soil Samples

Our Ref 19-12789-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct

			Lab No	1527732	1527733	1527734
			Sample ID	WS003	WS003A	WS003A
			Depth	0.30	0.90	1.20
			Other ID	3	3	6
			Sample Type	ES	ES	ES
			Sampling Date	25/06/19	25/06/19	25/06/19
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
PAHs						
Naphthalene	DETSC 3301	0.1	mg/kg	0.3	0.2	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.3	0.3	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	0.5	0.5	0.2
Fluorene	DETSC 3301	0.1	mg/kg	0.4	0.7	0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	3.4	3.7	1.0
Anthracene	DETSC 3301	0.1	mg/kg	0.6	0.9	0.3
Fluoranthene	DETSC 3301	0.1	mg/kg	6.4	7.8	2.0
Pyrene	DETSC 3301	0.1	mg/kg	6.2	7.0	2.0
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	2.7	3.1	0.9
Chrysene	DETSC 3301	0.1	mg/kg	3.3	3.7	1.0
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	2.7	2.8	0.8
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	1.6	1.8	0.4
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	3.4	3.8	1.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	2.7	2.8	1.0
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.6	0.5	0.2
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	2.2	2.3	0.5
Coronene	DETSC 3301*	0.1	mg/kg	0.4	0.5	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	38	42	12
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-12789-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct
Sample Id WS001 3 0.60

Sample Numbers 1527728 1527735 1527736
Date Analysed 12/07/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	4.6	3	5	6
DETSC 2003# Loss On Ignition	%	6.7	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	360	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	120	100	n/a	n/a
DETSC 2008# pH	pH Units	8.3	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	3.1	2.2	0.006	0.024	0.5	2	25
DETSC 2306 Barium as Ba	12	13	0.02	0.13	20	100	300
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	0.95	0.41	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	3.7	2.1	0.007	0.024	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	1.2	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	0.6	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	1.4	0.62	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.74	0.24	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.45	0.32	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	< 1.3	< 1.3	< 0.002	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	2900	1200	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	430	160	0.86	2.06	10	150	500
DETSC 2055 Sulphate as SO4	7100	2300	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	87000	38000	174	462.8	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	6300	4100	12.6	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.8	7.5
DETSC 2009 Conductivity uS/cm	125	54
* Temperature*	21	21

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.115

Stage 1

Volume of Leachant L2*	0.204
Volume of Eluate VE1*	0.194

Stage 2

Volume of Leachant L8*	0.918
Volume of Eluate VE2*	0.878

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-12789-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct
Sample Id WS003 3 0.30
Sample Numbers 1527732 1527737 1527738
Date Analysed 12/07/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	9.9	3	5	6
DETSC 2003# Loss On Ignition	%	19	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	150	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	38	100	n/a	n/a
DETSC 2008# pH	pH Units	7.8	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	8.5	3.9	0.017	0.047	0.5	2	25
DETSC 2306 Barium as Ba	19	15	0.04	0.16	20	100	300
DETSC 2306 Cadmium as Cd	0.03	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	3.9	1.3	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	19	8.3	0.038	0.101	2	50	100
DETSC 2306 Mercury as Hg	0.03	0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	8.2	2.2	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	3.6	1.2	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	2	0.9	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	3.2	0.94	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.77	0.26	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	4.3	1.9	0.009	0.023	4	50	200
DETSC 2055 Chloride as Cl	7400	2100	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	1600	570	3.2	7.44	10	150	500
DETSC 2055 Sulphate as SO4	21000	15000	42	160.1	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	200000	67000	400	894.9	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	14000	6200	28	75.2	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.8	7.4
DETSC 2009 Conductivity uS/cm	287	95
* Temperature*	21	21

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.115

Stage 1

Volume of Leachant L2*	0.204
Volume of Eluate VE1*	0.194

Stage 2

Volume of Leachant L8*	0.918
Volume of Eluate VE2*	0.887

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
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WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-12789-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct
Sample Id WS003A 3 0.90
Sample Numbers 1527733 1527739 1527740
Date Analysed 12/07/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	9.6	3	5	6
DETSC 2003# Loss On Ignition	%	21	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	190	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	42	100	n/a	n/a
DETSC 2008# pH	pH Units	6.9	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	6.2	2.1	0.012	0.028	0.5	2	25
DETSC 2306 Barium as Ba	19	8.1	0.04	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	0.05	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	5.2	1.5	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	16	5.3	0.032	0.07	2	50	100
DETSC 2306 Mercury as Hg	0.03	0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	2.9	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	2.5	0.7	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	4.3	1.2	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	3.3	0.97	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.42	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	7.3	1.4	0.015	0.024	4	50	200
DETSC 2055 Chloride as Cl	4900	1500	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	590	210	1.18	2.72	10	150	500
DETSC 2055 Sulphate as SO4	8600	2900	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	89000	27000	178	370.6	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	13000	5600	26	68	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	6.8	7.3
DETSC 2009 Conductivity uS/cm	127	38.2
* Temperature*	21	21

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.109

Stage 1

Volume of Leachant L2*	0.187
Volume of Eluate VE1*	0.177

Stage 2

Volume of Leachant L8*	0.873
Volume of Eluate VE2*	0.822

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
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Summary of Asbestos Analysis

Soil Samples

Our Ref 19-12789-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1527728	WS001 3 0.60	SOIL	NAD	none	Luke Donaghy
1527729	WS002 3 0.20	SOIL	NAD	none	Luke Donaghy
1527730	WS002 6 1.20	SOIL	NAD	none	Luke Donaghy
1527731	WS002 14 2.20	SOIL	NAD	none	Luke Donaghy
1527732	WS003 3 0.30	SOIL	NAD	none	Luke Donaghy
1527733	WS003A 3 0.90	SOIL	NAD	none	Luke Donaghy
1527734	WS003A 6 1.20	SOIL	NAD	none	Luke Donaghy

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 19-12789-1
Client Ref 4208L(d)
Contract A629 Halifax Road Cavalry Arms Jct

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1527728	WS001 0.60 SOIL	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2	pH + Conductivity (7 days)	
1527729	WS002 0.20 SOIL	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2	pH + Conductivity (7 days)	
1527730	WS002 1.20 SOIL	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L	pH + Conductivity (7 days)	
1527731	WS002 2.20 SOIL	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L	pH + Conductivity (7 days)	
1527732	WS003 0.30 SOIL	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2	pH + Conductivity (7 days)	
1527733	WS003A 0.90 SOIL	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2	pH + Conductivity (7 days)	
1527734	WS003A 1.20 SOIL	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2	pH + Conductivity (7 days)	
1527735	WS001 0.60 LEACHATE	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527736	WS001 0.60 LEACHATE	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527737	WS003 0.30 LEACHATE	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527738	WS003 0.30 LEACHATE	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527739	WS003A 0.90 LEACHATE	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527740	WS003A 0.90 LEACHATE	25/06/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Certificate of Analysis

Certificate Number 19-12787-1

15-Jul-19

Client Allied Exploration & Geotechnics Limited
Unit 25
Stella Gill Industrial Estate
Pelton Fell
DH2 2RG

Our Reference 19-12787-1

Client Reference 4208L(d)

Order No CH1527

Contract Title A629 Halifax Road Cavalry Arms Jct

Description 3 Soil samples, 2 Leachate samples.

Date Received 05-Jul-19

Date Started 05-Jul-19

Date Completed 15-Jul-19

Test Procedures Identified by prefix DETSn (details on request).

Notes **This report supersedes 19-12787, amendments.**

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

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Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-12787-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
WS004	3	0.6	1527721	11/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets
WS005	3	0.3	1527722	11/07/2019	Dark brown gravelly, sandy CLAY including numerous rootlets (Possible made ground - plastic)
WS005	6	1.2	1527723	11/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets

Summary of Chemical Analysis

Soil Samples

Our Ref 19-12787-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct

			Lab No	1527721	1527722	1527723
			Sample ID	WS004	WS005	WS005
			Depth	0.60	0.30	1.20
			Other ID	3	3	6
			Sample Type	ES	ES	ES
			Sampling Date	25/06/19	26/06/19	26/06/19
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Metals						
Arsenic	DETSC 2301#	0.2	mg/kg	33	10	14
Barium	DETSC 2301#	1.5	mg/kg	120	53	55
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.5	0.4	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.5	0.3	0.3
Chromium	DETSC 2301#	0.15	mg/kg	25	15	20
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	64	25	27
Lead	DETSC 2301#	0.3	mg/kg	160	58	56
Mercury	DETSC 2325#	0.05	mg/kg	0.27	0.12	0.13
Nickel	DETSC 2301#	1	mg/kg	21	9.9	13
Selenium	DETSC 2301#	0.5	mg/kg	1.0	< 0.5	0.7
Vanadium	DETSC 2301#	0.8	mg/kg	49	23	32
Zinc	DETSC 2301#	1	mg/kg	130	71	87
Inorganics						
pH	DETSC 2008#			6.6	6.7	6.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.3	0.4	0.2
Organic matter	DETSC 2002#	0.1	%	8.3	9.6	4.4
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	22	44	26
Sulphide	DETSC 2024*	10	mg/kg	< 10	12	< 10
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75	< 0.75	< 0.75
Petroleum Hydrocarbons						
EPH (C10-C25)	DETSC 3311	10	mg/kg	61	32	22
EPH (C25-C40)	DETSC 3311	10	mg/kg	60	39	30

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis

Soil Samples

Our Ref 19-12787-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct

			Lab No	1527721	1527722	1527723
			Sample ID	WS004	WS005	WS005
			Depth	0.60	0.30	1.20
			Other ID	3	3	6
			Sample Type	ES	ES	ES
			Sampling Date	25/06/19	26/06/19	26/06/19
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
PAHs						
Naphthalene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.3	0.1	0.2
Acenaphthene	DETSC 3301	0.1	mg/kg	0.8	0.3	0.2
Fluorene	DETSC 3301	0.1	mg/kg	0.7	0.4	0.2
Phenanthrene	DETSC 3301	0.1	mg/kg	4.6	1.5	1.3
Anthracene	DETSC 3301	0.1	mg/kg	1.1	0.4	0.3
Fluoranthene	DETSC 3301	0.1	mg/kg	7.7	2.8	2.3
Pyrene	DETSC 3301	0.1	mg/kg	7.1	2.9	2.3
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	3.2	1.3	1.0
Chrysene	DETSC 3301	0.1	mg/kg	3.5	1.3	1.0
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	2.9	1.2	1.2
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	1.8	0.6	0.5
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	3.5	1.6	1.3
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	2.1	1.1	0.9
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.5	0.3	0.2
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	2.2	0.9	0.7
Coronene	DETSC 3301*	0.1	mg/kg	0.4	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	42	17	14
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-12787-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct
Sample Id WS005 6 1.20

Sample Numbers 1527723 1527724 1527725
Date Analysed 11/07/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	3.9	3	5	6
DETSC 2003# Loss On Ignition	%	7.7	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	53	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	14	100	n/a	n/a
DETSC 2008# pH	pH Units	6.3	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l		Amount Leached* mg/kg		WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
	2:1	8:1	LS2	LS10			
DETSC 2306 Arsenic as As	1.4	0.69	0.003	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	6.1	2.8	< 0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.03	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	1.9	0.71	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	7.9	1.9	0.016	0.029	2	50	100
DETSC 2306 Mercury as Hg	0.02	< 0.01	< 0.0004	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	1.8	0.6	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	3.3	1.4	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.91	0.21	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.49	0.27	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	4	5	0.008	0.048	4	50	200
DETSC 2055 Chloride as Cl	5300	1300	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	480	290	0.96	3.21	10	150	500
DETSC 2055 Sulphate as SO4	7800	2300	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	54000	17000	108	231.3	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	15000	5400	30	69.9	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	7.3	6.1
DETSC 2009 Conductivity uS/cm	77	24.6
* Temperature*	20	21

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.119

Stage 1

Volume of Leachant L2*	0.218
Volume of Eluate VE1*	0.198

Stage 2

Volume of Leachant L8*	0.956
Volume of Eluate VE2*	0.905

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*
** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

Summary of Asbestos Analysis

Soil Samples

Our Ref 19-12787-1
Client Ref 4208L(d)
Contract Title A629 Halifax Road Cavalry Arms Jct

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1527721	WS004 3 0.60	SOIL	NAD	none	Luke Donaghy
1527722	WS005 3 0.30	SOIL	NAD	none	Luke Donaghy
1527723	WS005 6 1.20	SOIL	NAD	none	Luke Donaghy

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 19-12787-1
Client Ref 4208L(d)
Contract A629 Halifax Road Cavalry Arms Jct

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1527721	WS004 0.60 SOIL	25/06/19	PG	pH + Conductivity (7 days)	Naphthalene, PAH FID, EPH/TPH
1527722	WS005 0.30 SOIL	26/06/19	PG	pH + Conductivity (7 days)	Naphthalene, PAH FID, EPH/TPH
1527723	WS005 1.20 SOIL	26/06/19	PG	pH + Conductivity (7 days)	BTEX, Naphthalene, PAH FID, PCB, EPH/TPH
1527724	WS005 1.20 LEACHATE	26/06/19	PG		
1527725	WS005 1.20 LEACHATE	26/06/19	PG		

Key: P-Plastic G-Bag

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

APPENDIX 3

GAS AND GROUNDWATER MONITORING

RECORD OF GAS MONITORING			
Scheme:	Cavalry Arms Junction, Huddersfield	Leeds CITY COUNCIL	
Scheme No:	446368		
Client:	Kirklees Council	**GEOTECHNICAL SECTION**	
Instrument Type:	Gas Data LMSxi Type G4.18 with flow pod	**Hole ID:**	WS002
Next Calibration:	December 2019		

Top of response zone (m):	1.50	**Response zone strata: Residual soil**
Base of response zone (m):	3.80	

Monitoring Round No:	1	2	3	4	5	6
Date:	24/07/2019	13/09/2019	07/10/2019	16/10/2019		
Time:	13:21	NR	NR	NR		
Water level (m bgl):	3.67	NR	NR	NR		
Atmospheric pressure (mb):	989	NR	NR	NR		
Differential pressure (Pa):	0.0	NR	NR	NR		
CH4 [LEL] peak (%):	0.0	NR	NR	NR		
CH4 peak (% v/v):	0.0	NR	NR	NR		
CH4 steady state (% v/v):	0.0	NR	NR	NR		
CO2 peak (% v/v):	2.8	NR	NR	NR		
CO2 steady state (% v/v):	2.8	NR	NR	NR		
O2 minimum (% v/v):	18.8	NR	NR	NR		
O2 steady state (% v/v):	18.8	NR	NR	NR		
H2S peak (ppm):	0.0	NR	NR	NR		
CO peak (ppm):	0.0	NR	NR	NR		
Gas flow peak (l/hr):	0.0	NR	NR	NR		
Gas flow steady (l/hr):	0.0	NR	NR	NR		
Weather conditions:	Clear	Cloudy	Cloudy	Cloudy		
Temperature (˚C):	23	14	10	9		
Wind (mph):	12	9	13	14		
Atmospheric pressure trend:	Steady	Steady	Falling	Steady		
Monitoring engineer:	HW	HW	HW	HW		

Comments:

NR = Not recorded

24/07/2019: Bottom of well = 3.80m bgl.

13/09/2019: Unable to access church grounds.

07/10/2019: Unable to access church grounds.

16/10/2019: Unable to access church grounds.

RECORD OF GAS MONITORING			
Scheme:	Cavalry Arms Junction, Huddersfield	Leeds CITY COUNCIL	
Scheme No:	446368		
Client:	Kirklees Council	**GEOTECHNICAL SECTION**	
Instrument Type:	Gas Data LMSxi Type G4.18 with flow pod	**Hole ID:**	WS005
Next Calibration:	December 2019		

Top of response zone (m):	0.70	**Response zone strata: Residual soil**
Base of response zone (m):	1.20	

Monitoring Round No:	1	2	3	4	5	6
Date:	24/07/2019	13/09/2019	07/10/2019	16/10/2019		
Time:	13:15	NR	NR	NR		
Water level (m bgl):	Dry	NR	NR	NR		
Atmospheric pressure (mb):	989	NR	NR	NR		
Differential pressure (Pa):	0.0	NR	NR	NR		
CH4 [LEL] peak (%):	0.0	NR	NR	NR		
CH4 peak (% v/v):	0.0	NR	NR	NR		
CH4 steady state (% v/v):	0.0	NR	NR	NR		
CO2 peak (% v/v):	0.8	NR	NR	NR		
CO2 steady state (% v/v):	0.8	NR	NR	NR		
O2 minimum (% v/v):	19.8	NR	NR	NR		
O2 steady state (% v/v):	19.8	NR	NR	NR		
H2S peak (ppm):	0.0	NR	NR	NR		
CO peak (ppm):	0.0	NR	NR	NR		
Gas flow peak (l/hr):	0.0	NR	NR	NR		
Gas flow steady (l/hr):	0.0	NR	NR	NR		
Weather conditions:	Clear	Cloudy	Cloudy	Cloudy		
Temperature (˚C):	23	14	10	9		
Wind (mph):	12	9	13	14		
Atmospheric pressure trend:	Steady	Steady	Falling	Steady		
Monitoring engineer:	HW	HW	HW	HW		

Comments:

NR = Not recorded

24/07/2019: Bottom of well = 1.10m bgl.

13/09/2019: Unable to access church grounds.

07/10/2019: Unable to access church grounds.

16/10/2019: Unable to access church grounds.