Ainley Top Highway Improvements, A629 Halifax Road, Huddersfield

Ground Investigation Report, Rev 1

Our Scheme Ref: 446367

Date: December 2021

City Development

Geotechnical Section

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1 Introduction

Leeds City Council (LCC) Geotechnical Section (GS) was requested by Kirklees Council to carry out a ground investigation for the proposed Ainley Top highway improvements. The site is approximately 3.5km north-west from Huddersfield town centre at approximately OS National Grid Reference E: 411600 N: 419130. See Figure 1.

The site is occupied by areas of existing highway verge and a grassed field, used for grazing livestock, to the south of the existing roundabout and A629 Blackley New Road. The site area also includes a rectangular parcel of land at the intersection between A629 Halifax Road and Yew Tree Road in the south-east corner of the site which was formerly occupied by a residential property (recently demolished). The proposed highway improvement works comprise the construction of a new carriageway to the south of the existing roundabout and A629 Blackley New Road and the construction of a new retaining wall to the west of A629 Halifax Road.

A desk study report has previously been undertaken by LCC GS, with the findings summarised in Section 2; full details and references are included in the original desk study report. The desk study included a risk assessment in line with CIRIA C552, Contaminated Land Risk Assessment. A Guide to Good Practice (2001). This report continues to update the conceptual site model presented in the desk study (see Appendix 4).

2 Existing/Desk Study Information

2.1 Site History

Although Halifax Road was shown on the earliest available map, the current highway layout was established in the early 1970s when the Ainley Top roundabout was constructed. Most of the site area has remained undeveloped open fields since the earliest map. A water course continues to exist in the west corner of the study site. The south-eastern corner of the site was occupied by a residential property from 1930 until it was recently demolished.

The historical maps show former collieries and infilled quarries in the surrounding area.

2.2 Geology

No superficial (drift) or artificial deposits are shown to be present within the site area. Surface soils are expected to be residual, formed by in-situ weathering of bedrock. However, given the site history made ground is expected to be present at the surface particularly in the location of the former residential property off Yew Tree Road.

The geological map indicates an area of worked ground on the western corner of the site area. This is associated with the existing highway cutting for A629 Blackley New Road.

The BGS geological map indicates the site is underlain by Carboniferous Lower Coal Measures strata comprising predominantly Stanningley Rock (sandstone). The conjectured outcrop of the 36 Yard Coal (0.50m thick maximum) is shown in the eastern part of the site and to the south-west and west of the site area.

This coal is indicated to be present to the south and west of its conjectured outcrop position. The south-east corner of the site is shown to be underlain by undifferentiated strata above the 36 Yard Coal. The undifferentiated strata will comprise predominantly mudstones and siltstones with thin beds of sandstone.

The geological map shows numerous faults in the locality. One of these geological faults is present within the south-eastern part of the site, orientated approximately south-west to north-east, and downthrown towards the south-east.

To the north of the site the Rishworth-Stainland Fault Zone forms a major east to west fracture belt, bounded to the south by the Birchencliffe Fault. Within the fault zone, bedrock dips are highly variable and apparently range up to 60 degrees close to fault planes.

The minor faults present within the immediately locality of the site was proved in workings of the Soft Bed and Hard Bed Coals that recorded throws up to 15m.

2.3 Hydrology and Hydrogeology

The underlying geological sequence is classified as a Secondary A aquifer, with the soils classified as having a stated high leaching potential. Source Protection Zones (SPZ) are not recorded below the site, within a distance of 250m or within the confined Aquifer. There are no recorded abstractions and no records for active Licensed Discharge Consent within 500m of the site.

There is a surface watercourse recorded in the south west site area that is shown crossing the site in an easterly direction to the north boundary by a culvert under Halifax Road. Groundsure Enviro Insight Report records this and other watercourses beyond 80m distant to be small rivers that are catchments for the Rivers Aire and Calder.

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

2.4 Mines, Quarries and Mineral Deposits

A Coal Authority (CA) report was obtained as part of the desk study assessment. The report states there have been past underground mining in the Halifax Soft Coal at 56m depth beneath the site and last mined in 1861. The extraction thickness is stated to be 0.80m and the seam is reported to dip at 3.3 degrees to the north.

The CA report states there are probable unrecorded shallow coal workings beneath the site and the 36 Yards Band Coal outcrops within the site area.

The Groundsure Geo Insight Report indicates an area of historical mining approximately 150m north-east of the site. The Geo Insight Report also identifies an on-site risk of Elland Flags (sandstone) mining, which can occur within other sandstone formations to those named the Elland Flags.

Although not stated by either the CA Mining Report or the Groundsure Geo Insight Report, there is a risk of seatearth (fireclay) workings in the locality. The BGS Technical Report WA/00/03 (2000) states the 2.6m thick Stanningley Rock is overlain by seatearth and two thin coal seams. Seatearth contain some valuable refractory clays and ganisters which were worked, with the associated coals, along the outcrop.

The two coal seams are identified as the Hard Bed Band Coal (below) and the 36 Yard Coal (above), but neither is reported to be persistent, and for simplicity the geological map treats the two coals as a single seam. The Hard Bed Band Coal is reported to vary in quality with 0.11m to 0.45m of good coal above 0.05m to 0.47m of ‘coaly shale and shaly coal’. The 36 Yard Coal is reported to be between 0.05m and 0.10m thick in the locality and is separated from the Hard Bed Band Coal by approximately 5m of siltstone, sandstone and seatearth.

There are no recorded quarries within the site area. However, there are old, infilled sandstone quarries shown on the geological maps and historical maps, located to the north-east, east and south of the site. The presence of unrecorded quarries within the site area cannot be ruled out.

2.5 Current and Previous Land Uses

The desk study describes no current or historical on-site industrial uses, however beyond 80m distant industries include container storage, sub-stations fuel stations and producers of textiles, fabrics or silk.

Historical industries have included a quarry beyond 40m and cuttings situated local to the site. Two depots are recorded to the north with unspecified pits, quarries and heaps occurring beyond 100m.

Environmental records report one inert landfill at 153m to the south east that is shown as active between 1981 and 1988.

3 Previous Ground Investigations

The archive boreholes to the north and to the west of the site report 0.45m of topsoil over 1.22m of soft and firm clay with weathered sandstone and mudstone below 1.68m below

ground level (bgl). Groundwater was encountered during formation of the boreholes at depths of between 1.37m and 3.66m bgl. No coal seams were encountered.

4 Ground Investigation

4.1 Sitework

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

The investigation comprised seven cable percussive boreholes (ref: BH001 to BH007) carried out to rock head at depths of between 1.00m and 3.50m bgl and four rotary boreholes (ref: BH002R to BH005R) carried out to depths of between 20.00m and 30.00m bgl using rotary coring and open hole techniques.

For each borehole, an inspection pit was hand excavated to 1.20m bgl to confirm the absence of services.

Additionally, nine machine excavated trial pits (ref: TP001 to TP009) were carried out to depths of between 1.30m and 3.80m bgl. Soakaway tests were also attempted in trial pits TP003 and TP005.

Gas and groundwater monitoring wells were constructed in rotary boreholes BH002R, BH003R and BH005R.

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

4.2 Laboratory Testing

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

5 Ground Conditions

5.1 Introduction

The ground investigation generally confirmed the expected ground conditions comprising topsoil and/or made ground at the surface over cohesive (clay) or granular (sand and gravel) residual soils over weathered bedrock. Generally, the thickness of the residual soil and depth to bedrock appears to increase towards the west.

The outcrop of the suspected 36 Yard Coal was found in the western corner of the site. The suspected 36 Yard Coal was also encountered at relatively shallow depth beneath the south-eastern part of the site, beneath the proposed retaining wall. The geological fault appears to have been confirmed between boreholes BH003R and BH004R.

The weathered bedrock was found to consist of sandstone, siltstone, mudstone and coal. An interpretative section has been produced; Geological Section A (see Figure 3). The line of section follows approximately the south and south-west edge of the proposed new highway (see Figure 2).

5.2 Made Ground and Topsoil

Made ground was found at the surface throughout the site area to depths of between 0.30m and 1.20m bgl. The made ground is expected to predominantly represent landscaping or fill associated with the existing highway construction.

In the south east of the site, made ground represented recent demolition materials of the residential property known to have existed off Yew Tree Road. Locally it also corresponded to service trench backfill areas. On encountering a 300mm diameter cast iron water pipe at 1.30m bgl, trial pit TP008 was terminated at 1.80m bgl.

Borehole BH007 only, reported possible made ground to 3.20m bgl comprising a variable sequence of very soft to very stiff clay with coal fragments. GS interpret these soils to represent crop workings into the 36 Yard Coal and associated fireclay(s). This interpretation is supported by the adjacent trial pit TP009, which reported a weathered coal seam below 2.20m bgl.

Made ground was predominantly reported to comprise reworked topsoil, sandy gravelly clay and clayey sandy gravel with occasional cobbles and boulders. The anthropogenic constituents comprised gravel to boulder sized fragments of sandstone, mudstone, brick, concrete, tile, glass, pottery, wood, slate, breeze blocks, paving slabs and plastic bags.

Where no made ground was present, topsoil was encountered at the surface to depths of between 0.10m and 0.40m bgl. No visual or olfactory evidence of significant contamination was observed within the made ground soils.

No Standard Penetration Tests (SPTs) were carried out in the made ground and no geotechnical laboratory tests were carried out on samples of the made ground.

5.3 Residual Soil

Natural residual soils were encountered beneath the surface of made ground and/or topsoil in all of the exploratory holes throughout the site area.

Where proven, the thickness of the residual soils was reported to be between 0.10m and 3.10m bgl and the thickness of the residual soil appears to increase towards the west. The residual soils generally consist of soft to very stiff (typically firm to stiff) sandy gravelly clay and medium dense to very dense clayey sand and gravel with cobbles and boulders. Gravel to boulder sized fragments were reported as sandstone, siltstone, mudstone and coal.

Six SPTs were attempted in the residual soil at depths of between 0.90m and 2.95m bgl. Four of the SPTs achieved refusal (N=>50). The two complete SPTs report corrected N-values of 16 (BH007 2.50m depth) and 25 (BH002 1.50m depth).

Seven particle size distribution tests were carried out on samples of the residual soils from depths of between 0.50m and 2.60m bgl. The tests report between 22% and 86% fines (clay and silt), between 14% and 58% sand and between 0.2% and 31% gravel sized fragments.

Four plasticity tests were carried out on the cohesive residual soils and report modified plastic indices between 15% and 32% (low to medium volume change potential). Moisture contents are reported between 15% and 34%.

5.4 Bedrock

Weathered bedrock was encountered at depths of between 0.90m and 3.50m bgl. Weathered bedrock was found to comprise extremely weak to medium strong sandstone and extremely weak to weak mudstone, siltstone and coal.

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

Fifteen point load tests were undertaken on samples of sandstone, siltstone and mudstone bedrock taken from boreholes BH002R and BH003R at depths of between 4.45m and 10.10m bgl.

The rock tests show significant variation in apparent strength with mudstone generally being the weakest, sandstone the strongest and siltstone having intermediate strength.

Point load strength indices between 0.155 MN/m^2 and 1.302 MN/m^2 are reported for the 7 no. uni-axial tests and between 0.719 MN/m^2 and 2.134 MN/m^2 for the 5 no. diametral tests.

Omitting the highest and lowest results, the rock mass has a mean axial point load strength index of between 0.480 MN/m^2 (axial tests only) and 0.658 MN/m^2 (axial and irregular lump tests).

The point load tests report a mean diametral point load strength index of 1.300 MN/m^2. It should be noted that the mean diametral point load strength index should be lower than the mean axial point load strength index. GS suspect the results reflect a sampling effect that has

skewed the dataset, i.e., there were fewer diametral tests on generally stronger samples of rock.

The mean axial point load strength index approximately correlates to a uniaxial compressive strength (UCS) of between 10 MPa and 15 MPa or ‘weak’ rock. It was not possible to carry out laboratory UCS tests due to the fragmented nature of the recovered rock core.

Rock quality designations (RQD) were measured for the rock cores obtained from BH002R and BH003R. RQD represents the percentage of total intact core pieces greater than 100mm compared to the total core run length. RQD values of greater than 75% generally indicate good quality rock. Generally, a RQD of between 0% and 50% was recorded for the rock mass, indicating very poor to poor rock quality, and showing no significant improvement with depth. However, RQD was slightly improved (>50%) within the sandstone bedrock.

5.5 Coal Seams

The outcrop of the suspected 36 Yard Coal was found in the western corner of the site in TP009. The adjacent borehole BH007 reports possible made ground to 3.20m bgl, comprising a variable sequence of very soft to very stiff clay with coal fragments. GS suspect these soils are made ground and represent crop workings into the 36 Yard Coal and associated fireclay(s).

The 36 Yard Coal and/or the Hard Bed Band Coal were also identified at relatively shallow depth in the south-eastern part of the site, in boreholes BH002R and BH003R, at depths of between 8.20m and 9.10m bgl. No evidence of mine workings was found in boreholes BH002R and BH003R beneath the proposed retaining wall.

Samples of coal from BH007 and TP009 were tested for Calorific Value (CV). The CV results are reported to be between 4.9 MJ/kg and 21.1 MJ/kg. Generally, materials with a CV between 2 MJ/kg and 10 MJ/kg are considered to have the potential to combust and materials with a CV in excess of 10 MJ/kg are considered to pose a significant risk of combustion.

5.6 Groundwater

During the intrusive investigation groundwater was not encountered. Post site-work groundwater monitoring recorded groundwater levels between 4.36m and 6.22m bgl in the location of the proposed retaining wall (ref: BH002R and BH003R).

The monitoring well in BH005R consistently reported very shallow groundwater levels, between ground level and 0.53m bgl, in the centre of the site area. A watercourse appeared to be shown on the early historical maps in this location. It is unclear whether this monitoring well accurately represents the groundwater regime in this part of the site or relates to localised surface water flooding.

6 Contamination Assessment

6.1 Preliminary Conceptual Site Model

The Preliminary Conceptual Site Model put forward by the desk study identified the following pollutant linkages. Following this Ground Investigation, it has not been considered necessary to increase or amend these Pollutant Linkages. The Updated Conceptual Site Model and its recommendations can be found at Appendix 4.

TABLE 6-1: SUMMARY OF THE PRELIMINARY CONCEPTUAL SITE MODEL.

Source	Potential Hazard	Pathways	Potential Receptor
Made ground, (Redundant cellars) Undefined buried waste, (historical fill in quarries local to the site) Shallow coal or mine workings Historical industries local to the site (depots and textile mills)	Metals, oils, fuel PAH, TPH, asbestos, sharps,	Dermal contact, ingestion and inhalation of dust, fibres and soils.	Current site users
			Future site users
			Ground workers including ground investigation, utility providers construction and or demolition.
		Ingress of contaminants i.e.PAHs into pipes, drinking water or services.	Services or their users
		Leachability of contaminants within or off site.	Surface Aquifer (No significant superficial deposits recorded)
			Underlying Aquifer (Secondary A). No Source Protection Zones or abstractions within 240m,
			Surface water features (Within site Area)
	Ground gasses, vapours	Inhalation of dust or vapours.	Structures/persons above or adjacent to the proposals.
		Migration of gasses or vapours via ground faults or below ground structures.	

6.2 Contamination Screening

The test results have been compared against the Generic Assessment Criteria (GAC) Values, provided by the Chartered Institute of Environmental Health (CIEH) and those provided by DEFRA as Suitable for Use C4SL Values.

Although the majority of the site is proposed to be covered with hardstanding, there are areas of improved pedestrian access and soft landscaping, and the development is in close proximity to residential developments, therefore GAC values for Public Open Space (Residential) (POS $_{residential}$) end use has been used for initial risk assessment purposes.

Site values for organics were between 1.1% and 7.0% and the site average was 3.2%, therefore organic matter content of and 1.0%, 2.5% and 6% were all considered as both appropriately conservative to the respective guidance values and the sample locations. All samples were additionally screened for asbestos.

6.3 Asbestos

No asbestos fibres or asbestos containing material was found in any of the samples tested, nevertheless by its very nature this particular contaminant is variable in its deposition and groundworkers should be appropriately trained and remain vigilant.

6.4 Soil Assessment

When compared against the criteria for POS $_{residential}$, four of the surface samples in the location of BH002, TP006, BH003 and TP001 had slightly elevated values for Dibenzo(a,h) anthracene.

All of these locations except TP006 were also slightly elevated for benzo(b)fluoranthene and benzo(a) pyrene. BH002 and TP001 only had slightly elevated values for benzo (a) anthracene and BH002 only showed a minor elevation with respect to chrysene.

It was noted that all of these locations except TP006 were in an isolated corner at the south east of the site, in near proximity to an area described by the desk study as having been occupied by a recently demolished building.

All of the elevated samples were from depths above 0.40m from ground level. In all cases except the BH002 a second sample was taken at a depth at or less than 0.50m below the elevated sample and this second sample was found to be below guidance values.

The maximum values recorded were less than nine times the acceptable value for the guidance. This suggests that while localised surface elevations may exist, they will be suitably

mitigated by removal or covering with a clean imported soil and / or hard standing, however LCC GS understand that soils in the south east corner will be removed from site.

TABLE 6-2: SUMMARY OF CONTAMINATION TESTING VS POS $_{RESIDENTIAL}$ END USE.

CONTAMINATION TESTING SUMMARY AND GAC							
Site:	Ainley Top						
Date:	24 11 2021	Table 2					
Analyte	No. of Samples	Maximum Concentration	95th Percentile	No. of samples >GAC	GAC (mg/kg)	GAC Source	
		(mg/kg)					
Asbestos	17	None Detected		0		-	
Arsenic	17	43	19	0	79	C4SL&LQM S4ULs	Inorganics
Boron	17	1.1	0.8	0	21000	LQM/CIEH S4ULs	
Cadmium	17	1.5	0.98	0	120	LQM/CIEH S4ULs	
Chromium	17	50	41.2	0	1500	LQM/CIEH S4ULs	
Chromium VI	17	1	1	0	8	LQM/CIEH S4ULs	
Copper	17	110	95.6	0	12000	LQM/CIEH S4ULs	
Elemental Mercury	17	0.1	0.095	0	16	LQM/CIEH S4ULs	
Nickel	17	34	22	0	230	LQM/CIEH S4ULs	
Selenium	17	1.5	< 0.5	0	2000	LQM/CIEH S4ULs	
Vanadium	17	59	48.6	0	2000	LQM/CIEH S4ULs	
Zinc	17	620	220	0	81000	LQM/CIEH S4ULs	
Lead	17	310	206	0	630	C4SL (SP1010)	
Organic Matter (%)	17	7	n/a	0		2.50%	Organics - PAHs
Acenaphthene	17	9.2	7.345	0	15000	LQM/CIEH S4ULs	
Acenaphthylene	17	13	12.16	0	15000	LQM/CIEH S4ULs	
Anthracene	17	26	25.6	0	74000	LQM/CIEH S4ULs	
Benzo(a)anthracene	17	60	49.6	2	29	LQM/CIEH S4ULs	
Benzo(a)pyrene	17	49	42.2	3	5.7	LQM/CIEH S4ULs	
Benzo(b)fluoranthene	17	36	31.2	3	7.2	LQM/CIEH S4ULs	
Benzo(g,h,i)perylene	17	32	27.6	0	640	LQM/CIEH S4ULs	
Benzo(k)fluoranthene	17	21	18.2	0	190	LQM/CIEH S4ULs	
Chrysene	17	67	53.5	1	57	LQM/CIEH S4ULs	
Dibenzo(a,h)anthracene	17	4.9	4.655	4	0.57	LQM/CIEH S4ULs	
Fluoranthene	17	120	102	0	3100	LQM/CIEH S4ULs	
Fluorene	17	15	14	0	9900	LQM/CIEH S4ULs	
Indeno(1,2,3-cd)pyrene	17	35	30.2	0	82	LQM/CIEH S4ULs	
Naphthalene	17	4.1	4	0	4900	LQM/CIEH S4ULs	
Phenanthrene	17	89	81.35	0	3100	LQM/CIEH S4ULs	
Pyrene	17	120	95.4	0	7400	LQM/CIEH S4ULs	
Notes:							
GAC = Generic Assessment Criteria based on Public Open Space Residential end use. GAC from Chartered Institute of Environmental Health LQM and / or DEFRA C4SL based on Soil Organic Matter at 2.5%							

6.5 Remediation Recommendations

The initial assessment has revealed some limited PAH contamination which is considered to represent recent demolition rubble in soils exposed at the surface in the south-east corner of the site. The current development proposal (see Appendix 1) shows the surface made ground in the location of BH002, BH003 and TP001 will be removed during construction of the proposed retaining wall, therefore the made ground will be excavated and removed from site as part of the works.

If it is proposed to retain made ground soils as landscaping or engineered fill as part of the permanent works, procedurally soils should be covered with a minimum thickness of 600mm of clean imported topsoil. In proximity to any shallow coal this should be raised to a 1000mm thickness and will preferably include a lower layer of compacted stiff clay or similar barrier layer of inert material.

Any soil remediation should be surveyed and validated in accordance with the requirements of Technical Guidance for Developers, Landowners & Consultants - (v11.2) June 2020 by the Yorkshire and Lincolnshire Pollution Advisory Group.

6.6 Ground Gas

Three gas and groundwater monitoring wells were constructed in rotary boreholes BH002R, BH003R and BH005R. The wells were monitored on up to five occasions between September and November 2019 (see Appendix 3). Five visits were possible for BH002R and BH0003R. Unfortunately, readings from BH005R were not possible after the initial reading on the 13th September 2019 as a result of surface water flooding.

The gas monitoring for BH003R, identified unusual differential pressure readings (up to 681 Pa maximum) and both positive and negative gas flow readings (up to 93.4 l/hr maximum).

The unusual pressure readings were attributed to a phenomenon known as barometric pumping which is believed to have resulted from the well having a relatively deep response zone (5.00m to 16.00m bgl) within the bedrock. The well was also near a geological fault. Barometric Pumping causes anomalous flow rates if the pressure in the ground does not equalise readily with atmospheric pressure and occurs when the ground is either sealed or of low permeability.

The readings at this location were undertaken using two different pieces of equipment, however both were calibrated and used over a range of atmospheric pressures. Barometric pumping was experienced throughout the monitoring period.

The available gas monitoring did not reveal any significant methane (>1%) or carbon dioxide (>5%) and no significant gas flow was recorded (0.3l/hr maximum).

In conclusion, up to five records at BH002R were possible and no significant concentrations of methane, carbon dioxide, carbon monoxide or hydrogen sulphide were recorded during the monitoring. The monitoring was for both periods of high and low atmospheric pressure.

In addition, significant average thicknesses of made ground were not encountered (>3.0m) and the majority of made ground that will remain on site is considered likely to have been in place in excess of 20 years. No sizable hydrocarbon contamination was reported.

The risk to the structures surrounding the site has been reappraised to LOW and the conceptual site model has been adjusted accordingly. (see Appendix 4).

The desk study has previously established that no onsite radon risk exists.

6.7 Waste Disposal

Eleven Waste Acceptance Criteria (WAC) tests were carried out to assess the disposal implications for the made ground (6 no. samples) and natural soils (5 no. samples).

Of the eleven samples tested, four samples (2 no. of made ground and 2 no. natural soils) report concentrations of all determinants below the Inert Waste limit values.

For both the made ground and natural soils the remaining WAC tests report marginal exceedances of both the Inert Waste and Stable Non-Reactive Hazardous Waste (SNRHW) limits with respect to pH, Total Organic Carbon (TOC) and Loss on Ignition (LOI).

Site soils will require to be processed before moving to land fill. In this respect the samples would require to be processed to address Low (acidic) pH values that appear to be widespread within the natural soils and topsoil throughout the site. TOC and LOI that are expected to reflect the organic content of these soils (Organic content reported to be up to 7%).

The values reported for WAC leachate testing were not significantly elevated with respect to hydrocarbons, metals or non-metals and in this respect the risks to groundwater from excavating, moving or disturbing site wastes is reappraised to low (See Appendix 4).

7 Geotechnical Assessment

7.1 Mining and Quarrying

The majority of the site area is not at risk from past mine workings. However, in the western corner of the site (area of BH007 and TP009) crop workings may be present in the form of shallow opencast type excavations into the 36 Yard Coal and associated fireclay(s). These potential workings present a modest risk to the proposed development as the proposed highway will be in cutting in this location and any old mine workings present should be easily identified in the new cutting slopes. If crop workings are exposed in cutting slopes, any soft or

insecure soils shall be excavated (500mm minimum) and replaced immediately with ST2 concrete, well rammed into the cleaned-out void. For larger areas, the insecure soils should be excavated and the resulting cavity filled with ST2 concrete or with masonry infill including weep holes.

In the south-eastern part of the site, in the location of the proposed retaining wall, the 36 Yard Coal and/or the Hard Bed Band Coal were identified at relatively shallow depth (between 8.20m and 9.10m bgl). Although no evidence of mine workings was found during the ground investigation, the possibility of localised workings cannot be entirely ruled out.

The south eastern area will be subject to a substantial new cutting (approximately 4m maximum) to facilitate the proposed widening of A629 Halifax Road and construction of the retaining wall. It is recommended that the resulting exposure is examined by an experienced geotechnical engineer to check for evidence of mine workings.

If any evidence of suspected mine workings, circular features or anomalous areas of deep made ground are encountered, further advice should be sought.

7.2 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 proposed scheme shows two areas of cut. The first is shown in the south-eastern part of the site, to the north of Yew Tree Road and in the location of the proposed retaining wall, between approximate Chainage (Ch) 45m to 145m and 4m maximum height. The second area of cut is shown in the western corner of the site, adjacent to A629 Blackley New Road, between approximate Ch 285m to 360m and 2m maximum height.

The proposed cutting to the north of Yew Tree Road will be within made ground, natural residual soils and weathered bedrock. The proposed retaining wall construction will require excavation up to approximately 4m into the weathered sandstone and mudstone bedrock. The logging measurements (RQD, Fracture Index) suggest the rock mass to be poor quality and highly fractured. The laboratory tests report mean axial point load strength index of between 0.480 MN/m^2 and 0.658 MN/m^2, approximately correlating to a ‘weak’ rock.

The proposed cutting to the north of Yew Tree Road will be predominantly within weathered sandstone bedrock (see Figure 3). Cut faces in sandstone may remain stable at steep angles but the presence of interbedded siltstones and mudstones reduce stability. Temporary excavations into mudstone should be stable however, slumping may occur in highly weathered zones and the mudstones are highly susceptible to deterioration and softening when relieved

of overburden pressure and in the presence of water. To prevent deterioration in open excavations, the exposed mudstones should be covered with a layer of blinding concrete or plastic sheeting/tarpaulins. To the north of BH003, a geological fault is likely to be encountered during excavation and present as a zone of highly weathered and fractured rock. Treatment should be consistent with the potential crop workings; any insecure soils should be excavated and the resulting cavity filled with ST2 concrete or with masonry infill including weep holes.

The proposed cutting in the western corner of the site will be within natural residual soils. No excavation problems are expected. Side slopes of 1(vertical) in 3(horizontal) are recommended for preliminary design.

The ground investigation data indicates that shallow groundwater may be encountered in the centre of the site area, adjacent to the existing roundabout. The monitoring well constructed in BH005R consistently reports very shallow groundwater levels, however, it is unclear whether this monitoring well accurately represents the groundwater regime in this part of the site or relates to localised surface water flooding.

In the location of the proposed cutting and retaining wall groundwater levels between 4.36m and 6.22m bgl were recorded in BH002R and BH003R. Groundwater may be encountered in excavations for the retaining wall foundations and/or within the proposed cutting slope from siltstone and sandstone beds. Dewatering will be required where groundwater seepages are encountered. Excavations within the surface made ground and natural residual soils are likely to be unstable and may require full support. Excavations may encounter coal within the natural strata at shallow depth in the western corner of the site. Where encountered, the coal shall be excavated and sealed in all directions with a minimum of 1000mm of cohesive fill to mitigate against the possibility of spontaneous combustion.

It should be possible to re-use the soils generated by the proposed excavation works as engineered fill however, these soils will require processing prior to reuse as fill to remove coarse particles and unsuitable materials. The laboratory tests suggest the weathered sandstone will likely classify as Class 1A well graded granular material and the residual soils as Class 2A wet cohesive material and Class 2C stoney cohesive material. Weathered mudstone will likely classify as Class 1A and/or 2C depending on its state of weathering.

All earthworks shall be carried out in accordance with Specification for Highway Works (SHW) Series 600.

7.3 Concrete

Soil and rock samples from depths of between 0.20m and 10.55m bgl were analysed for water soluble sulphate and pH. Concentrations of water-soluble sulfate ranged from <10 mg/l to 400 mg/l. pH values are reported to vary between 4.4 and 10.3.

In accordance with BRE SD1, the characteristic value for sulphate and pH are taken to be 200 mg/l and 5.1 respectively and the groundwater is considered to be mobile. Design Sulfate Class DS-1 ACEC Class AC-3z should be employed for below ground concrete.

7.4 Proposed Retaining Wall

To accommodate the proposed highway widening a new retaining wall is proposed on the west side of A629 Halifax Road, to the north of Yew Tree Road, between approximately Ch 45m and 145m (approximately 100m length). No proposed ground loadings were available for the proposed retaining wall at the time of the ground investigation.

The proposed cross-sections (see Appendix 1) appear to show the retaining wall to attain a maximum height of 2m between Ch 80m and 100m with a slope above. The proposed retaining wall will be founded on weathered bedrock for the majority of its length. A conventional mass gravity reinforced foundation is appropriate and there should be adequate bearing capacity available on the weathered bedrock.

The foundation excavation for the retaining wall should be checked by an experienced geotechnical engineer for evidence of mine workings and in the location of the geological fault (see Figure 2) to confirm if any additional treatment or strengthening works are required.

The slope above the wall will require drainage and erosion protection. Drainage should be provided at the crest of the slope and above the proposed retaining wall. Slope angles should generally not be cut steeper than 1 (vertical) in 3 (horizontal) in soils without reinforcement and the cutting face shall be benched to retain topsoil. An approved, erosion control product is also recommended on the slope above the retaining wall.

7.5 Highways

Non-engineered made ground cannot be left untreated in-situ beneath the proposed highway. However, proposed highway levels are generally at or below existing ground level for the majority of the scheme and the only significant thickness of made ground was found in TP004 (1.20m). Where encountered, it is recommended that the full thickness of made ground is excavated and replaced with engineered fill.

The majority of the highway construction will be over natural cohesive (clay) residual soils however, in the location of the proposed retaining wall the subgrade will be over weathered bedrock (approximately Ch 45m to 120m).

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 or 325mm subbase over 250mm capping as a minimum. For preliminary design purposes the weathered bedrock should be assumed to have a CBR of 10%. The highway pavement foundation shall therefore comprise either 250mm of subbase only or 175mm subbase over 175mm capping as a minimum.

7.6 Surface Water Drainage

Two soakaway tests were attempted in locations specified by KMC, to the south of the proposed new highway, in trial pits TP003 and TP005. For both tests insufficient drainage was observed, over a period between 245 minutes and 290 minutes, to calculate a soil infiltration rate and the tests were terminated. The test records are presented in Appendix 2.

It may be possible to construct soakaways in the sandstone bedrock in the location of borehole BH005 however, the soakaways may need to be up to 4m deep and shallow groundwater may be present. It may also be possible to construct a permeable pavement type construction at the south-eastern end of the scheme where the highway subgrade is weathered sandstone. Unfortunately, permeable pavements are not appropriate where gradients exceed 1(v) in 20(h) as water will simply run-off the surface rather than soaking through.

On site attenuation with a restricted discharge to a watercourse or sewer is recommended.

CITY DEVELOPMENT GEOTECHNICAL SECTION

Ainley Top Highway Improvements, A629 Halifax Road, Huddersfield

Site Location Plan

KEY:

= THE SITE

SCALE @ A3: 1:25,000

DATE: February 2020

SCHEME NO: 446367

FIGURE: 1

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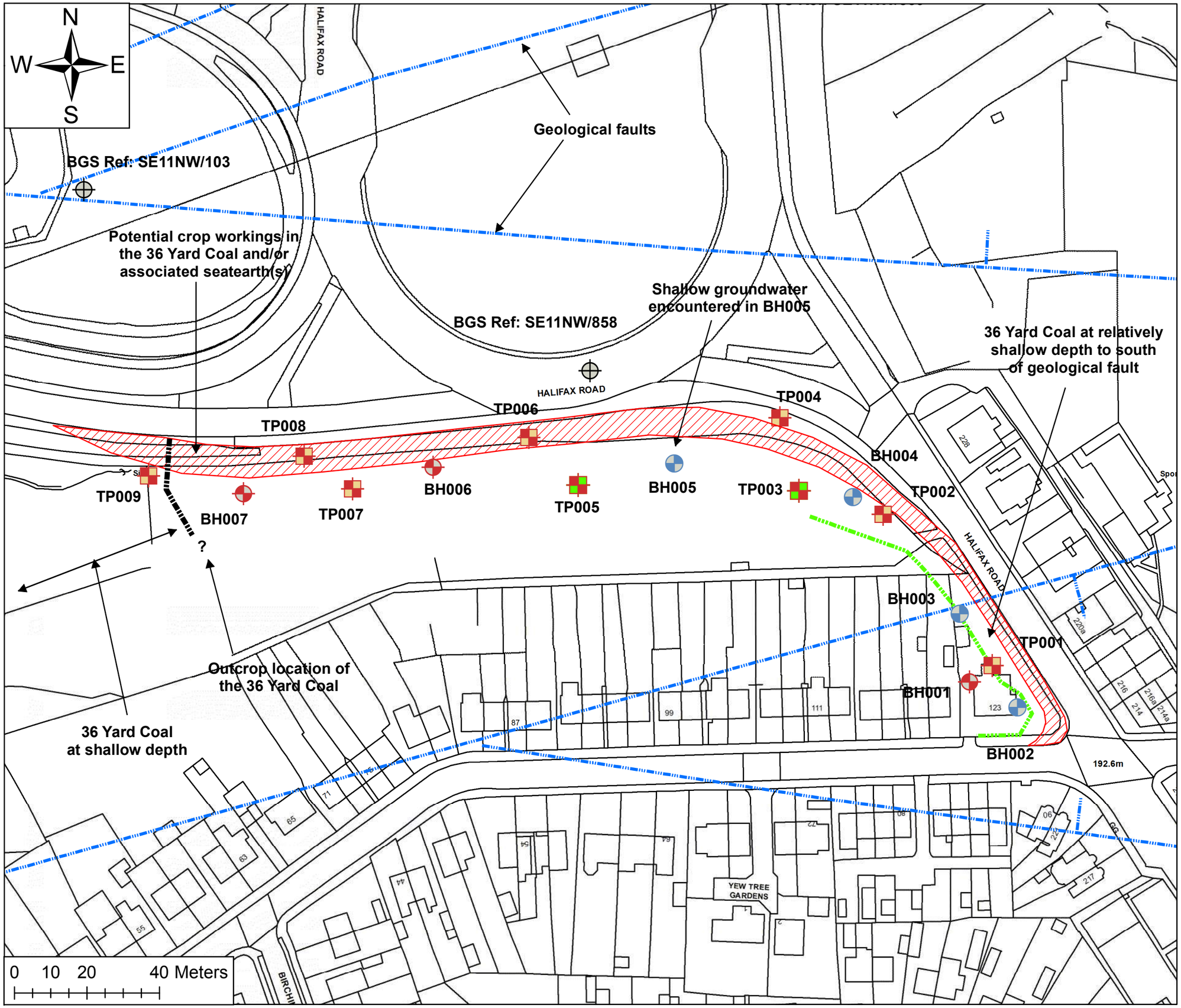

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CITY DEVELOPMENT GEOTECHNICAL SECTION

Ainley Top Highway Improvements, A629 Halifax Road, Huddersfield

Site Layout Plan

KEY:

- = Archive boreholes
- = Geological faults as shown on 1:10K BGS map (approximate)
- = Cable percussive borehole
- = Cable percussive with rotary follow-on borehole
- = Trial pit
- = Trial pit with soakaway test attempted (no infiltration)
- = Proposed retaining wall
- = Proposed new highway

Note, line of Geological Section A (see Figure 3) follows approximately the south/south-west edge of proposed new highway area

SCALE @ A3: 1:1,000

DATE: February 2020

SCHEME NO: 446367

FIGURE: 2

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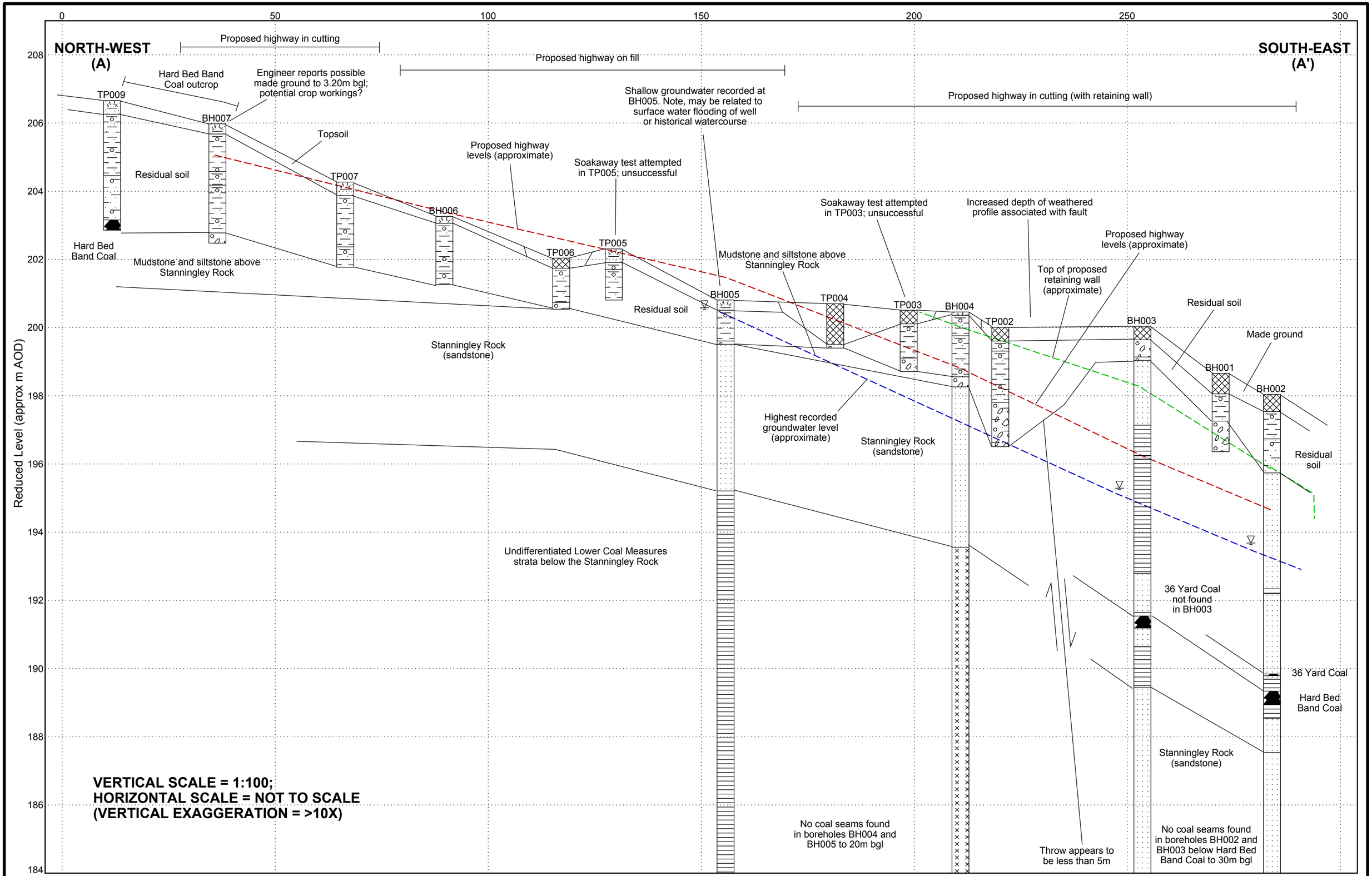


CITY DEVELOPMENT
Geotechnical Section
3rd Floor
St George's House
40 Great George Street
Leeds LS1 3DL

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

Date
Feb 2020

Sheet Size
A3

FIGURE 3 / GEOLOGICAL SECTION A

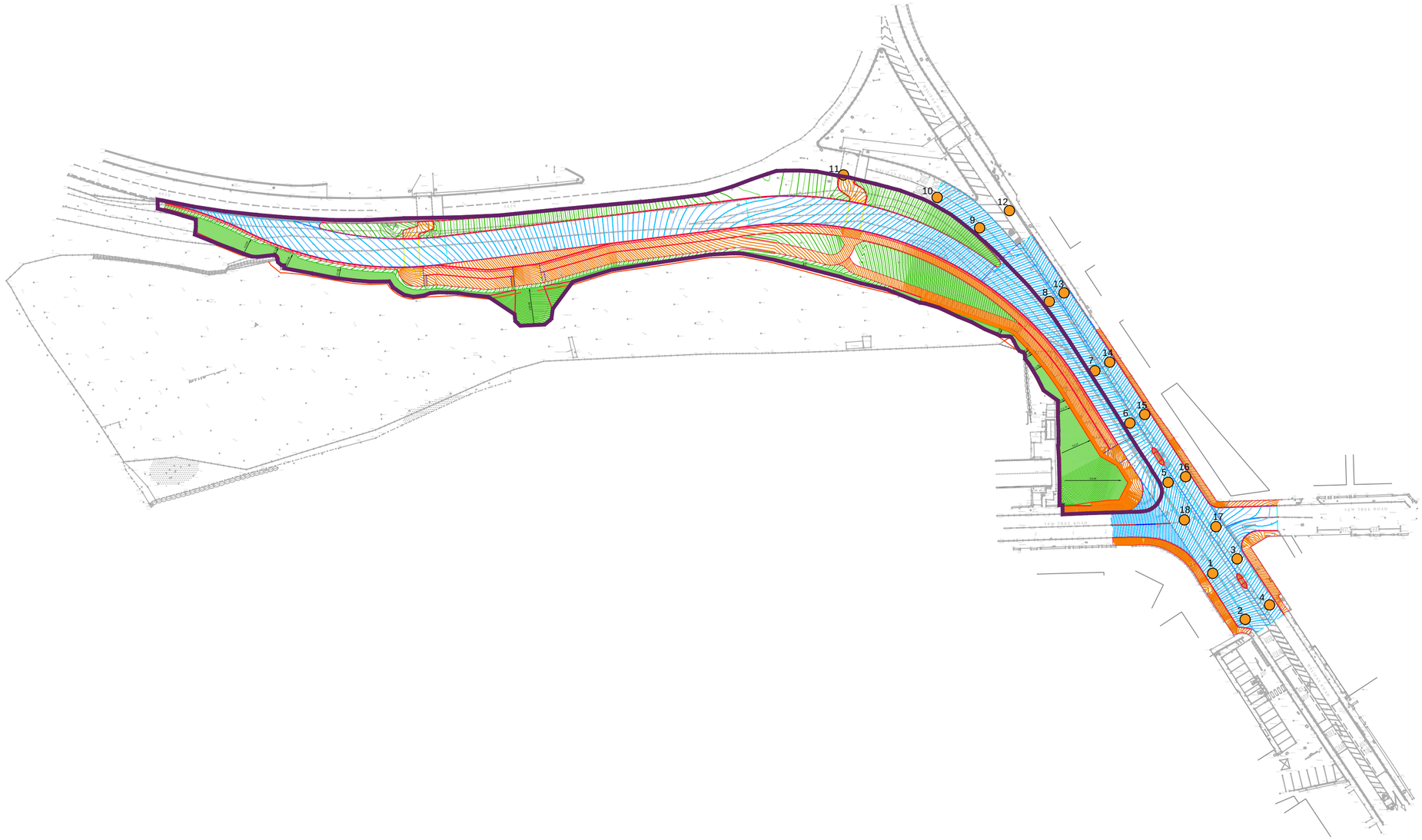
Client: Kirklees Council

Project: Ainley Top Highway Improvements

Number: 446367

APPENDIX 1

PROPOSED DEVELOPMENT



= Approx. Extents of Construction.

12 = Approx Core Test Location.

Typical Cross Section

CORE SAMPLES

LOCATION	Wearing Course	Binder Course	Bitumen Base	Concrete Base
1	45	135	N/A	N/A
2	45	120		35
3	40	100		150
4	40	115		180
5	25	95	105	
6	30	60	180	
7	25	85	195	
8	25	90	180	
9	35	75	220	
10	30	55	215	
11	30	90	185	
12	30	60	210	
13	30	65	195	
14	50	145	80	
15	15	55	N/A	N/A
16	40	150	N/A	N/A
17	60	80		265
18	65	75	N/A	N/A

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Kirklees COUNCIL

Streetscene & Housing
Flint Street, Fartown
Huddersfield, HD1 6LG

SECTION HD

DRAWN RM | CHECKED

SCALE NTS | PROJECT NO. 25/12448 | DATE 03/12/18

PROJECT
A629 Halifax Road
Highway Improvements

TITLE
Geotecnical Base Plan
Showing Core Samples

DRAWING No. HD/25/12448/SURVEY/001

CAD No.

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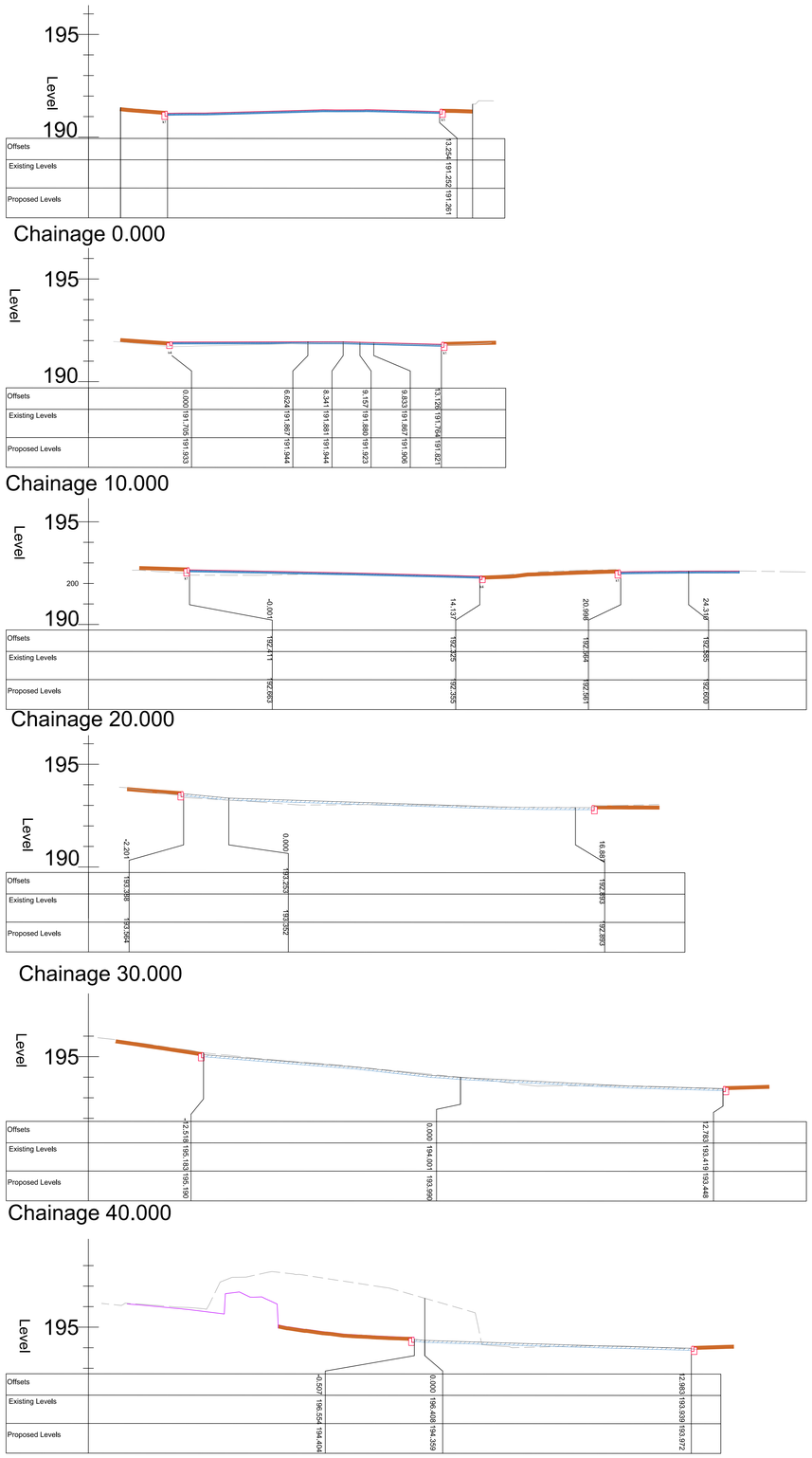

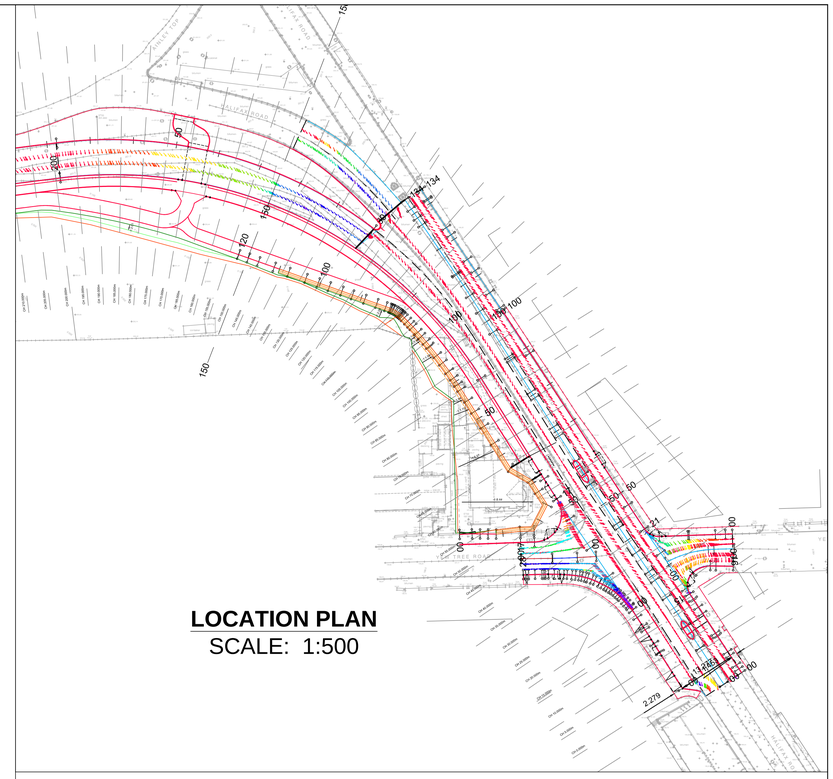

CROSS SECTION 0.0-50.0
SCALE 1:200

Preliminary Design

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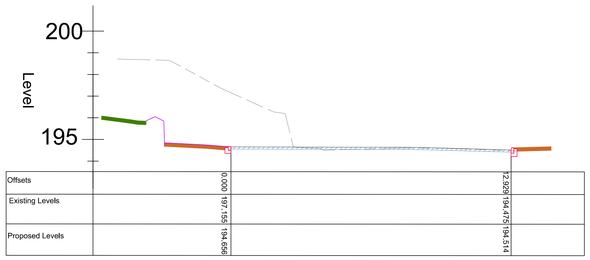
SCALE	AS SHOWN	PROJECT NO. 25/12488
DATE	MAY 2019	

PROJECT
WYTF–A629
HALIFAX ROAD
CORRIDOR IMPROVEMENT

TITLE
LONG SECTION & CROSS SECTION OF MC03
AINLEY TOP

DRAWING No. TF5//HD/25/12448/AT/LS-01

CAD No.



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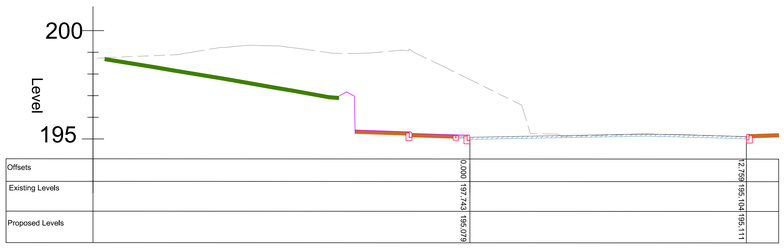

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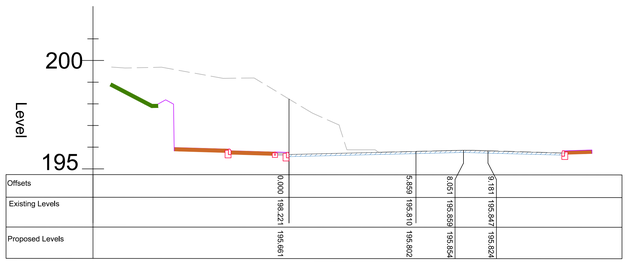

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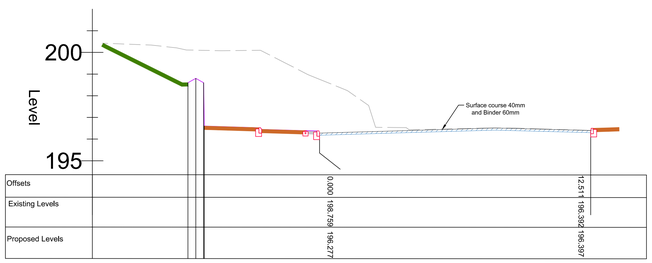

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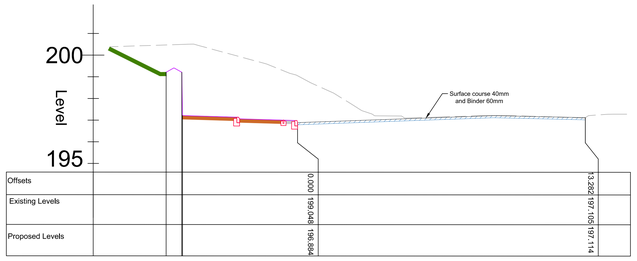

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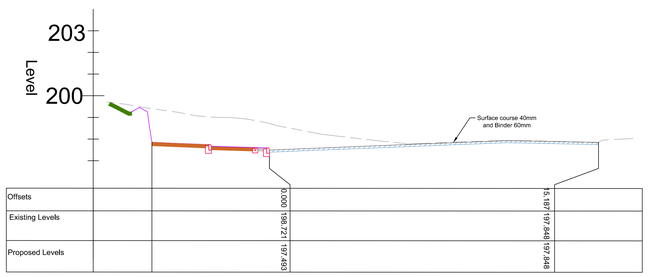

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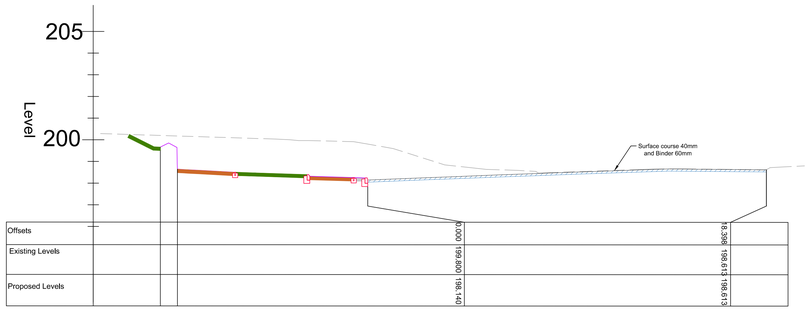

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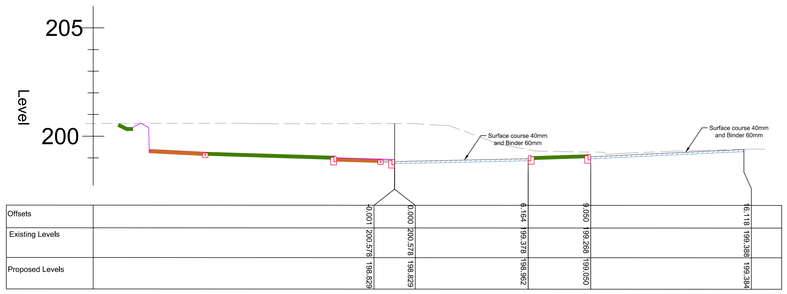

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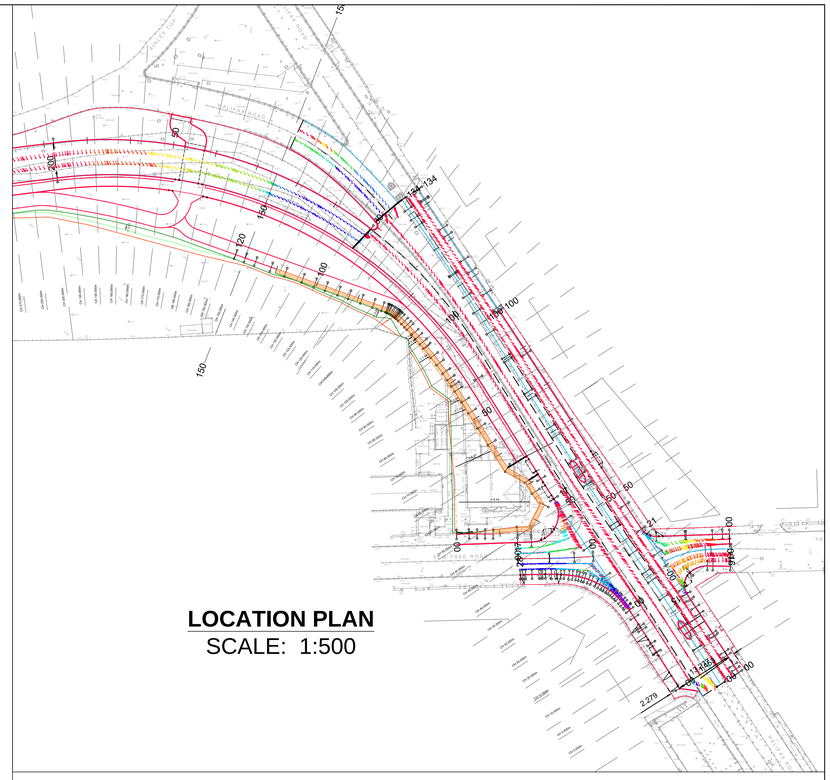

LOCATION PLAN
SCALE: 1:500

CROSS SECTION 0.0-130.0
SCALE 1:200

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Huddersfield HD1 6LG

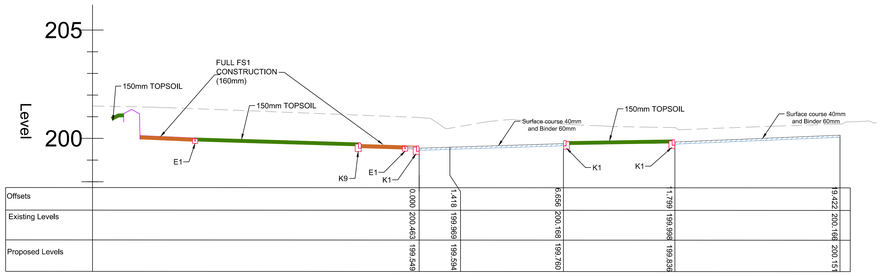
SECTION: HD		
DRAWN: FR		CHECKED: AKKV
SCALE: AS SHOWN	PROJECT NO.: 25/12488	DATE: MAY 2019

PROJECT: WYTF–A629 HALIFAX ROAD CORRIDOR IMPROVEMENT

TITLE: LONG SECTION & CROSS SECTION OF MC03 AINLEY TOP

DRAWING No.: TF5//HD/25/12448/AT/LS–01

CAD No.:



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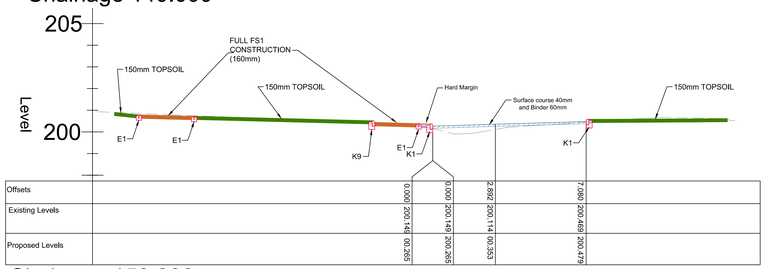

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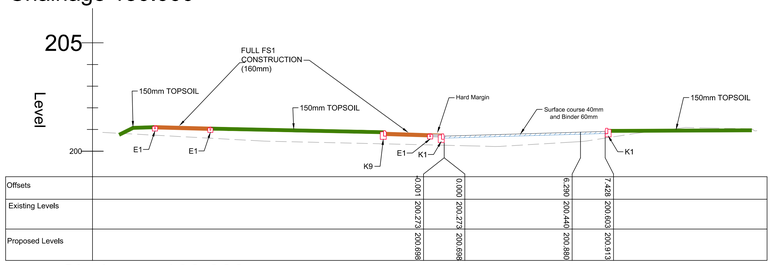

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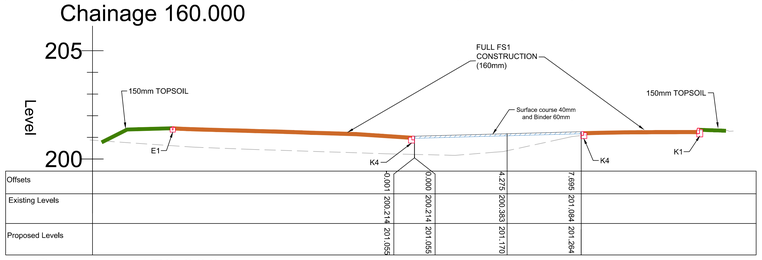

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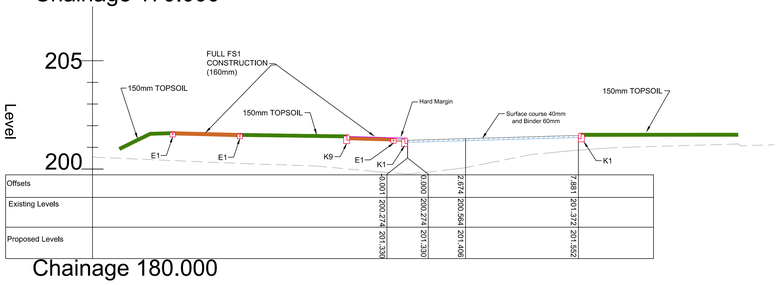

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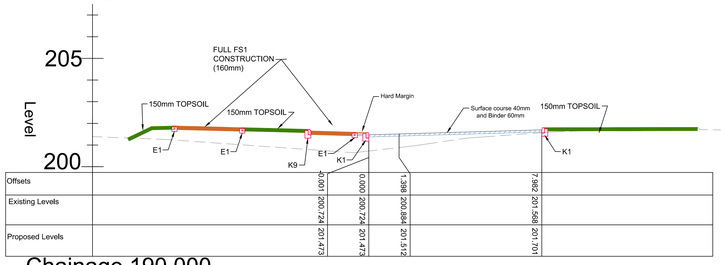

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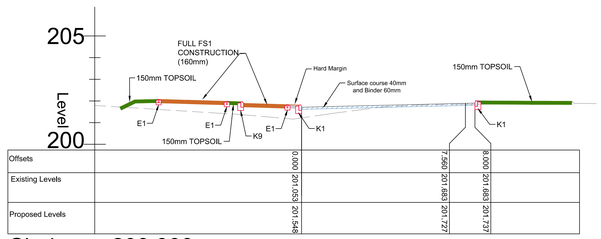

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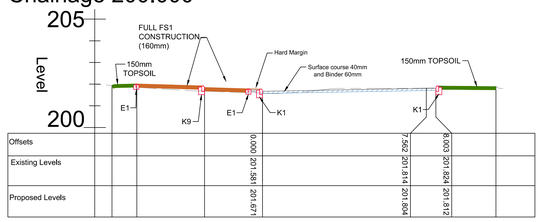

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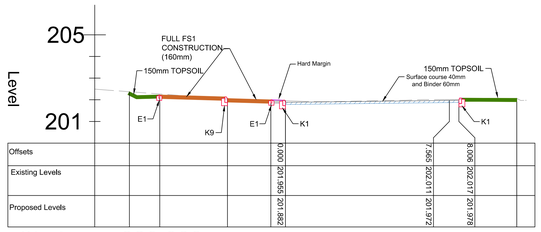

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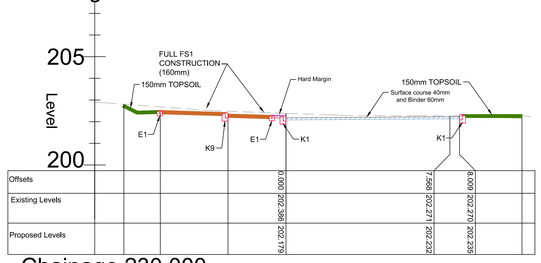

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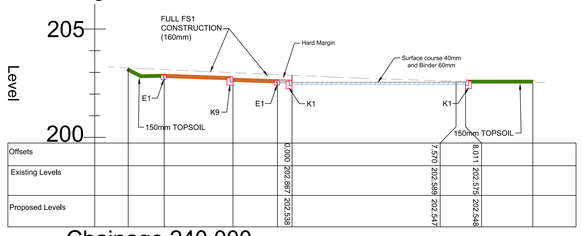

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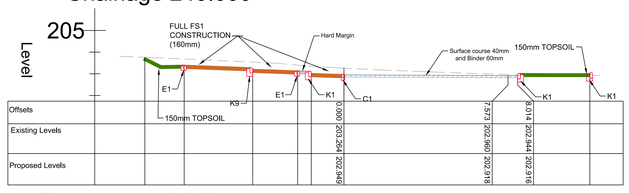

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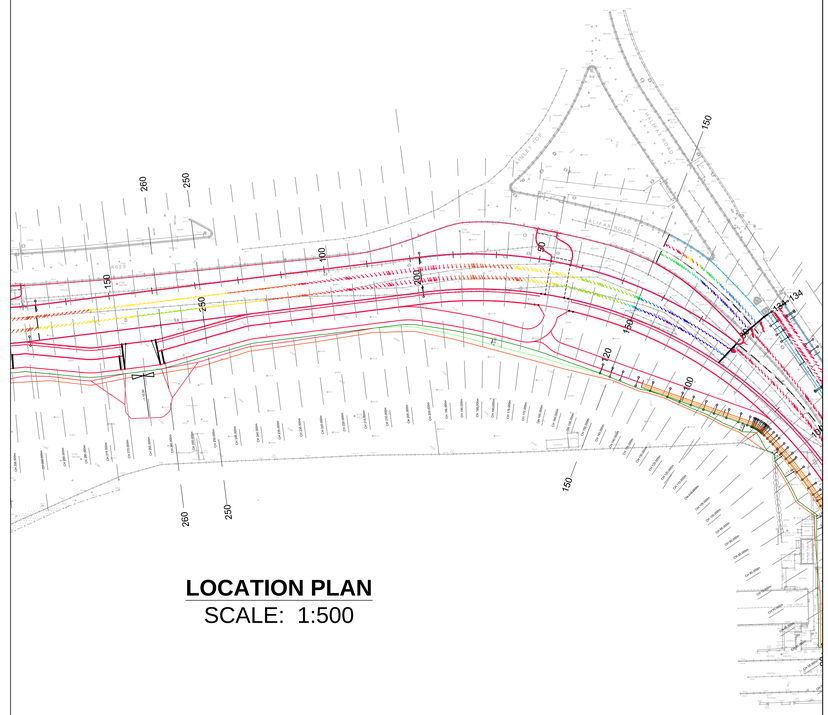

LOCATION PLAN
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CROSS SECTION 140.0-250.0
SCALE 1:200

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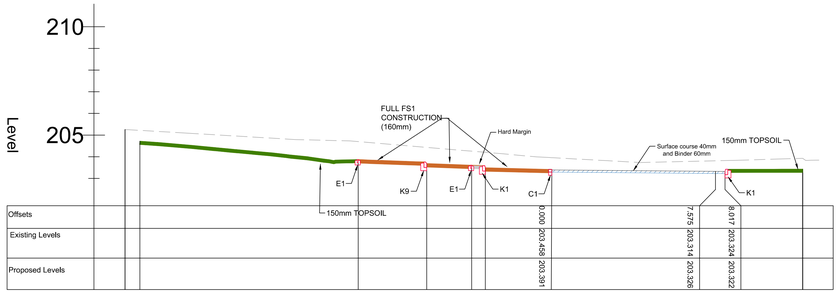
PROJECT NO.	25/12488
DATE	MAY 2019
PROJECT	WYTF–A629 HALIFAX ROAD CORRIDOR IMPROVEMENT
TITLE	LONG SECTION & CROSS SECTION OF MC03 AINLEY TOP
DRAWING No.	TFS//HD/25/12448/AT/LS–01
CAD No.	



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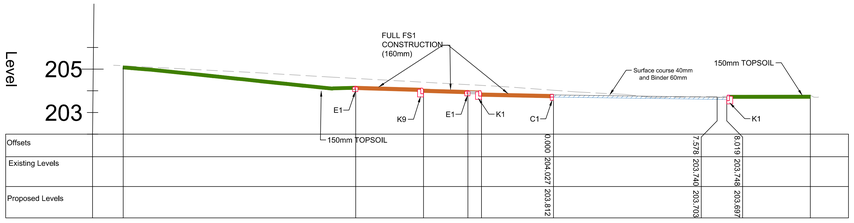

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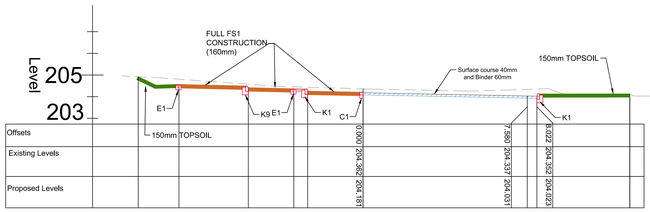

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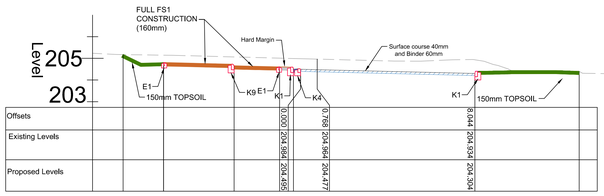

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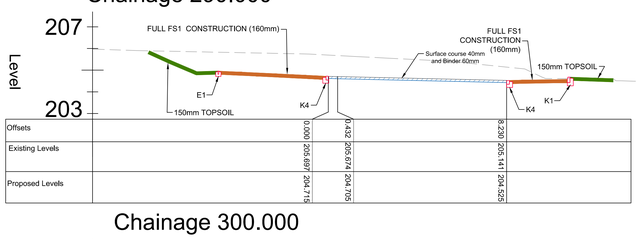

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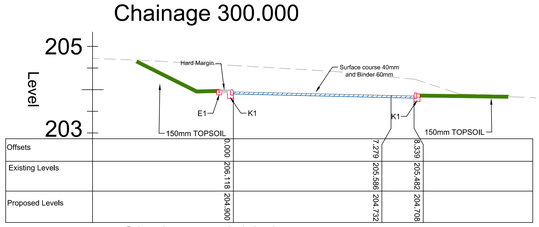

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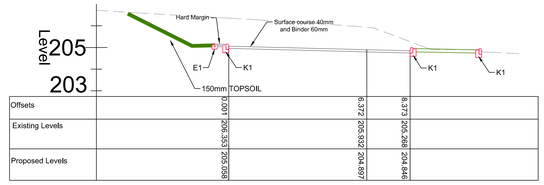

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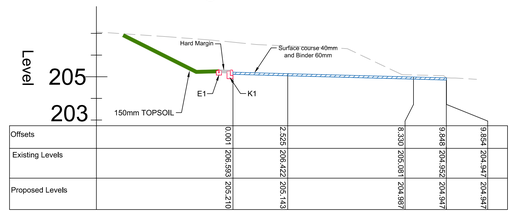

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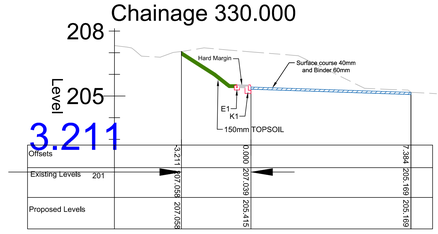

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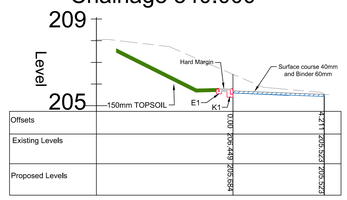

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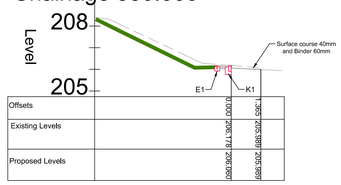

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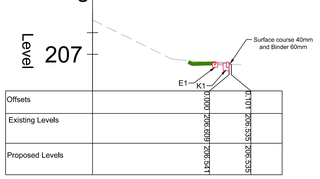

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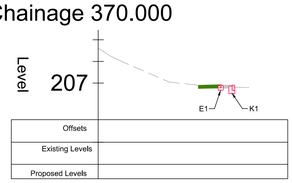

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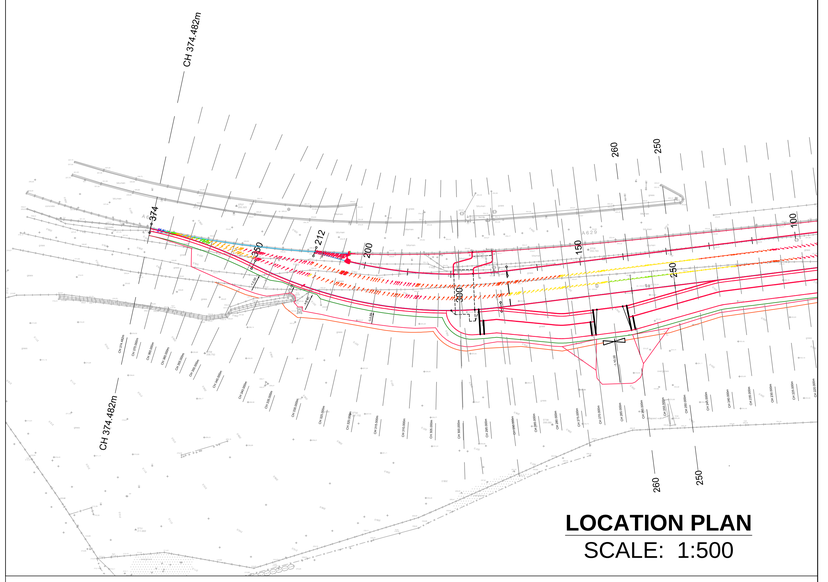

LOCATION PLAN
SCALE: 1:500

CROSS SECTION 260.0-374.482
SCALE 1:200

Preliminary Design

NOTES

1. ALL DIMENSIONS TO BE CHECKED/VERIFIED ON SITE IF REQUIRED WITH SUPERVISOR.
2. ALL DIMENSION IN MILLIMETRES AND LEVELS IN METRES UNLESS NOTED OTHERWISE.
3. ANY DISCREPANCIES NOTED ON THE SITE ARE TO BE REPORTED TO THE SUPERVISOR IMMEDIATELY.
4. CONTRACTOR TO CHECK EXISTING AND PROPOSED LEVELS AT TIE IN POINTS BEFORE COMMENCEMENT OF WORKS
5. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH OTHER CONTRACT DOCUMENTS AND DRAWING, SUCH AS
   - 5.1. KERBING AND FENCING PLAN
   - 5.2. TYPICAL SECTIONS PLAN
   - 5.3. CROSS SECTION FOR MC03 PLAN
   - 5.4. LONG SECTION PLAN
   - 5.5. PAVEMENT PLAN
   - 5.6. GENERAL LAYOUT PLAN

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Date: 2019

REF.	DATE	REVISIONS

Kirklees COUNCIL

Streetscene and Housing Service
Highways and Operation Division
Flint Street, Fartown
Huddersfield HD1 6LG

SECTION: HD		
DRAWN: FR		CHECKED: AKKV
SCALE: AS SHOWN	PROJECT NO.: 25/12488	DATE: MAY 2019

PROJECT
WYTF–A629
HALIFAX ROAD
CORRIDOR IMPROVEMENT

TITLE
LONG SECTION & CROSS SECTION OF MC03
AINLEY TOP

DRAWING No. TF5//HD/25/12448/AT/LS-01

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

BOREHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** BH001
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411674.054 N:419074.066		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 198.658	**Start Date:** 04/07/2019	**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	J1 B2 ES3					(0.60) 0.60	MADE GROUND (Grey brown slightly clayey sandy gravel with occasional whole bricks noted. Gravel is fine to coarse angular to subangular and includes sandstone and brick).	
0.60 0.90 1.20	J4 B5 ES6					(0.80) 1.40	Stiff grey brown sandy gravelly CLAY. Gravel is fine to coarse angular to tabular and includes mudstone.	
1.50-1.90 1.50 1.90	B8 SJ7 SJ9	 50/91mm 50/3mm				(0.90) 2.30	Very dense grey yellow sandy GRAVEL. Gravel is fine to coarse angular to tabular and includes sandstone.	
2.30	S10	100/0mm					*Terminated at 2.30m BGL - due to refusal.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
04/07/2019	0.00	0.00	200	
04/07/2019	2.30	2.30	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
1.90 - 2.30	1:00	

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(b)**

Print Date and Time: 01/10/2019 11:16:27

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

BOREHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** BH002
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411686.040 N:419067.087		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 198.036	**Start Date:** 05/07/2019	**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	J1 B2 ES3					(0.50) 0.50	MADE GROUND (Grey brown sandy slightly clayey gravel with occasional brick, tile and glass. Gravel is fine to coarse angular to subangular and includes sandstone).	
0.60 0.90 1.20	J4 B5 ES6					(0.80) 1.30	Stiff yellow brown mottled sandy gravelly CLAY. Gravel is fine to coarse angular to subangular tabular and includes sandstone, mudstone and siltstone.	
1.50-2.00 1.50-1.95	B8 SJ7	N25				(1.00) 2.30	Medium dense brown yellow very clayey gravelly SAND. Gravel is fine to coarse angular tabular and includes sandstone. (Probable Weathered Sandstone).	
2.20 2.30	J9 SJ10	25/7mm				(0.40) 2.70	Very weak brown yellow SANDSTONE. (Recovered as sandy gravel).	
2.70	SJ11	100/0mm					*Terminated at 2.70m BGL - due to encountering bedrock.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
05/07/2019	0.00	0.00	200	
05/07/2019	2.70	2.70	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
2.30 - 2.70	1:00	1.20 - 2.70

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(b)**

Print Date and Time: 01/10/2019 11:16:27

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

DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411686.040 N:419067.087		**BH002 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 198.036	**Start Date:** 30/07/2019	**Sheet:** 1 of 10

RUN DETAILS				STRATA					
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	Instrument/ Backfill
		RO				(0.50) 0.50	0.00-2.20m ... rotary openhole drilling.	MADE GROUND (Grey brown sandy slightly clayey gravel with occasional brick, tile and glass. Gravel is fine to coarse angular to subangular and includes sandstone).	
						(0.80) 1.30		Stiff yellow brown mottled sandy gravelly CLAY. Gravel is fine to coarse angular to subangular tabular and includes sandstone, mudstone and siltstone.	
2.20						(0.90) 2.20		Medium dense brown yellow very clayey gravelly SAND. Gravel is fine to coarse angular tabular and includes sandstone. (Probable Weathered Sandstone).	
(113mm) 2.70	70 (0) 0	NI				(0.35) 2.55	2.20-2.55m ... non-intact.	Weak to medium strong grey brown fine to medium grained SANDSTONE partially weathered with iron staining noted. (Recovered predominantly as gravel to cobble sized fragments).	
(113mm) 3.20	0 (0) 0	NR				(0.65) 3.20	2.55-3.20m ... no recovery.	(1) SANDSTONE.	
(113mm) 3.70	60 (8) 0	NI				(0.30) 3.50	3.20-3.50m ... non-intact.	Weak to medium strong grey brown fine to medium grained SANDSTONE partially weathered with iron staining noted. (Recovered predominantly as gravel to cobble sized fragments).	
(113mm)	60 (8) 0	NR				(0.40) 3.90	3.50-3.90m ... no recovery.	(1) SANDSTONE. 3.70-5.70m ... driller notes loss of flush to 50% returns.	
		NI					3.90-4.20m ... non-intact.		

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing
30/07/2019	0.00	0.00	
30/07/2019	2.20	2.20	0.96
31/07/2019	2.20	2.20	

Standard Penetration Test		
Depth	Type	Result

Flush		
From - To	Type	Returns (%)
0.00 - 2.20	Water	100
2.20 - 2.70	Water	100
2.70 - 3.20	Water	100
3.20 - 3.70	Water	100
3.70 - 4.20	Water	50

General Remarks

(1) Description derived from drillers daily report.
(2) BH002R drilled through BH002.
(3) 50mm diameter slotted standpipe installed between 3.00-8.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

Print Date and Time: 04/10/2019 16:52:55

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

DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top		**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411686.040 N:419067.087	**BH002 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 198.036 / **Start Date:** 30/07/2019	**Sheet:** 2 of 10

RUN DETAILS				STRATA					
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	Instrument/ Backfill
4.20								Weak to medium strong grey brown fine to medium grained SANDSTONE partially weathered with iron staining noted. (Recovered predominantly as gravel to cobble sized fragments). *(continued)*	
	90 (40) 15	NR					4.20-4.30m ... no recovery.		
(113mm)		NI					4.30-4.90m ... non-intact.		
						(1.50)			
		11					4.90-5.20m ... subhorizontal (5-30) closely spaced planar rough very tight to partly open infilled (gravel and sand) discontinuities and subvertical (85-90 degrees) planar smooth very tight stained (iron) discontinuities.		
5.20									
	60 (0) 0	NI					5.20-5.40m ... non-intact.		
(113mm)						5.40			
		NR					5.40-5.70m ... no recovery.	(1) SANDSTONE.	
5.70						(0.30) 5.70			
	100 (69) 43	13				5.85	5.70-6.40m ... subhorizontal (5-30) closely spaced planar rough very tight to partly open infilled (gravel and sand) discontinuities and subvertical (85-90 degrees) planar smooth very tight stained (iron) discontinuities.	Extremely to very weak grey MUDSTONE partially weathered. 5.70-6.40m ... driller notes loss of flush to 0% returns.	
(113mm)								Weak to medium strong grey brown fine to medium SANDSTONE partially to distinctly weathered with iron staining noted. (Recovered as predominantly sandy gravel to cobble sized fragments).	
6.40									
	100 (0) 0	NI					6.40-6.90m ... non-intact.		
(113mm)									
6.90									
	80 (13) 0	NR					6.90-7.10m ... no recovery.		
						(2.35)			
		NI					7.10-7.60m ... non-intact.	7.10-7.19m ... interbed of very weak thinly laminated grey mudstone.	
(113mm)									
		7					7.60-7.90m ... subhorizontal (15-30 degrees) closely planar rough tight to partly open stained (iron) discontinuities.		
7.90									
	100	NI					7.90-8.20m ... non-intact.		

Drilling Progress and Water Observations

Date	Depth	Casing	Water Standing

Standard Penetration Test

Depth	Type	Result

Flush

From - To	Type	Returns (%)
4.20 - 5.20	Water	50
5.20 - 5.70	Water	50
5.70 - 6.40	Water	0
6.40 - 6.90	Water	100
6.90 - 7.90	Water	100
7.90 - 8.20	Water	100

General Remarks

(1) Description derived from drillers daily report.
(2) BH002R drilled through BH002.
(3) 50mm diameter slotted standpipe installed between 3.00-8.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

Print Date and Time: 04/10/2019 16:52:55

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

DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411686.040 N:419067.087		**BH002 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 198.036	**Start Date:** 30/07/2019	**Sheet:** 3 of 10

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
8.20 (113mm)	(20) 0					8.20			
	100 (12) 0	33				8.25	8.20-8.35m ... subhorizontal (5-30 degrees) very closely spaced planar rough smooth partly open to open discontinuities.	Weak black COAL.	
						8.35			
(113mm)		NI				(0.35)	8.35-8.70m ... non-intact.	Weak to moderately strong grey brown fine to medium grained SANDSTONE partially weathered.	
8.70						8.70		Extremely weak grey black carbonaceous MUDSTONE partially weathered distinctly weathered to destructured. (Recovered as gravelly clay/clayey gravel).	
	50 (0) 0	NR				(0.40)	8.70-9.10m ... no recovery.		
(113mm)						9.10		(1) MUDSTONE and COAL.	
		NI				(0.40)	9.10-9.50m ... non intact.	Extremely weak grey black carbonaceous MUDSTONE distinctly weathered.	
9.50						9.50			
	90 (85) 55	27				(1.00)	9.50-10.40m ... subhorizontal (5-30 degrees) closely spaced planar smooth infilled (clay) discontinuities. 9.80-9.90m ... 1No. oblique (30-60 degrees) planar smooth infilled (clay) discontinuity. 9.90-10.00m ... 1No. subvertical (85-90 degrees) planar smooth infilled (clay) discontinuity. 10.28-10.40m ... 1No. subvertical (85-90 degrees) undulating smooth stained discontinuity.	Weak to medium strong grey brown fine to medium grained SANDSTONE partially weathered.	
(113mm)		NR				10.50	10.40-10.50m ... no recovery.		
		RO					10.50-30.00m ... rotary openhole drilling.	(1) SILTSTONE and SANDSTONE.	

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing
31/07/2019	8.20	6.90	
01/08/2019	8.20	6.90	

Standard Penetration Test		
Depth	Type	Result

Flush		
From - To	Type	Returns (%)
8.20 - 8.70	Water	100
8.70 - 9.50	Water	100
9.50 - 10.50	Water	100
10.50 - 30.00	Water	100

General Remarks

(1) Description derived from drillers daily report.
(2) BH002R drilled through BH002.
(3) 50mm diameter slotted standpipe installed between 3.00-8.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

Print Date and Time: 04/10/2019 16:52:55

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

DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411686.040 N:419067.087		**BH002 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 198.036	**Start Date:** 30/07/2019	**Sheet:** 4 of 10

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
								(1) SILTSTONE and SANDSTONE. *(continued)*	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
										(1) Description derived from drillers daily report. (2) BH002R drilled through BH002. (3) 50mm diameter slotted standpipe installed between 3.00-8.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

Print Date and Time: 04/10/2019 16:52:56

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

DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top		**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411686.040 N:419067.087	**BH002 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 198.036 / **Start Date:** 30/07/2019	**Sheet:** 5 of 10

RUN DETAILS				STRATA					
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	Instrument/ Backfill
								(1) SILTSTONE and SANDSTONE. *(continued)*	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
										(1) Description derived from drillers daily report. (2) BH002R drilled through BH002. (3) 50mm diameter slotted standpipe installed between 3.00-8.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

Print Date and Time: 04/10/2019 16:52:56

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

DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411686.040 N:419067.087		**BH002 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 198.036	**Start Date:** 30/07/2019	**Sheet:** 6 of 10

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
						(19.50)		(1) SILTSTONE and SANDSTONE. *(continued)*	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
										(1) Description derived from drillers daily report. (2) BH002R drilled through BH002. (3) 50mm diameter slotted standpipe installed between 3.00-8.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

Print Date and Time: 04/10/2019 16:52:56

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

DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top		**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411686.040 N:419067.087	**BH002 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 198.036 / **Start Date:** 30/07/2019	**Sheet:** 7 of 10

RUN DETAILS				STRATA					
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	Instrument/ Backfill
								(1) SILTSTONE and SANDSTONE. *(continued)*	

Drilling Progress and Water Observations				Standard Penetration Test			Flush		
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)

General Remarks

(1) Description derived from drillers daily report.
(2) BH002R drilled through BH002.
(3) 50mm diameter slotted standpipe installed between 3.00-8.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

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DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411686.040 N:419067.087		**BH002 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 198.036	**Start Date:** 30/07/2019	**Sheet:** 8 of 10

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
								(1) SILTSTONE and SANDSTONE. *(continued)*	
						30.00			
								Complete at 30.00m BGL.	

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing
01/08/2019	30.00	6.90	0.00

Standard Penetration Test		
Depth	Type	Result

Flush		
From - To	Type	Returns (%)

General Remarks

(1) Description derived from drillers daily report.
(2) BH002R drilled through BH002.
(3) 50mm diameter slotted standpipe installed between 3.00-8.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

Print Date and Time: 04/10/2019 16:52:56

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DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411686.040 N:419067.087		**BH002 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 198.036	**Start Date:** 30/07/2019	**Sheet:** 9 of 10

Figure BH002 R.1
BH002 2.20-6.40m BGL

Figure BH002 R.2
BH002 6.40-8.20m BGL

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DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411686.040 N:419067.087		**BH002 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 198.036	**Start Date:** 30/07/2019	**Sheet:** 10 of 10

Figure BH002 R.3
BH002 8.20-10.50m BGL

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BOREHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411671.574 N:419093.519		**BH003**
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 200.041	**Start Date:** 05/07/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.10	J1					(0.40)	MADE GROUND (Grey brown sandy slightly clayey gravel with occasional brick, pottery and glass fragments. Gravel is fine to medium angular to subangular and includes sandstone and concrete).	
0.20	B2			199.641		0.40		
0.30	ES3					(0.50)	Yellow brown sandy GRAVEL. Gravel is fine to coarse angular to tabular and includes sandstone.	
0.60	J4							
0.80	B5			199.141		0.90	Brown grey GRAVEL. Gravel is fine to coarse angular tabular and includes sandstone. (Probable Weathered Sandstone).	
0.80	ES6			199.041		1.00	*Terminated at 1.00m BGL - due to refusal.*	
0.90	SJ7	50/86mm						
1.00	SJ8	100/0mm						

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
03/07/2019	0.00	0.00	200		0.90 - 1.00	1:00	0.90 - 1.00	(1) Description derived from drillers daily report.
03/07/2019	1.00	1.00	200	Dry				(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(b)**

Print Date and Time: 08/11/2019 10:35:20

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DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411671.574 N:419093.519		**BH003 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.041	**Start Date:** 02/08/2019	**Sheet:** 1 of 10

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
		RO		199.641		(0.40) 0.40	0.00-2.20m ... rotary openhole drilling.	MADE GROUND (Grey brown sandy slightly clayey gravel with occasional brick, pottery and glass fragments. Gravel is fine to medium angular to subangular and includes sandstone and concrete).	
				199.141		(0.50) 0.90		Yellow brown sandy GRAVEL. Gravel is fine to coarse angular to tabular and includes sandstone.	
				199.041		1.00		Brown grey GRAVEL. Gravel is fine to coarse angular tabular and includes sandstone. (Probable Weathered Sandstone).	
2.20				197.841		(1.20) 2.20		(1) SANDSTONE. (Driller describes as 'weathered').	
(113mm) 2.70	0 (0) 0	NR		197.341		(0.50) 2.70	2.20-2.70m ... no recovery.	(1) SANDSTONE.	
(113mm) 3.30	83 (0) 0	NI		197.141		(0.20) 2.90	2.70-4.60m ... non-intact.	Brown SANDSTONE destructured to residual. (Recovered as clayey gravel).	
				196.741		(0.40) 3.30		Grey MUDSTONE destructured to residual. (Recovered as firm very gravelly clay).	
(113mm) 3.90	100 (0) 0			196.241		(0.50) 3.80		Grey MUDSTONE/SILTSTONE destructured to residual with iron staining. (Recovered as firm to soft very gravelly CLAY).	
	100			196.141		3.90		Brown MUDSTONE and SANDSTONE destructured to	

Drilling Progress and Water Observations

Date	Depth	Casing	Water Standing
02/08/2019	0.00	0.00	

Standard Penetration Test

Depth	Type	Result

Flush

From - To	Type	Returns (%)
0.00 - 2.20	Water	100
2.20 - 2.70	Water	100
2.70 - 3.30	Water	100
3.30 - 3.90	Water	100
3.90 - 4.90	Water	100

General Remarks

(1) Description derived from drillers daily report.
(2) BH003R drilled through BH003.
(3) 50mm diameter slotted standpipe installed between 5.00-16.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

Print Date and Time: 08/11/2019 10:35:34

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DRILLHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** BH003 R
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411671.574 N:419093.519		
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.041	**Start Date:** 02/08/2019	**Sheet:** 2 of 10

RUN DETAILS				STRATA					
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	Instrument/ Backfill
(113mm)	(30) 0					(0.70)		residual. (Recovered as very clayey sandy gravel).	
				195.441		4.60		Grey MUDSTONE destructured to residual with iron staining. (Recovered as soft and firm gravelly clay). *(continued)*	
4.90		13					4.60-4.90m ... horizontal (0-5 degrees) very closely spaced stepped undulating smooth and infilled (clay) discontinuities.	Very weak to weak grey MUDSTONE and SILTSTONE distinctly weathered with much iron staining.	
(113mm)	100 (34) 0	NI					4.90-5.10m ... non-intact.	4.90-5.10m ... recovered as gravel.	
		18				(1.30)	5.10-5.16m ... 1No. vertical (90 degrees) planar smooth infilled (silt) and stained (iron) discontinuity. 5.10-5.27m ... horizontal (0-5 degrees) very closely spaced planar smooth infilled (silt) and stained (iron) discontinuities.		
5.40		NI					5.27-5.80m ... non-intact.	5.27-5.90m ... recovered as gravel.	
(113mm)	80 (0) 0								
5.90		NR		194.141		5.90	5.80-5.90m ... no recovery.		
(113mm)	100 (20) 0	5					5.90-6.10m ... subhorizontal (15-30 degrees) very closely spaced planar smooth wide to open clean discontinuities. Possibly drilling induced.	Extremely weak to very weak grey MUDSTONE distinctly weathered.	
		NI					6.10-7.25m ... non-intact.		
6.90						(1.35)		6.30-7.25m ... destructured. Recovered as gravelly clay.	
(113mm)	100 (73) 53								
				192.791		7.25			
(113mm)		10				(1.15)	7.25-8.40m ... subhorizontal (15-30 degrees) to subvertical (85 degrees) closely spaced planar smooth stained (iron) discontinuities.	Weak to medium stong grey orange mottled fine grained SANDSTONE partially to distinctly weathered with some iron staining.	

Drilling Progress and Water Observations

Date	Depth	Casing	Water Standing
02/08/2019	5.40	2.20	0.00
05/08/2019	5.40	2.20	0.00

Standard Penetration Test

Depth	Type	Result

Flush

From - To	Type	Returns (%)
4.90 - 5.40	Water	100
5.40 - 5.90	Water	100
5.90 - 6.90	Water	100
6.90 - 8.40	Water	100

General Remarks

(1) Description derived from drillers daily report.
(2) BH003R drilled through BH003.
(3) 50mm diameter slotted standpipe installed between 5.00-16.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

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DRILLHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** BH003 R
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411671.574 N:419093.519		
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.041	**Start Date:** 02/08/2019	**Sheet:** 3 of 10

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
8.40				191.641		8.40	8.27-8.40m ... subvertical (60-75 degrees) stepped smooth stained (iron) discontinuities.	Weak to medium stong grey orange mottled fine grained SANDSTONE partially to distinctly weathered with some iron staining. *(continued)*	
(113mm)	100 (0) 0	NI		191.541		8.50	8.40-10.23m ... non-intact.	Grey MUDSTONE/SILTSTONE destructured. (Recovered as sand and gravel).	
				191.191		(0.35) 8.85		Black COAL destructured. (Recovered as sand and gravel).	
				190.641		(0.55) 9.40		Extremely weak to weak yellow grey SANDSTONE distinctly weathered. (Recovered as gravel and cobble sized fragments).	
9.60								Extremely weak dark grey MUDSTONE and SILTSTONE distinctly weathered to destructured. 9.40-9.60m ... recovered as sand and gravel. 9.60-10.00m ... recovered as firm and stiff gravelly clay.	
(113mm)	100 (58) 25	8		189.441		(1.20) 10.60	10.23-10.60m ... horizontal (0-5 degrees) closely spaced planar smooth clean discontinuities.		
		RO					10.60-30.00m ... rotary openhole drilling.	(1) SANDSTONE and MUDSTONE.	

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing

Standard Penetration Test		
Depth	Type	Result

Flush		
From - To	Type	Returns (%)
8.40 - 9.60	Water	100
9.60 - 10.60	Water	100
10.60 - 19.00	Water	100

General Remarks

(1) Description derived from drillers daily report.
(2) BH003R drilled through BH003.
(3) 50mm diameter slotted standpipe installed between 5.00-16.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

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DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411671.574 N:419093.519		**BH003 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.041	**Start Date:** 02/08/2019	**Sheet:** 4 of 10

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
								(1) SANDSTONE and MUDSTONE. *(continued)*	
						(8.40)			

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
										(1) Description derived from drillers daily report. (2) BH003R drilled through BH003. (3) 50mm diameter slotted standpipe installed between 5.00-16.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

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DRILLHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** BH003 R
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411671.574 N:419093.519		
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.041	**Start Date:** 02/08/2019	**Sheet:** 5 of 10

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
								(1) SANDSTONE and MUDSTONE. *(continued)*	
				181.041		19.00			
								(1) SILTSTONE, MUDSTONE and SANDSTONE. (Driller describes as 'hard').	

Drilling Progress and Water Observations

Date	Depth	Casing	Water Standing
05/08/2019	19.00	2.20	0.00
06/08/2019	19.00	2.20	3.19

Standard Penetration Test

Depth	Type	Result

Flush

From - To	Type	Returns (%)
19.00 - 30.00	Water	100

General Remarks

(1) Description derived from drillers daily report.
(2) BH003R drilled through BH003.
(3) 50mm diameter slotted standpipe installed between 5.00-16.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

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DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411671.574 N:419093.519		**BH003 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.041	**Start Date:** 02/08/2019	**Sheet:** 6 of 10

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
								(1) SILTSTONE, MUDSTONE and SANDSTONE. (Driller describes as 'hard'). *(continued)*	

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing

Standard Penetration Test		
Depth	Type	Result

Flush		
From - To	Type	Returns (%)

General Remarks

(1) Description derived from drillers daily report.
(2) BH003R drilled through BH003.
(3) 50mm diameter slotted standpipe installed between 5.00-16.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

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DRILLHOLE RECORD

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Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411671.574 N:419093.519		**BH003 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.041	**Start Date:** 02/08/2019	**Sheet:** 7 of 10

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
						(11.00)		(1) SILTSTONE, MUDSTONE and SANDSTONE. (Driller describes as 'hard'). *(continued)*	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
										(1) Description derived from drillers daily report. (2) BH003R drilled through BH003. (3) 50mm diameter slotted standpipe installed between 5.00-16.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

Print Date and Time: 08/11/2019 10:35:35

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DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411671.574 N:419093.519		**BH003 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.041	**Start Date:** 02/08/2019	**Sheet:** 8 of 10

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
				170.041	× × ×	30.00		(1) SILTSTONE, MUDSTONE and SANDSTONE. (Driller describes as 'hard'). *(continued)*	
								Complete at 30.00m BGL.	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
06/08/2019	30.00	2.20	3.19							(1) Description derived from drillers daily report. (2) BH003R drilled through BH003. (3) 50mm diameter slotted standpipe installed between 5.00-16.00m BGL.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Masterman	Contract No. **4208L(b)**

Print Date and Time: 08/11/2019 10:35:35

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DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411671.574 N:419093.519		**BH003 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.041	**Start Date:** 02/08/2019	**Sheet:** 9 of 10

Figure BH003 R.1
BH003 2.20-4.90m BGL

Figure BH003 R.2
BH003 4.90-7.90m BGL

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DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411671.574 N:419093.519		**BH003 R**
Method (Equipment): Rotary Coring/Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.041	**Start Date:** 02/08/2019	**Sheet:** 10 of 10

Figure BH003 R.3
BH003 7.90-9.60m BGL

Figure BH003 R.4
BH003 9.60-10.60m BGL

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BOREHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** BH004
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411642.480 N:419125.383		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 200.458	**Start Date:** 01/07/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.00	J1					0.10	Grass over firm yellow brown slightly sandy gravelly CLAY with occasional rootlets. Gravel is fine to medium angular to tabular and includes mudstone and sandstone.	
0.20	B2					(0.60)		
0.40	ES3					0.70	Stiff yellow brown mottled slightly sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone, mudstone and siltstone.	
0.80	J4							
1.00	B5						Firm silty slightly sandy slightly gravelly CLAY. Gravel is fine to medium angular tabular and includes mudstone and siltstone.	
1.20	ES6					(1.20)		
1.50-2.00	B8							
1.50	SJ7	50/256mm				1.90		
						2.20	Very dense brown grey GRAVEL. Gravel is fine to coarse angular tabular and includes mudstone and siltstone. (Probable Weathered Mudstone/Siltstone).	
2.20	SJ9	50/12mm					*Terminated at 2.20m BGL - due to refusal.*	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
01/07/2019	0.00	0.00	200	
01/07/2019	2.20	2.20	200	Dry

Chiselling

From - To	Duration (hh:mm)
1.90 - 2.20	1:00

Water Added

From - To
1.20 - 2.20

General Remarks

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

All dimensions in metres Scale 1:49.6875	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: A. Rees	Contract No. **4208L(b)**

Print Date and Time: 01/10/2019 11:16:28

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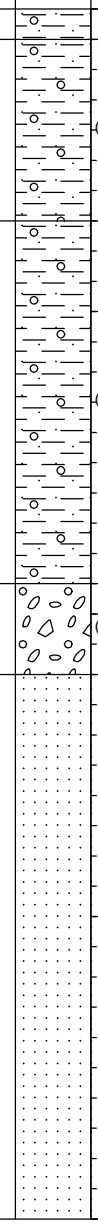
DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top		**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411642.480 N:419125.383	**BH004 R**
Method (Equipment): Rotary Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.458 / **Start Date:** 06/08/2019	**Sheet:** 1 of 5

RUN DETAILS				STRATA					
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index	Water	Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	Instrument/ Backfill
		RO				0.10	0.00-20.00m ... rotary openhole drilling.	Grass over firm yellow brown slightly sandy gravelly CLAY with occasional rootlets. Gravel is fine to medium angular to tabular and includes mudstone and sandstone.	
						(0.60) 0.70		Stiff yellow brown mottled slightly sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone, mudstone and siltstone.	
						(1.20) 1.90		Firm silty slightly sandy slightly gravelly CLAY. Gravel is fine to medium angular tabular and includes mudstone and siltstone.	
						(0.30) 2.20		Very dense brown grey GRAVEL. Gravel is fine to coarse angular tabular and includes mudstone and siltstone. (Probable Weathered Mudstone/Siltstone).	
								(1) SANDSTONE.	



Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing
06/08/2019	0.00	0.00	
06/08/2019	2.20	2.20	
07/08/2019	2.20	2.20	

Standard Penetration Test		
Depth	Type	Result

Flush		
From - To	Type	Returns (%)
0.00 - 2.20	Water	100
2.20 - 20.00	Water	100

General Remarks

(1) Description derived from drillers daily report.
(2) BH004R drilled through BH004.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: N/A	Contract No. **4208L(b)**

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DRILLHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** BH004 R
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411642.480 N:419125.383		
Method (Equipment): Rotary Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.458	**Start Date:** 06/08/2019	**Sheet:** 2 of 5

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
						(4.70)		(1) SANDSTONE. *(continued)*	
						6.90			
								(1) MUDSTONE and SILTSTONE.	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
										(1) Description derived from drillers daily report. (2) BH004R drilled through BH004.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: N/A	Contract No. **4208L(b)**

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DRILLHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top		**Exploratory Hole No.** BH004 R
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411642.480 N:419125.383	
Method (Equipment): Rotary Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.458 / **Start Date:** 06/08/2019	**Sheet:** 3 of 5

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
								(1) MUDSTONE and SILTSTONE. *(continued)*	

Drilling Progress and Water Observations				Standard Penetration Test			Flush		
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)

General Remarks

(1) Description derived from drillers daily report.
(2) BH004R drilled through BH004.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: N/A	Contract No. **4208L(b)**

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DRILLHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411642.480 N:419125.383		**BH004 R**
Method (Equipment): Rotary Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.458	**Start Date:** 06/08/2019	**Sheet:** 4 of 5

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
						(13.10)		(1) MUDSTONE and SILTSTONE. *(continued)*	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
										(1) Description derived from drillers daily report. (2) BH004R drilled through BH004.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: N/A	Contract No. **4208L(b)**

Print Date and Time: 01/10/2019 11:12:52

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DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411642.480 N:419125.383		**BH004 R**
Method (Equipment): Rotary Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.458	**Start Date:** 06/08/2019	**Sheet:** 5 of 5

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description		
							Discontinuity Detail	Main	
								(1) MUDSTONE and SILTSTONE. *(continued)*	
						20.00			

Complete at 20.00m BGL.

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
07/08/2019	20.00	2.20	0.00							(1) Description derived from drillers daily report. (2) BH004R drilled through BH004.

All dimensions in metres Scale 1:25	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: N/A	Contract No. **4208L(b)**

Print Date and Time: 01/10/2019 11:12:53

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BOREHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** BH005
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411593.119 N:419134.741		
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 200.812	**Start Date:** 03/07/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.00	J1						Grass over firm yellow brown slightly sandy gravelly CLAY with occasional rootlets. Gravel is fine to medium angular tabular and includes mudstone and sandstone.	
0.10	B2			200.512		0.30		
0.20	ES3						Firm yellow brown mottled gravelly CLAY. Gravel is fine to medium angular tabular and includes mudstone and sandstone.	
0.60	J4					(0.90)		
0.90	B5			199.612		1.20		
1.20	ES6			199.512		1.30	Very dense yellow brown clayey sandy GRAVEL. Gravel is fine to coarse angular to tabular and includes sandstone. (Probable Weathered Sandstone).	
1.20	SJ7	25/0mm						
1.30	SB8	100/0mm					*Terminated at 1.30m BGL - due to refusal.*	

Boring Progress and Water Observations				
Date	Depth	Casing	Casing Dia (mm)	Water Standing
03/07/2019	0.00	0.00	200	
03/07/2019	1.30	1.30	200	Dry

Chiselling		Water Added
From - To	Duration (hh:mm)	From - To
1.20 - 1.30	1:00	1.20 - 1.30

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(b)**

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DRILLHOLE RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411593.119 N:419134.741		**BH005 R**
Method (Equipment): Rotary Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.812	**Start Date:** 07/08/2019	**Sheet:** 1 of 3

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
		RO		200.512		0.30	0.00-20.00m ... rotary openhole drilling.	Grass over firm yellow brown slightly sandy gravelly CLAY with occasional rootlets. Gravel is fine to medium angular tabular and includes mudstone and sandstone.	
						(0.90)			
				199.612		1.20		Firm yellow brown mottled gravelly CLAY. Gravel is fine to medium angular tabular and includes mudstone and sandstone.	
				199.512		1.30		Very dense yellow brown clayey sandy GRAVEL. Gravel is fine to coarse angular to tabular and includes sandstone. (Probable Weathered Sandstone).	
						(0.90)			
				198.612		2.20		(1) SANDSTONE. (Driller describes as 'Weathered').	
								(1) SANDSTONE.	
						(3.40)			
				195.212		5.60			
								(1) MUDSTONE and SANDSTONE.	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
07/08/2019	0.00	0.00								(1) Description derived from drillers daily report.
07/08/2019	2.20	2.20								(2) BH005R drilled through BH005.
08/08/2019	2.20	2.20								(3) 50mm diameter slotted standpipe installed between 4.00-10.00m BGL.

All dimensions in metres Scale 1:49.6875	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: N/A	Contract No. **4208L(b)**

Print Date and Time: 08/11/2019 09:15:57

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DRILLHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411593.119 N:419134.741		**BH005 R**
Method (Equipment): Rotary Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.812	**Start Date:** 07/08/2019	**Sheet:** 2 of 3

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
						(14.40)		(1) MUDSTONE and SANDSTONE. *(continued)*	

Drilling Progress and Water Observations				Standard Penetration Test			Flush			General Remarks
Date	Depth	Casing	Water Standing	Depth	Type	Result	From - To	Type	Returns (%)	
										(1) Description derived from drillers daily report. (2) BH005R drilled through BH005. (3) 50mm diameter slotted standpipe installed between 4.00-10.00m BGL.

All dimensions in metres Scale 1:49.6875	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: N/A	Contract No. **4208L(b)**

Print Date and Time: 08/11/2019 09:15:57

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DRILLHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top		**Exploratory Hole No.** BH005 R
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411593.119 N:419134.741	
Method (Equipment): Rotary Openhole (Comacchio GEO 205)	**Ground Level (m):** 200.812 / **Start Date:** 07/08/2019	**Sheet:** 3 of 3

RUN DETAILS			Water	STRATA					Instrument/ Backfill
Depth & (Core Ø)	TCR (SCR) RQD	Fracture Index		Reduced Level	Legend	Depth (Thickness)	Description: Discontinuity Detail	Description: Main	
				180.812		20.00		(1) MUDSTONE and SANDSTONE. *(continued)*	
								Complete at 20.00m BGL.	

Drilling Progress and Water Observations			
Date	Depth	Casing	Water Standing
08/08/2019	20.00	2.20	3.19

Standard Penetration Test		
Depth	Type	Result

Flush		
From - To	Type	Returns (%)

General Remarks

(1) Description derived from drillers daily report.
(2) BH005R drilled through BH005.
(3) 50mm diameter slotted standpipe installed between 4.00-10.00m BGL.

All dimensions in metres Scale 1:49.6875	For explanation of symbols and abbreviations see Key Sheets	Checked by: K.W.	Logged by: N/A	Contract No. **4208L(b)**

Print Date and Time: 08/11/2019 09:15:57

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BOREHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411526.783 N:419133.235		**BH006**
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 203.262	**Start Date:** 02/07/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.10	J1					0.20	Firm yellow brown slightly sandy gravelly CLAY with occasional rootlets. Gravel is fine to medium angular tabular and includes mudstone and sandstone.	
0.40	B2						Stiff yellow brown mottled slightly sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone, mudstone and siltstone.	
0.80	ES3					(1.40)		
1.20	J4							
1.50-2.00	B6					1.60		
1.50	SJ5	50/75mm				(0.40)	Firm very silty gravelly CLAY. Gravel is fine to medium angular tabular and includes mudstone and siltstone.	
2.00	S7	100/0mm				2.00	at c.2.00m BGL ... driller notes obstructions (possible rockhead). *Terminated at 2.00m BGL - due to refusal (obstruction).*	

Boring Progress and Water Observations

Date	Depth	Casing	Casing Dia (mm)	Water Standing
02/07/2019	0.00	0.00	200	
02/07/2019	2.00	2.00	200	Dry

Chiselling

From - To	Duration (hh:mm)
2.00 - 2.00	1:00

Water Added

From - To
1.20 - 2.00

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(b)**

Print Date and Time: 01/10/2019 11:16:29

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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BOREHOLE RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411474.200 N:419126.022		**BH007**
Method (Equipment): Cable Percussion (Dando 2000)	**Ground Level (m):** 205.984	**Start Date:** 02/07/2019	**Sheet:** 1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description	
0.00	J1						Grass over firm yellow brown slightly sandy gravelly CLAY with rootlets. Gravel is fine to medium angular tabular and includes mudstone and sandstone. (Possible Made Ground).	
0.10	B2					0.30		
0.20	ES3						Firm yellow brown mottled slightly gravelly CLAY. Gravel is fine to medium angular tabular and mudstone and sandstone. (Possible Made Ground).	
0.60	J4					(1.10)		
0.90	B5							
1.20	ES6					1.40		
1.50	U7	(66)				(0.40)	Stiff to very stiff grey sandy gravelly CLAY. Gravel is fine to medium angular to tabular and includes mudstone, sandstone and siltstone. (Possible Made Ground)	
						1.80		
2.00	J8						Firm and stiff dark grey slightly sandy gravelly CLAY. Gravel is fine to coarse angular tabular and includes coal and mudstone. (Possible Made Ground).	
2.20	B9					(1.40)		
2.50	B11						at c.2.00m BGL ... black to dark grey very clayey gravel. Gravel is predominantly coal.	
2.50-2.95	SJ10	N16					at c.2.50m BGL ... recovered as very soft.	
						3.20		
3.20	J12						Very dense brown grey GRAVEL. Gravel is fine to coarse angular tabular and includes mudstone and siltstone.	
3.20	SJ13	50/14mm				3.50		
3.50	SJ14	100/2mm					*Terminated at 3.50m BGL - due to refusal.*	

Boring Progress and Water Observations					Chiselling		Water Added	General Remarks
Date	Depth	Casing	Casing Dia (mm)	Water Standing	From - To	Duration (hh:mm)	From - To	
02/07/2019	0.00	0.00	200		3.20 - 3.50	1:00	1.20 - 3.50	(1) Description derived from drillers daily report.
02/07/2019	3.50	3.50	200	Dry				(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(b)**

Print Date and Time: 01/10/2019 11:16:30

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

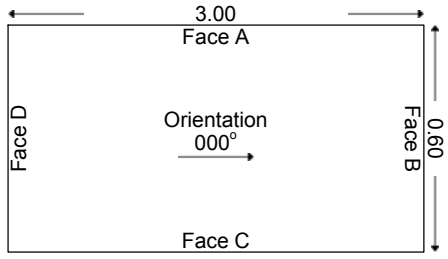
TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411680.545 N:419078.183		**TP001**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 198.725	**Start Date:** 02/07/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.20	ES1					0.35	MADE GROUND (Grey sandy gravel with tile, wood, glass, slate, breeze blocks and occasional rootlets. Gravel is fine to coarse angular to subangular and includes brick, concrete and sandstone).
0.20	B2						
0.20	J3						
0.50	ES4					(0.65)	Firm brown yellow sandy slightly gravelly CLAY with rootlets. Gravel is fine to medium angular to subangular and includes sandstone and mudstone.
0.50	B5						
0.50	J6					1.00	at c.0.50m BGL ... clay is of high plasticity.
1.00	B7						
1.00	J8					(0.50)	Firm and stiff silty gravelly CLAY with rootlets. Gravel is fine to coarse angular to tabular and includes mudstone and siltstone.
						1.50	
1.60	B9					(0.50)	Firm and stiff slightly sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone.
1.60	J10					2.00	
2.20	B11					(0.40)	Yellow brown slightly sandy GRAVEL. Gravel is fine to coarse angular to tabular and includes sandstone.
2.20	J12					2.40	
							Terminated at 2.40m BGL - due to encountering probable rockhead.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS

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(b)**

Print Date and Time: 01/10/2019 11:17:17

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TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP001
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411680.545 N:419078.183		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 198.725	**Start Date:** 02/07/2019	**Sheet:** 2 of 3

Figure TP001.1
TP001

Figure TP001.2
TP001

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP001
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411680.545 N:419078.183		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 198.725	**Start Date:** 02/07/2019	**Sheet:** 3 of 3

Figure TP001.3
TP001 Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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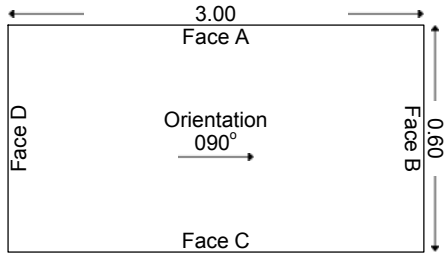
TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411650.044 N:419120.195		**TP002**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 200.013	**Start Date:** 03/07/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.20	ES1					(0.40)	MADE GROUND (Grey brown sandy gravelly clay with rootlets. Gravel is fine to medium angular to subangular and includes sandstone and brick).
0.20	B2					0.40	
0.20	J3						Firm slightly sandy very gravelly CLAY. Gravel is fine to coarse angular to tabular and includes mudstone.
0.60	ES4					0.70	
0.60	B5						Firm brown sandy very gravelly CLAY. Gravel is fine to medium angular to tabular and includes mudstone.
0.60	J6					(1.50)	
1.60	B7						
1.60	J8					2.20	
2.50	B9						Brown slightly sandy very clayey GRAVEL. Gravel is fine to coarse angular to tabular and includes mudstone and sandstone.
2.50	J10					(1.30)	
3.40	B11					3.50	
3.40	J12						*Terminated at 3.50m BGL - due to encountering probable rockhead.*

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS

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(b)**

Print Date and Time: 01/10/2019 11:17:24

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

TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP002
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411650.044 N:419120.195		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 200.013	**Start Date:** 03/07/2019	**Sheet:** 2 of 3

Figure TP002.1
TP002

Figure TP002.2
TP002

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP002
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411650.044 N:419120.195		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 200.013	**Start Date:** 03/07/2019	**Sheet:** 3 of 3

Figure TP002.3
TP002 Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

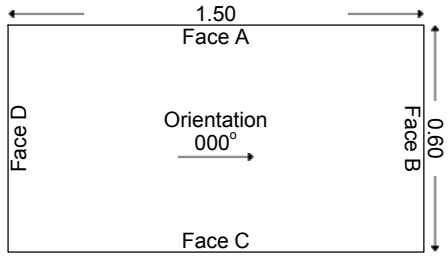
TRIAL PIT RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP003
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411627.765 N:419126.630		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 200.513	**Start Date:** 04/07/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.20 0.20	ES1 B2			200.11		(0.40) 0.40	MADE GROUND (Firm grey brown sandy gravelly clay with occasional rootlets. Gravel is fine to medium angular to subangular and includes sandstone and mudstone).
0.50-1.40	B3					(1.00)	Firm yellow brown with grey mottling slightly sandy slightly gravelly CLAY. Gravel is fine to coarse angular tabular and includes mudstone and sandstone. at c.0.50m BGL ... clay is of intermediate plasticity.
				199.11		1.40	
1.40-1.80	B4			198.71		(0.40) 1.80	Yellow brown sandy GRAVEL. Gravel is fine to coarse angular tabular and includes mudstone.
							Terminated at 1.80m BGL - due to encountering probable rockhead.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
(1) Excavated to perform soakaway test. Refer to In-situ Testing Enclosures for results.

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(b)**

Print Date and Time: 08/11/2019 09:16:30

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

TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP003
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411627.765 N:419126.630		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 200.513	**Start Date:** 04/07/2019	**Sheet:** 2 of 3

Figure TP003.1
TP003

Figure TP003.2
TP003

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top				**Exploratory Hole No.** TP003
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411627.765 N:419126.630			
Method (Equipment): Machine Excavated (JCB 3CX)		**Ground Level (m):** 200.513	**Start Date:** 04/07/2019	**Sheet:** 3 of 3

Figure TP003.3
TP003 Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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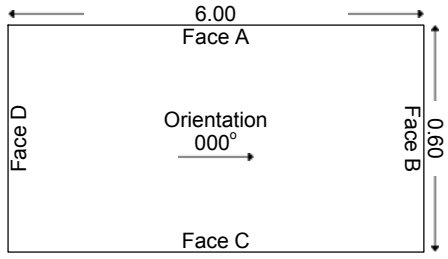
TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411622.333 N:419147.228		**TP004**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 200.696	**Start Date:** 03/07/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.50	ES1					(1.20)	MADE GROUND (Black brown sandy gravelly clay with low cobble content. Gravel is fine to coarse angular to subangular tabular and includes sandstone, mudstone, concrete and paving slabs. Cobbles and boulders include brick and paving slab).
0.50	B2						
0.50	J3						
						1.20	
1.20	B5					1.30	Yellow brown slightly clayey sandy GRAVEL with cobbles and boulders. Gravel is fine to coarse angular to tabular and includes mudstone, sandstone and siltstone. Cobbles and boulders include sandstone.
1.30	ES4						*Terminated at 1.30m BGL - due to encountering probable rockhead.*

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS

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(b)**

Print Date and Time: 01/10/2019 11:17:38

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TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP004
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411622.333 N:419147.228		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 200.696	**Start Date:** 03/07/2019	**Sheet:** 2 of 3

Figure TP004.1
TP004

Figure TP004.2
TP004

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP004
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411622.333 N:419147.228		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 200.696	**Start Date:** 03/07/2019	**Sheet:** 3 of 3

Figure TP004.3
TP004 Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

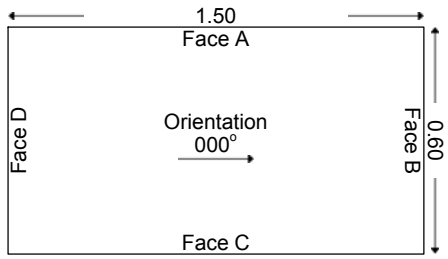
TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411566.838 N:419128.736		**TP005**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 202.307	**Start Date:** 04/07/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.20 0.20 0.20 0.50 0.50 0.50 1.00 1.00	ES1 B2 J3 ES4 B5 J6 B7 J8			201.91		(0.40) 0.40	Soft and firm grey sandy gravelly CLAY. Gravel is fine to medium angular to subangular and includes sandstone and mudstone.
				201.71		0.60	Firm yellow brown sandy gravelly CLAY. Gravel is fine to medium angular to subangular tabular and includes sandstone and mudstone.
				200.81		(0.90) 1.50	Soft and firm yellow brown with orange and grey mottling slightly sandy slightly gravelly CLAY. Gravel is fine to medium angular to subangular tabular and includes mudstone and sandstone.
							Complete at 1.50m BGL.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS
(1) Excavated to perform soakaway test. Refer to In-situ Testing Enclosures for results.

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(b)**

Print Date and Time: 08/11/2019 09:16:48

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TRIAL PIT RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP005
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411566.838 N:419128.736		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 202.307	**Start Date:** 04/07/2019	**Sheet:** 2 of 3

Figure TP005.1
TP005

Figure TP005.2
TP005

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TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411566.838 N:419128.736		**TP005**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 202.307	**Start Date:** 04/07/2019	**Sheet:** 3 of 3

Figure TP005.3
TP005 Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

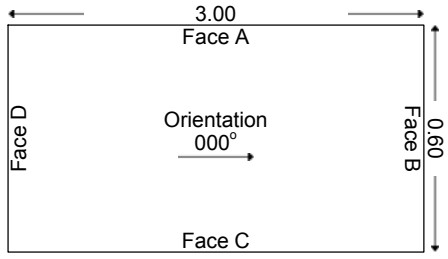
TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411553.637 N:419141.769		**TP006**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 202.037	**Start Date:** 05/07/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.20	ES1					0.30	MADE GROUND (Black brown sandy gravelly clay with rootlets, plastic bags and glass fragments. Gravel is fine to medium angular to subangular and includes sandstone and mudstone).
0.20	B2						
0.20	J3						Firm yellow brown sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone and mudstone.
0.60	ES4					(1.00)	
0.60	B5						
0.60	J6					1.30	
						1.50	Yellow brown COBBLES with much clayey sandy GRAVEL. Gravel is fine to coarse angular to tabular and includes sandstone. Cobbles are angular to tabular and include sandstone.
1.50	B7						
1.50	J8						*Terminated at 1.50m BGL - due to encountering probable rockhead.*

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS

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(b)**

Print Date and Time: 01/10/2019 11:17:53

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

TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP006
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411553.637 N:419141.769		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 202.037	**Start Date:** 05/07/2019	**Sheet:** 2 of 3

Figure TP006.1
TP006

Figure TP006.2
TP006

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

TRIAL PIT RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP006
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411553.637 N:419141.769		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 202.037	**Start Date:** 05/07/2019	**Sheet:** 3 of 3

Figure TP006.3
TP006 Spoil

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

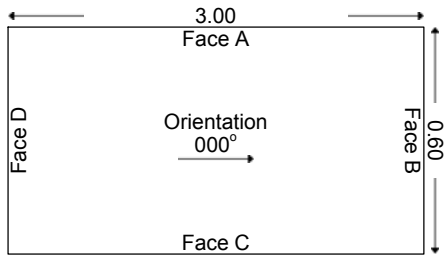
TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411504.222 N:419127.456		**TP007**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 204.272	**Start Date:** 03/07/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.20	ES1					(0.40) 0.40	Firm grey sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone and mudstone.
0.20	B2						
0.20	J3						
0.60	ES4						
0.60	B5						
0.60	J6					(1.50)	Firm yellow brown sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone and mudstone.
1.60	B7						
1.60	J8					1.90	
2.00	B9					(0.60)	Firm and stiff grey slightly sandy gravelly CLAY. Gravel is fine to coarse angular to tabular and includes sandstone and mudstone.
2.00	J10					2.50	
							Terminated at 2.50m BGL - due to encountering probable rockhead.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION		
Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS

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(b)**

Print Date and Time: 01/10/2019 11:18:01

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

TRIAL PIT RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP007
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411504.222 N:419127.456		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 204.272	**Start Date:** 03/07/2019	**Sheet:** 2 of 3

Figure TP007.1
TP007

Figure TP007.2
TP007

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

TRIAL PIT RECORD

Status:- FINAL

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP007
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411504.222 N:419127.456		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 204.272	**Start Date:** 03/07/2019	**Sheet:** 3 of 3

Figure TP007.3
TP007 Spoil

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

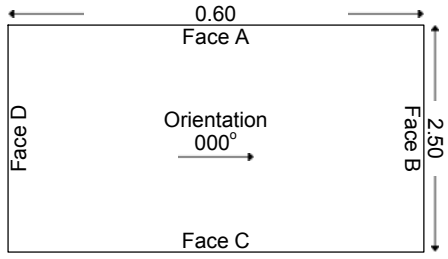
TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411491.096 N:419136.716		**TP008**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 204.935	**Start Date:** 05/07/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.20 0.20 0.20	ES1 B2 J3			204.54		(0.40) 0.40	MADE GROUND (Black brown sandy gravelly clay with rootlets. Gravel is fine to medium angular to subangular and includes sandstone, mudstone and concrete).
1.00 1.00 1.00	ES4 B5 J6					(1.40)	Firm yellow brown sandy gravelly CLAY. Gravel is fine to coarse angular to subangular and includes sandstone and mudstone. at c.1.30m BGL ... 300mm diameter cast iron water pipe in 20mm pipe bed gravel running 000-180 degrees.
1.60 1.60	B7 J8			203.14		1.80	*Terminated at 1.80m BGL - due to encountering service.*

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS

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(b)**

Print Date and Time: 08/11/2019 09:17:05

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

TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP008
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411491.096 N:419136.716		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 204.935	**Start Date:** 05/07/2019	**Sheet:** 2 of 3

Figure TP008.1
TP008

Figure TP008.2
TP008

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP008
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411491.096 N:419136.716		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 204.935	**Start Date:** 05/07/2019	**Sheet:** 3 of 3

Figure TP008.3
TP008 Spoil

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

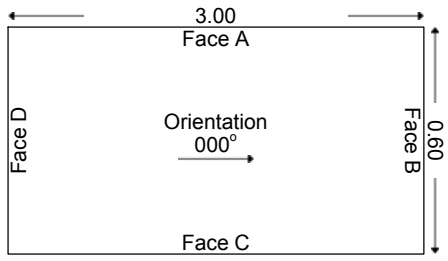
TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.**
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411448.797 N:419131.377		**TP009**
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 206.655	**Start Date:** 05/07/2019	**Sheet:** 1 of 3

SAMPLES & TESTS			Water	STRATA			
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	Description
0.20	ES1					(0.40)	Soft and firm grey sandy gravelly CLAY with rootlets. Gravel is fine to medium angular to subangular and includes sandstone and mudstone.
0.20	B2					0.40	
0.20	J3						Firm yellow brown sandy slightly gravelly CLAY. Gravel is fine to medium angular to subangular tabular and includes sandstone and mudstone.
0.60	ES4						at c.0.60m BGL ... slightly sandy clay of high plasticity.
0.60	B5						
0.60	J6					(1.80)	
1.60	B7						
1.60	J8					2.20	
2.60	B9						Grey black very clayey gravelly SAND. Gravel is fine to medium and includes coal and mudstone.
2.60	J10					(1.30)	
						3.50	
3.60	B11						Black GRAVEL. Gravel is fine to coarse angular cubic and includes coal.
3.60	J12					3.80	
							Terminated at 3.80m BGL - due to encountering probable rockhead.

PLAN



GROUNDWATER
No groundwater inflow observed.

STABILITY
Pit sides and base stable throughout excavation.

ADDITIONAL INFORMATION

Sketch Diagram:	No Sketch Taken	
Photographs:	Yes	See additional sheets.

GENERAL REMARKS

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(b)**

Print Date and Time: 01/10/2019 11:18:16

ALLIED EXPLORATION & GEOTECHNICS LIMITED

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

TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP009
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411448.797 N:419131.377		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 206.655	**Start Date:** 05/07/2019	**Sheet:** 2 of 3

Figure TP009.1
TP009

Figure TP009.2
TP009

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

TRIAL PIT RECORD

Status:- **FINAL**

Project: A629 Halifax Road Ainley Top			**Exploratory Hole No.** TP009
Client: Leeds City Council	**Location:** A629 Halifax Road, Huddersfield E:411448.797 N:419131.377		
Method (Equipment): Machine Excavated (JCB 3CX)	**Ground Level (m):** 206.655	**Start Date:** 05/07/2019	**Sheet:** 3 of 3

Figure TP009.3
TP009 Spoil

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

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	SPTN' Value	SPTN' 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	
BH001	1.50 (197.16)	Dry (1.50)	1.50	ATH01	59	75	10	75	16	150	26	75	22	16	25	0	3			91	50	0.66	0.98	1.82	-	-	S	
BH001	1.90 (196.76)	Dry (1.90)	1.90	ATH01	59	7	25			7	25	3	50							3	50	0.68	0.98	0.06	-	-	S	
BH001	2.30 (196.36)	Dry (2.30)	2.30	ATH01	59	0	50			0	50	0	100							0	100	0.69	0.98	0.00	-	-	S	
BH002	1.50 (196.54)	Dry (1.50)	1.50	ATH01	59	75	4	75	6	150	10	75	6	75	5	75	6	75	8	300	25	0.66	0.98	12.00	25	16	S	
BH002	2.30 (195.74)	Dry (2.30)	2.30	ATH01	59	75	17	19	25	94	42	7	25							7	25	0.69	0.98	0.28	-	-	S	
BH002	2.70 (195.34)	Dry (2.70)	2.70	ATH01	59	9	50			9	50	0	100							0	100	0.71	0.98	0.00	-	-	S	
BH003	0.90 (199.14)	Dry (0.90)	0.90	ATH01	59	75	7	75	16	150	23	75	21	11	25	0	4			86	50	0.64	0.98	1.72	-	-	S	
BH003	1.00 (199.04)	Dry (1.00)	1.00	ATH01	59	6	50			6	50	0	100							0	100	0.64	0.98	0.00	-	-	S	
BH004	1.50 (198.96)	Dry (1.50)	1.50	ATH01	59	75	4	75	7	150	11	75	9	75	12	75	18	31	11	256	50	0.66	0.98	5.12	-	-	S	
BH004	2.20 (198.26)	Dry (2.20)	2.20	ATH01	59	27	25			27	25	12	50							12	50	0.69	0.98	0.24	-	-	S	

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

Contract Title :-	Client :-	AEG Contract No :-
A629 Halifax Road Ainley Top	Leeds City Council	4208L(b)

Date of Issue :-	Page No. :-	Checked By :-	Approved By :-	Certificate No. :-
08/11/2019	1 of 2	LC		SPT/4208L(b)/1

UKAS TESTING 1367

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

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	SPTN' Value	SPTN' 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	
BH005	1.20 (199.61)	Dry (1.20)	1.20	ATH01	59	75	14	2	25	77	39	0	25							0	25	0.65	0.98	0.00	-	-	S	
BH005	1.30 (199.51)	Dry (1.30)	1.30	ATH01	59	10	50			10	50	0	100							0	100	0.65	0.98	0.00	-	-	S	
BH006	1.50 (201.76)	Dry (1.50)	1.50	ATH01	59	75	6	75	11	150	17	75	22	0	25	0	3			75	50	0.66	0.98	1.50	-	-	S	
BH006	2.00 (201.26)	Dry (2.00)	2.00	ATH01	59	0	50			0	50	0	100							0	100	0.68	0.98	0.00	-	-	S	
BH007	2.50 (203.48)	Dry (2.50)	2.50	ATH01	59	75	4	75	4	150	8	75	3	75	4	75	5	75	4	300	16	0.70	0.98	18.75	16	11	S	
BH007	3.20 (202.78)	Dry (3.20)	3.20	ATH01	59	75	9	75	17	150	26	14	25	0	25					14	50	0.73	0.98	0.28	-	-	S	
BH007	3.50 (202.48)	Dry (3.50)	3.50	ATH01	59	8	50			8	50	2	100							2	100	0.74	0.98	0.02	-	-	S	

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

Contract Title :-	Client :-	AEG Contract No :-
A629 Halifax Road Ainley Top	Leeds City Council	4208L(b)

Date of Issue :-	Page No. :-	Checked By :-	Approved By :-	Certificate No. :-
08/11/2019	2 of 2	LC	NW	SPT/4208L(b)/2

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:	ATH01
Test Date:	02/08/2019
Report Date:	07/08/2019
File Name:	ATH01.spt
Test Operator:	BP

QUALITY CONTROL CHECKED
07 AUG 2019
Signed

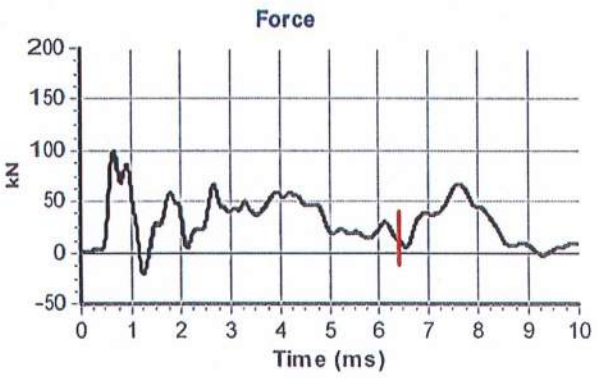
Instrumented Rod Data

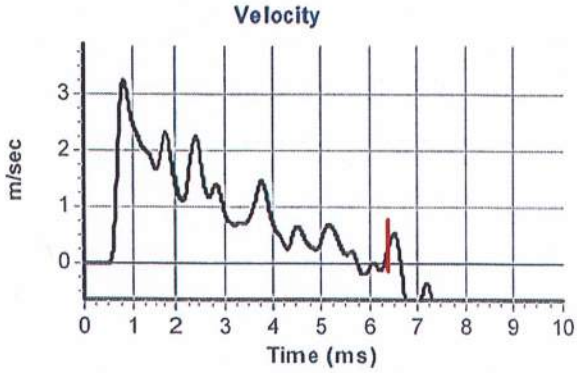
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.3
Assumed Modulus E_a (GPa):	208
Accelerometer No.1:	5991
Accelerometer No.2:	5990

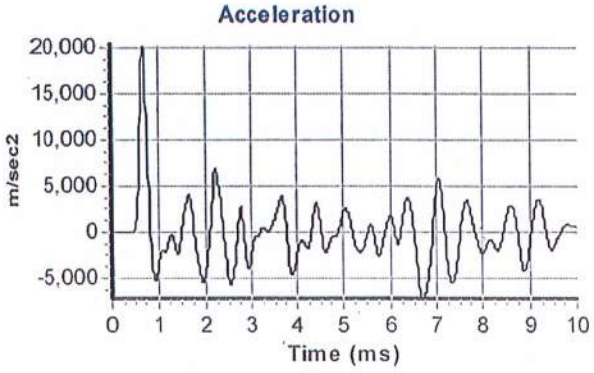
SPT Hammer Information

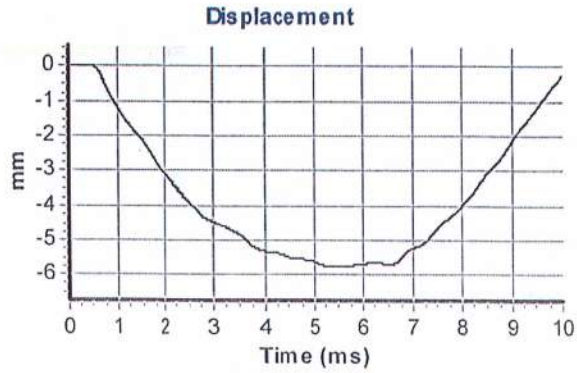
Hammer Mass m (kg):	63.8
Falling Height h (mm):	761
SPT String Length L (m):	14.1

Comments / Location









Calculations

Area of Rod A (mm2):	944
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	262

Energy Ratio E_r (%): 55

B Proctor

Signed: Brian Proctor
Title: Technician

The recommended calibration interval is 12 months

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ALLIED EXPLORATION & GEOTECHNICS LTD.
Unit 25, Stella Gill Industrial Site, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG

SOIL INFILTRATION DETERMINATION (SOAKAWAY DESIGN (BRE Digest 365))
Installation Type: Trial Pit

CONTRACT & POSITION DETAILS

SITE: A629 Halifax Road Ainley Top

CONTRACT: 4208L(b) **PIT:** TP03 **DEPTH:** 1.80 **mBGL**

SOAKAWAY PIT CONDITIONS

Soakaway Depth:	1.80	mBGL
Soakaway Length:	1.50	m
Soakaway Width:	0.60	m
Filled Water Level:	0.60	mBGL
Operator:	**AVR**	
Test Date:	04/07/2019	

EFFECTIVE DEPTH DETAILS

Soakaway 25% Full:	1.500		m
Soakaway 75% Full:	0.900		m
Soakaway 50% Full:	1.200		m
Test No.:	**1 of 1**		
Weather Conditions:	Fine		
Test Zone (m):	0.60	to	1.80

TEST CALCULATION

Soil Infiltration (*f*)

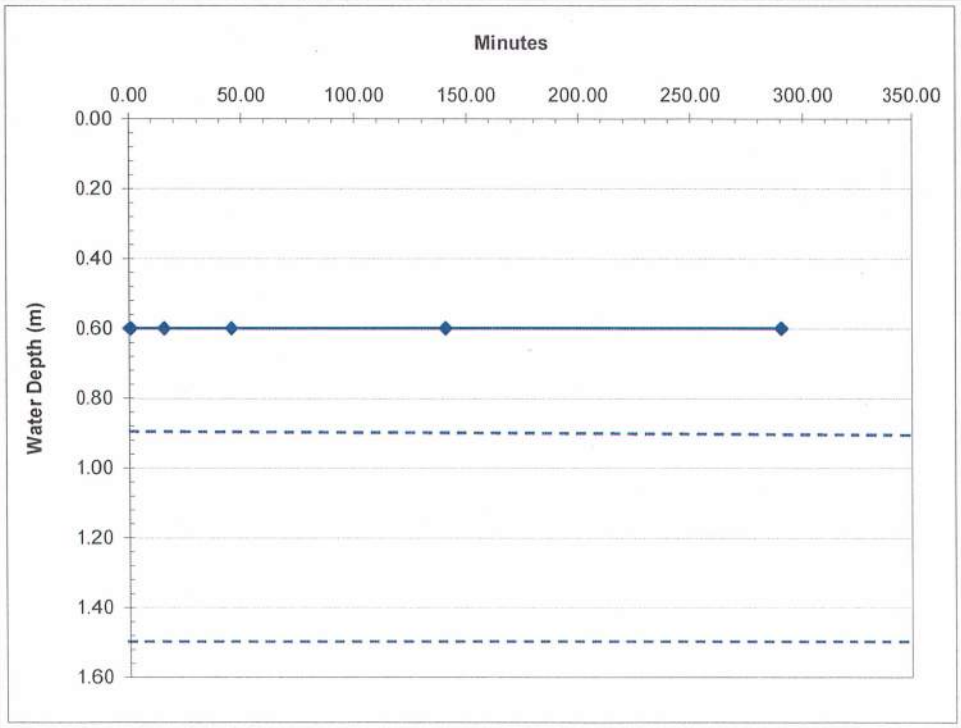
$$f = \frac{V_{p\,75-25}}{a_{p50} \times t_{p75-25}}$$ **Equation (i)**

$V_{p\,75-25}$ = the effective storage volume of water in the trial pit 75% and 25% effective depth.

a_{p50} = the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} = the time for the water level to fall from 75% to 25% effective depth.

Minutes	Water Depth (m)	Remarks
0.00	0.60	**Test Start**
15.00	0.60	
45.00	0.60	
140.00	0.60	
290.00	0.60	**Test Finish**



Time (from Graph) 75% Full: n/a Minutes
Time (from Graph) 25% Full: n/a Minutes

t_{p75-25} = **n/a** **Minutes**

MATERIAL TYPE

0.00-0.40m: MADE GROUND (Topsoil); 0.40-1.40m: Firm yellow brown sandy gravelly CLAY; 1.40-1.80m: Yellow brown sandy GRAVEL.

REMARKS

(1) 75% effective depth level not reached during the test. No discerable water movement noted. Test should be considered failed – no infiltration (f) calculated.

SOIL INFILTRATION RESULTS

$V_{p\,75-25}$ =	0.540	m^3	
a_{p50} =	3.420	m^2	
Soil Infiltration Rate (*f*) =	**n/a**	**m/s**	**From (i)**

Calculated: K.W **Date:** 29/07/2019

ALLIED EXPLORATION & GEOTECHNICS LTD.
Unit 25, Stella Gill Industrial Site, Pelton Fell, Chester-le-Street, County Durham, DH2 2RG

SOIL INFILTRATION DETERMINATION (SOAKAWAY DESIGN (BRE Digest 365))
Installation Type: Trial Pit

CONTRACT & POSITION DETAILS

SITE: A629 Halifax Road Ainley Top

CONTRACT: 4208L(b) **PIT:** TP05 **DEPTH:** 1.50 **mBGL**

SOAKAWAY PIT CONDITIONS

Soakaway Depth:	1.50	mBGL
Soakaway Length:	1.50	m
Soakaway Width:	0.60	m
Filled Water Level:	0.40	mBGL
Operator:	**AVR**	
Test Date:	04/07/2019	

EFFECTIVE DEPTH DETAILS

Soakaway 25% Full:	1.225		m
Soakaway 75% Full:	0.675		m
Soakaway 50% Full:	0.950		m
Test No.:	**1 of 1**		
Weather Conditions:	Fine		
Test Zone (m):	0.40	to	1.50

TEST CALCULATION

Soil Infiltration (f)

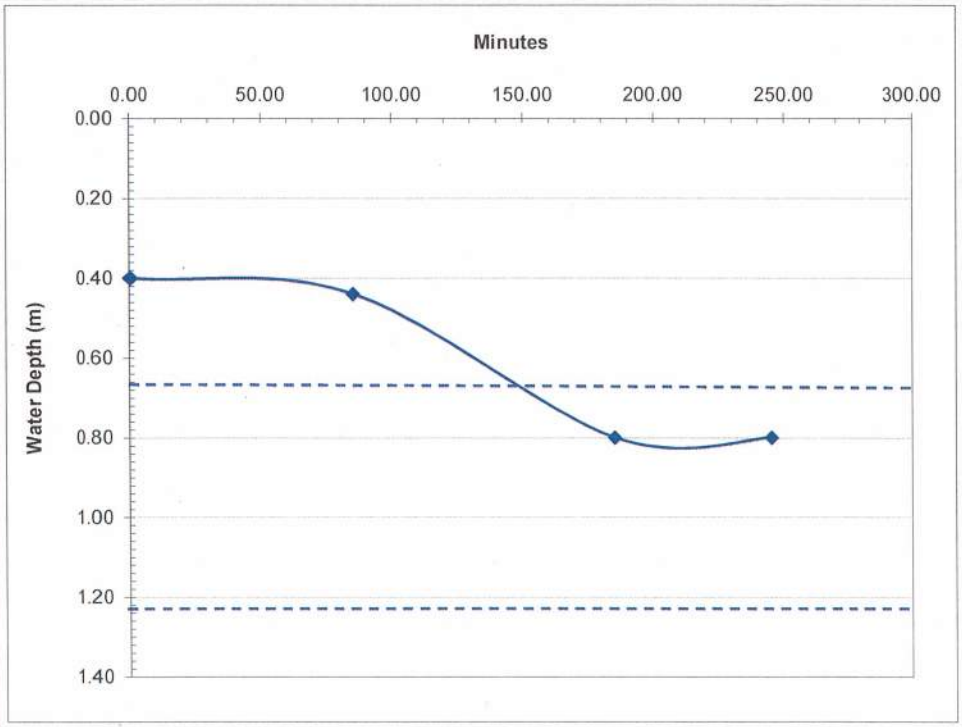
$$f = \frac{V_{p\,75-25}}{a_{p50} \times t_{p75-25}}$$ **Equation (i)**

$V_{p\,75-25}$ = the effective storage volume of water in the trial pit 75% and 25% effective depth.

a_{p50} = the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} = the time for the water level to fall from 75% to 25% effective depth.

Minutes	Water Depth (m)	Remarks
0.00	0.40	**Test Start**
85.00	0.44	
185.00	0.80	
245.00	0.80	**Test Finish**



Time (from Graph) 75% Full: n/a Minutes
Time (from Graph) 25% Full: n/a Minutes

t_{p75-25} = **n/a Minutes**

MATERIAL TYPE

0.00-0.40m: Soft and firm grey sandy gravelly CLAY; 0.40-0.60m: Firm yellow brown sandy gravelly CLAY; 0.60-1.50m: Yellow brown clayey sandy GRAVEL.

REMARKS

(1) Only 75% effective depth level reached during test – some water movement indicated. Test should be considered failed – no infiltration rate (f) calculated.

SOIL INFILTRATION RESULTS

$V_{p\,75-25}$ =	0.495	m^3	
a_{p50} =	3.210	m^2	
Soil Infiltration Rate (f) =	**n/a**	**m/s**	**From (i)**

Calculated: K.W **Date:** 29/07/2019

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LABORATORY SAMPLE DESCRIPTION SHEET

Exploratory Hole No.	Sample Depth (m)	ID	Description	Laboratory Tests/Remarks
BH002	1.50	B8	Yellow light brown with light grey mottling very clayey very gravelly SAND.	MC PSD SED
BH004	1.50	B8	Friable light grey silty slightly sandy slightly gravelly CLAY. Gravel includes mudstone.	MC PSD SED
BH007	2.20	B9	MADE GROUND (Grey black slightly sandy slightly gravelly clay with brown discolouration on sample surface. Gravel includes coal).	Calorific Value
TP001	0.50	B5	Brown sandy slightly gravelly CLAY of high plasticity.	MC PI PSD SED PD US for CP2 and CBR
TP003	0.50	B3	Light brown with grey mottling slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI PSD SED
TP005	1.00	B7	Yellow brown with orange and grey mottling slightly sandy slightly gravelly CLAY of intermediate plasticity.	MC PI PSD SED
TP006	1.50	B7	Yellow brown COBBLES with much clayey sandy GRAVEL.	MC PSD PD US for CPV and CBR
TP009	0.60	B5	MADE GROUND (Light brown with orange and grey mottling slightly sandy clay of high plasticity).	MC PI PSD SED
TP009	2.60	B9	MADE GROUND (Brown black very clayey gravelly sand. Gravel includes mudstone).	MC PSD SED
TP009	3.60	B11	MADE GROUND (Black slightly clayey sandy gravel with occasional clay pockets. Gravel includes coal).	Calorific Value

Contract Title :- A629 Halifax Road Ainley Top

Client :- Leeds City Council

Signed :- MSelk

Name :- M SELKIRK

Date of issue :- 13/09/2019

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

AEG Contract No. :- 4208L(b)

UKAS TESTING 1367

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MOISTURE CONTENT CERTIFICATE

BS 1377 : Part 2 : Clause 3.2

Exploratory Hole No.	Sample Depth (m)	Sample ID	Specific Depth (m)	Moisture Content (%)	Date Tested	Remarks
BH002	1.50	B8	1.50	14.9	03/09/2019	
BH004	1.50	B8	1.50	17.6	04/09/2019	
TP006	1.50	B7	1.50	7.3	04/09/2019	
TP009	2.60	B9	2.60	15.2	05/09/2019	

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

Contract Title :-	Client :-
A629 Halifax Road Ainley Top	Leeds City Council

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

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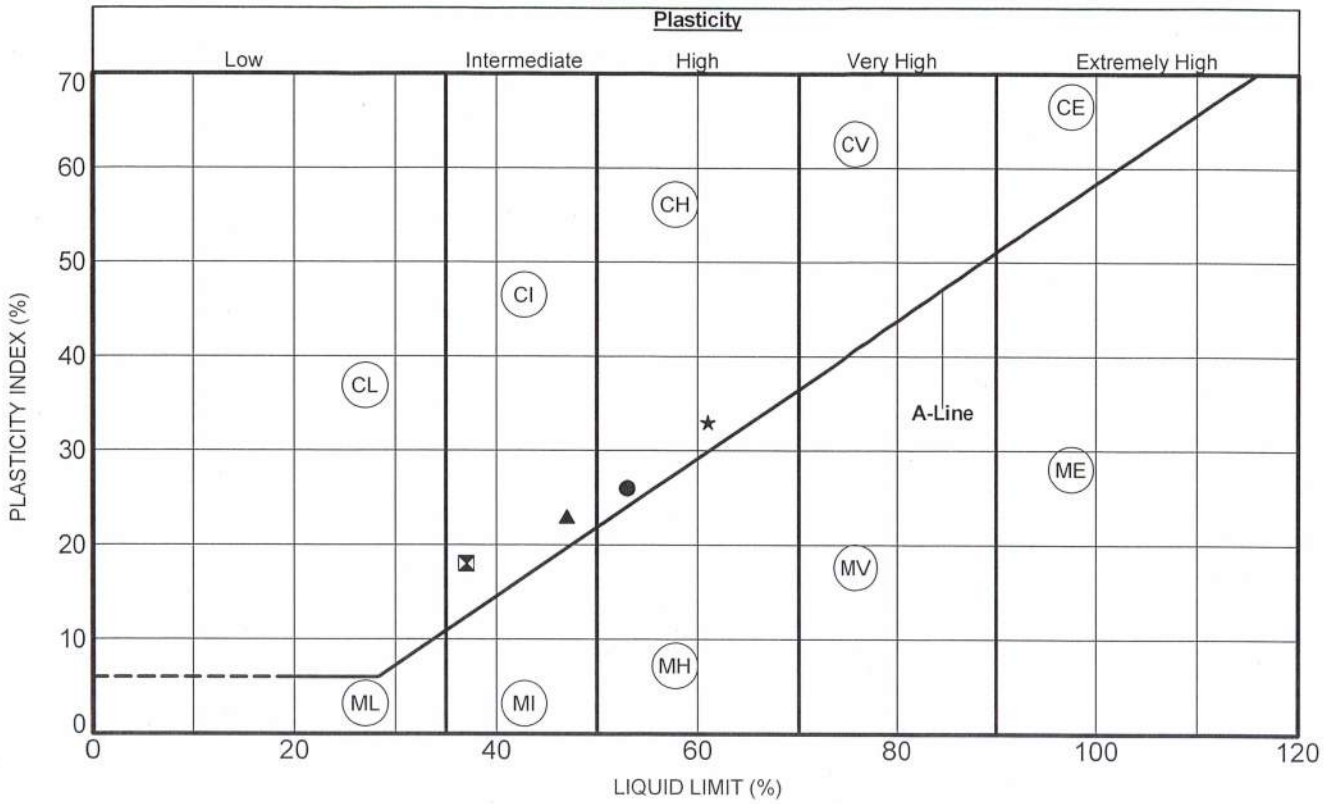
ATTERBERG LIMITS & NATURAL MOISTURE CONTENT

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	
● TP001	0.50	B5	0.50	53	27	26	-0.14	Air Dried	58.0	23.4	04/09/2019	#
⊠ TP003	0.50	B3	0.50	37	19	18	0.09	Natural	84.0	20.6	04/09/2019	
▲ TP005	1.00	B7	1.00	47	24	23	0.30	Natural	76.0	30.8	05/09/2019	
★ TP009	0.60	B5	0.60	61	28	33	0.18	Natural	98.0	34.0	05/09/2019	

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 Ainley Top	Leeds City Council

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

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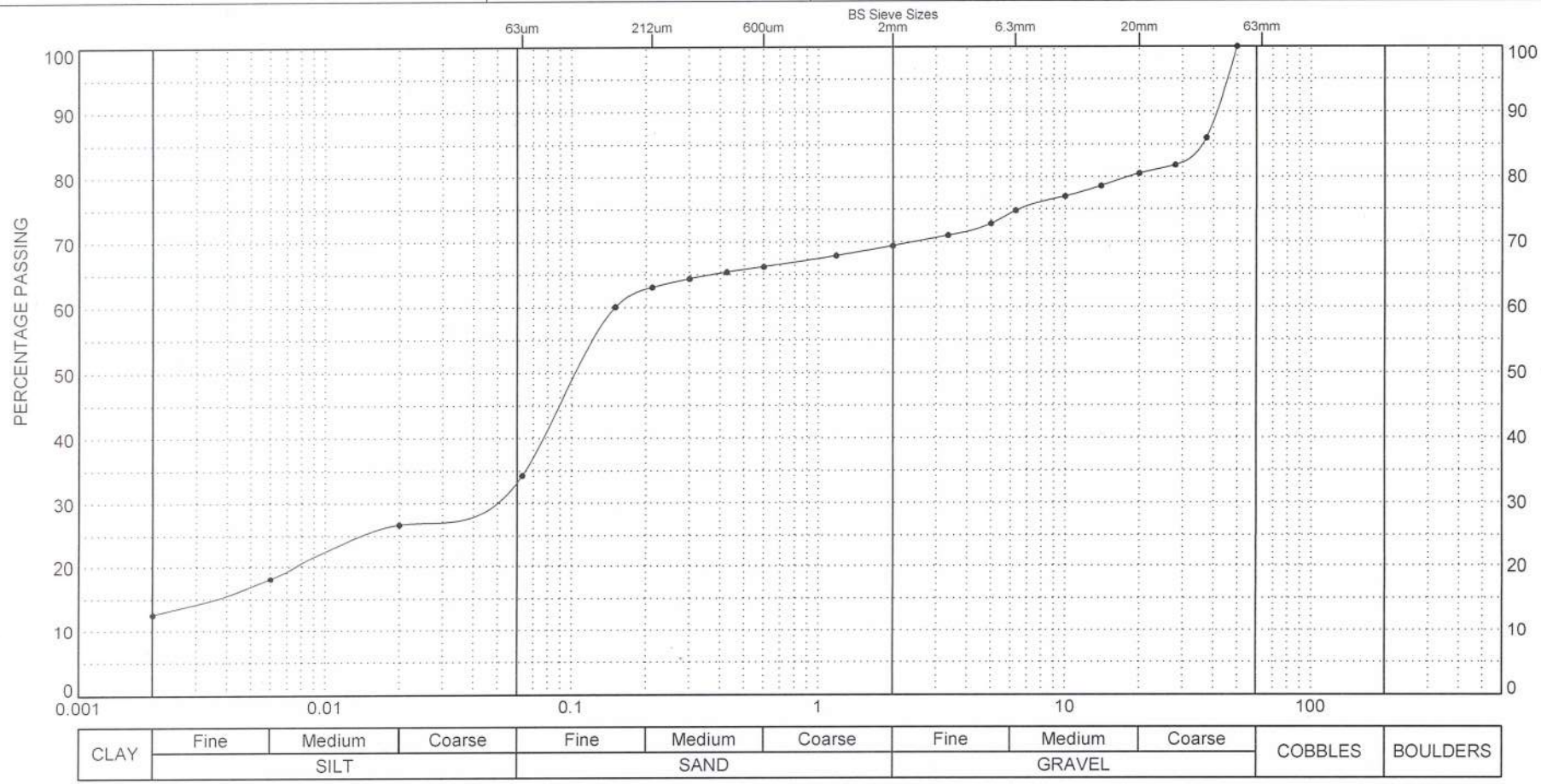
PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- **BH002**	Depth (m) :- **1.50**	Sample Type & No :- **B8**	Specific Depth (m) :- **1.50**	Date Tested :- **03/09/2019**



Sieve Size (mm)	Passing (%)
50	100.0
37.5	86.0
28	81.8
20	80.5
14	78.6
10	77.0
6.3	74.8
5	72.8
3.35	71.0
2	69.4
1.18	67.9
0.6	66.2
0.425	65.4
0.3	64.4
0.212	63.1
0.15	60.1
0.063	34.3
0.02	26.7
0.006	18.1
0.002	12.5

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(b)/BH002/B8/1.50	msene	M. SELKIRK	

Client :-	Contract Title :-	AEG Contract No :-
Leeds City Council	A629 Halifax Road Ainley Top	4208L(b)

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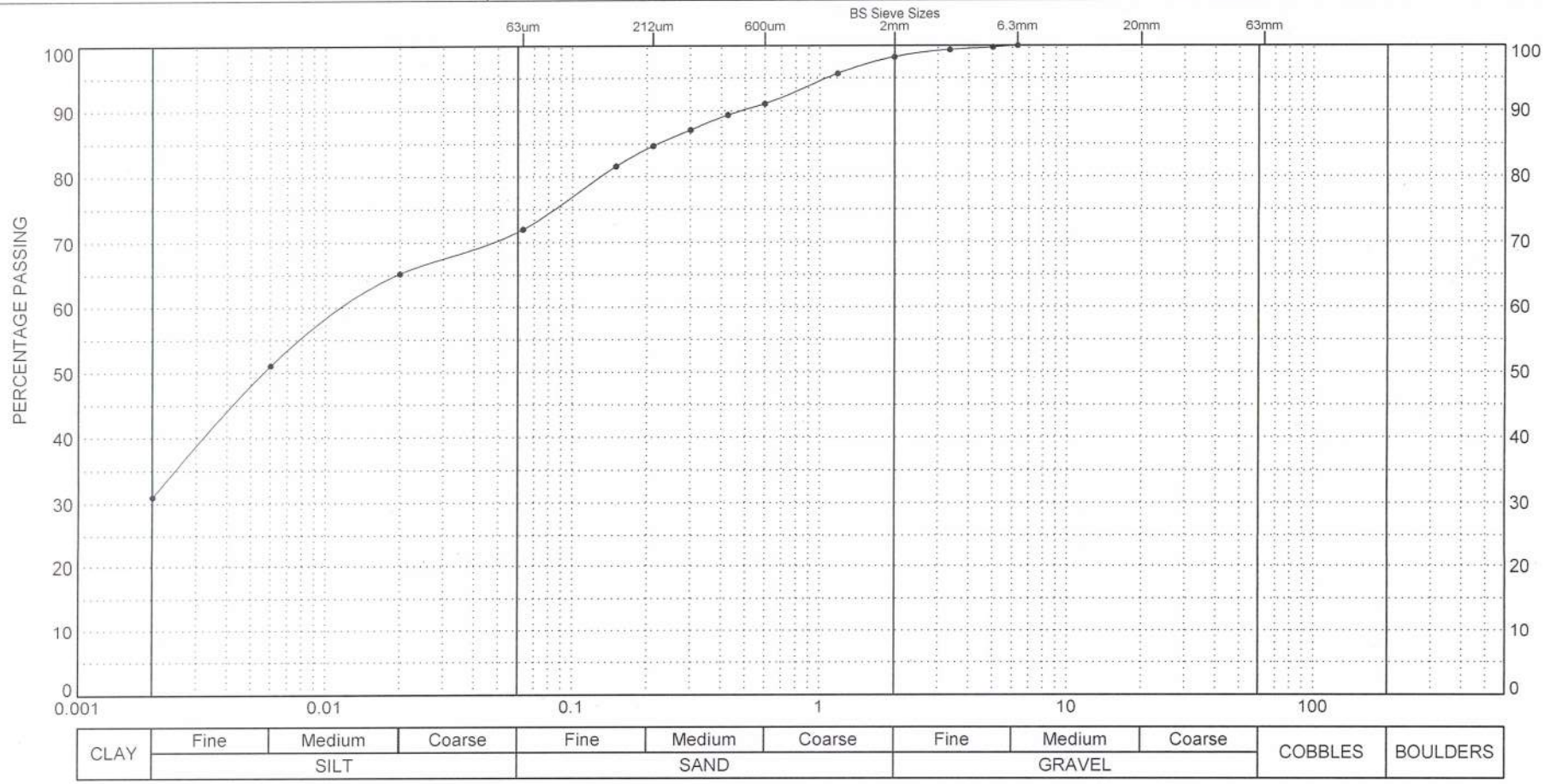
PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- **BH004**	Depth (m) :- **1.50**	Sample Type & No :- **B8**	Specific Depth (m) :- **1.50**	Date Tested :- **04/09/2019**



Sieve Size (mm)	Passing (%)
6.3	100.0
5	99.7
3.35	99.3
2	98.2
1.18	95.7
0.6	91.1
0.425	89.4
0.3	87.1
0.212	84.7
0.15	81.6
0.063	72.0
0.02	65.2
0.006	51.1
0.002	31.0

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(b)/BH004/B8/1.50		M. SELKIRK	

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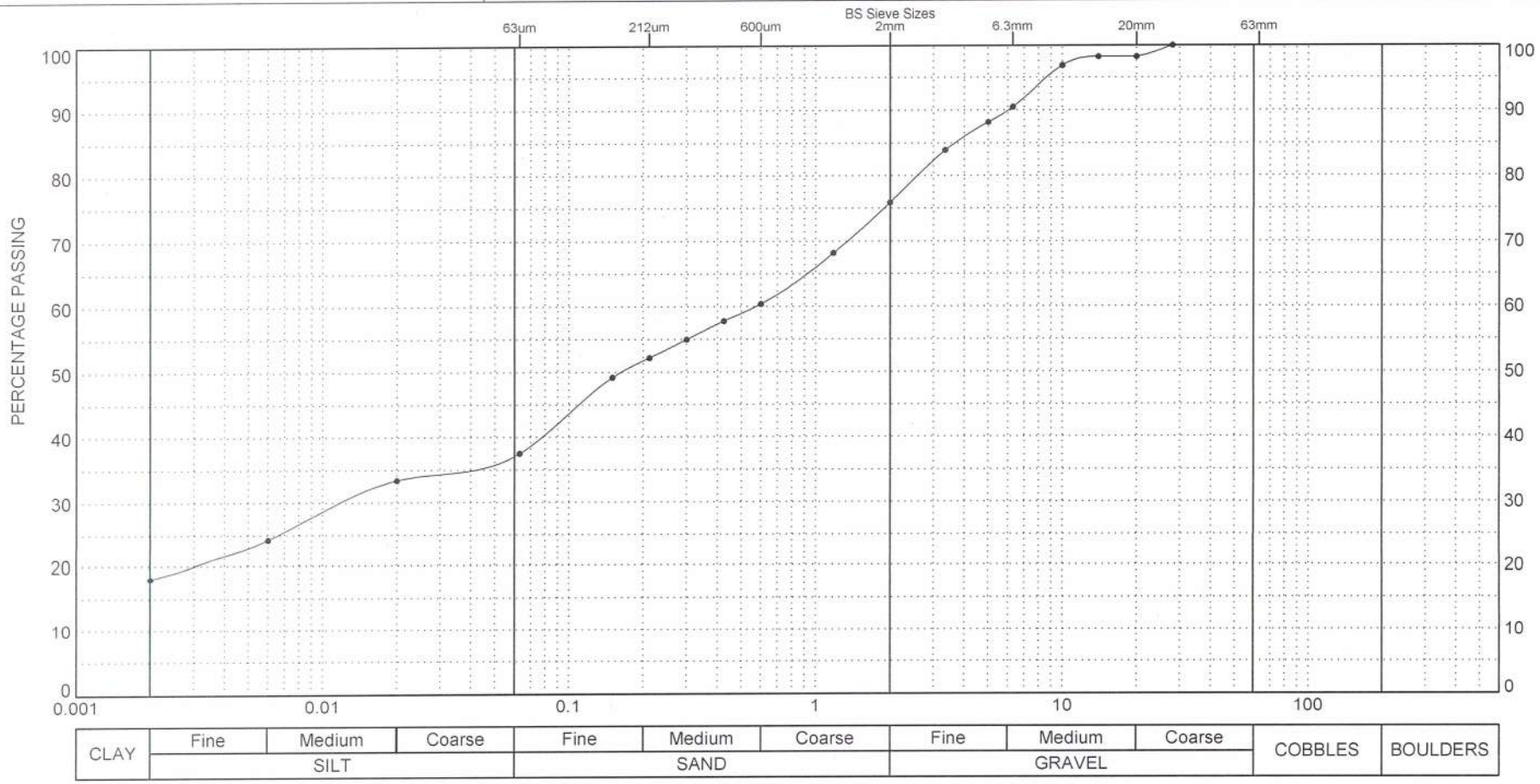
PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- **TP001**	Depth (m) :- **0.50**	Sample Type & No :- **B5**	Specific Depth (m) :- **0.50**	Date Tested :- **04/09/2019**



Sieve Size (mm)	Passing (%)
28	100.0
20	98.2
14	98.2
10	96.9
6.3	90.5
5	88.2
3.35	83.9
2	75.9
1.18	68.2
0.6	60.4
0.425	57.8
0.3	55.0
0.212	52.2
0.15	49.2
0.063	37.5
0.02	33.4
0.006	24.3
0.002	17.9

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(b)/TP001/B5/0.50	MSone	M. SELKIRK	

Client :-	Contract Title :-	AEG Contract No :-
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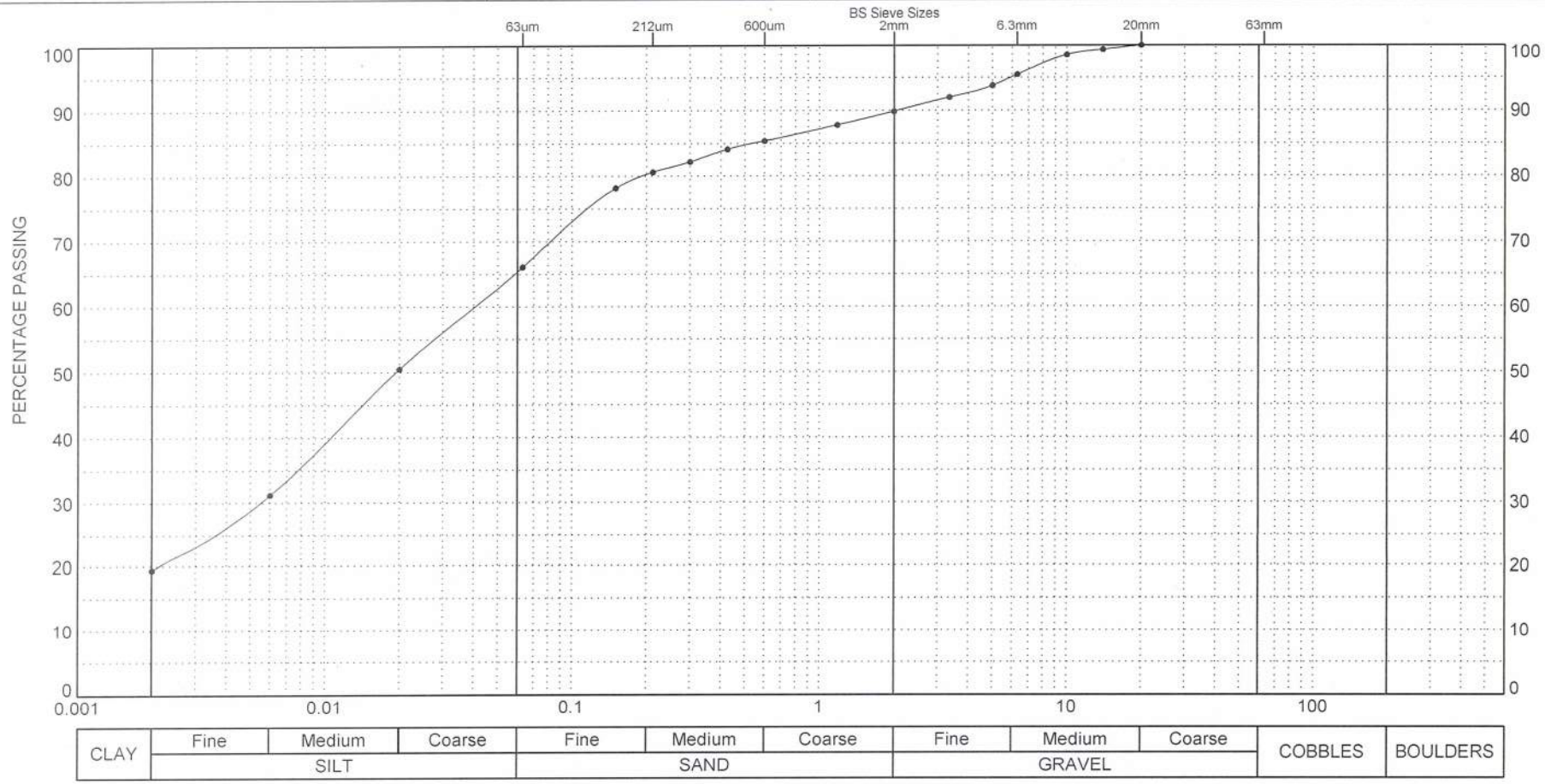
PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- **TP003**	Depth (m) :- **0.50**	Sample Type & No :- **B3**	Specific Depth (m) :- **0.50**	Date Tested :- **04/09/2019**



Sieve Size (mm)	Passing (%)
20	100.0
14	99.3
10	98.5
6.3	95.5
5	93.8
3.35	92.0
2	89.9
1.18	87.8
0.6	85.4
0.425	84.1
0.3	82.2
0.212	80.6
0.15	78.2
0.063	66.1
0.02	50.5
0.006	31.2
0.002	19.4

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(b)/TP003/B3/0.50		M. SELKIRK	

Client :-	Contract Title :-	AEG Contract No :-
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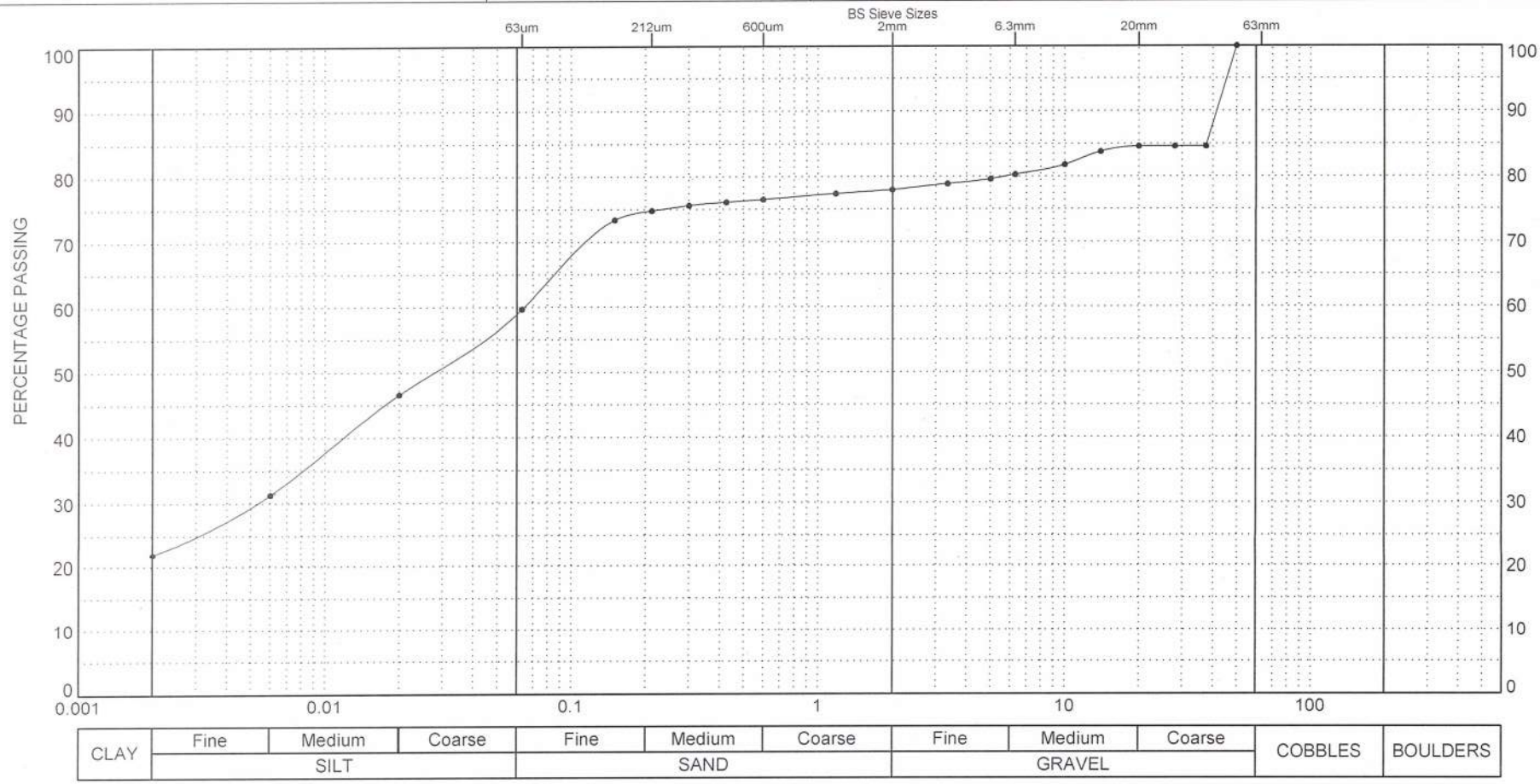
PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- **TP005**	Depth (m) :- **1.00**	Sample Type & No :- **B7**	Specific Depth (m) :- **1.00**	Date Tested :- **05/09/2019**



Sieve Size (mm)	Passing (%)
50	100.0
37.5	84.6
28	84.6
20	84.6
14	83.8
10	81.8
6.3	80.3
5	79.6
3.35	78.9
2	78.0
1.18	77.4
0.6	76.5
0.425	76.1
0.3	75.6
0.212	74.8
0.15	73.4
0.063	59.7
0.02	46.6
0.006	31.3
0.002	21.8

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(b)/TP005/B7/1.00	MSone	M. SELKIRK	

Client :-	Contract Title :-	AEG Contract No :-
Leeds City Council	A629 Halifax Road Ainley Top	4208L(b)

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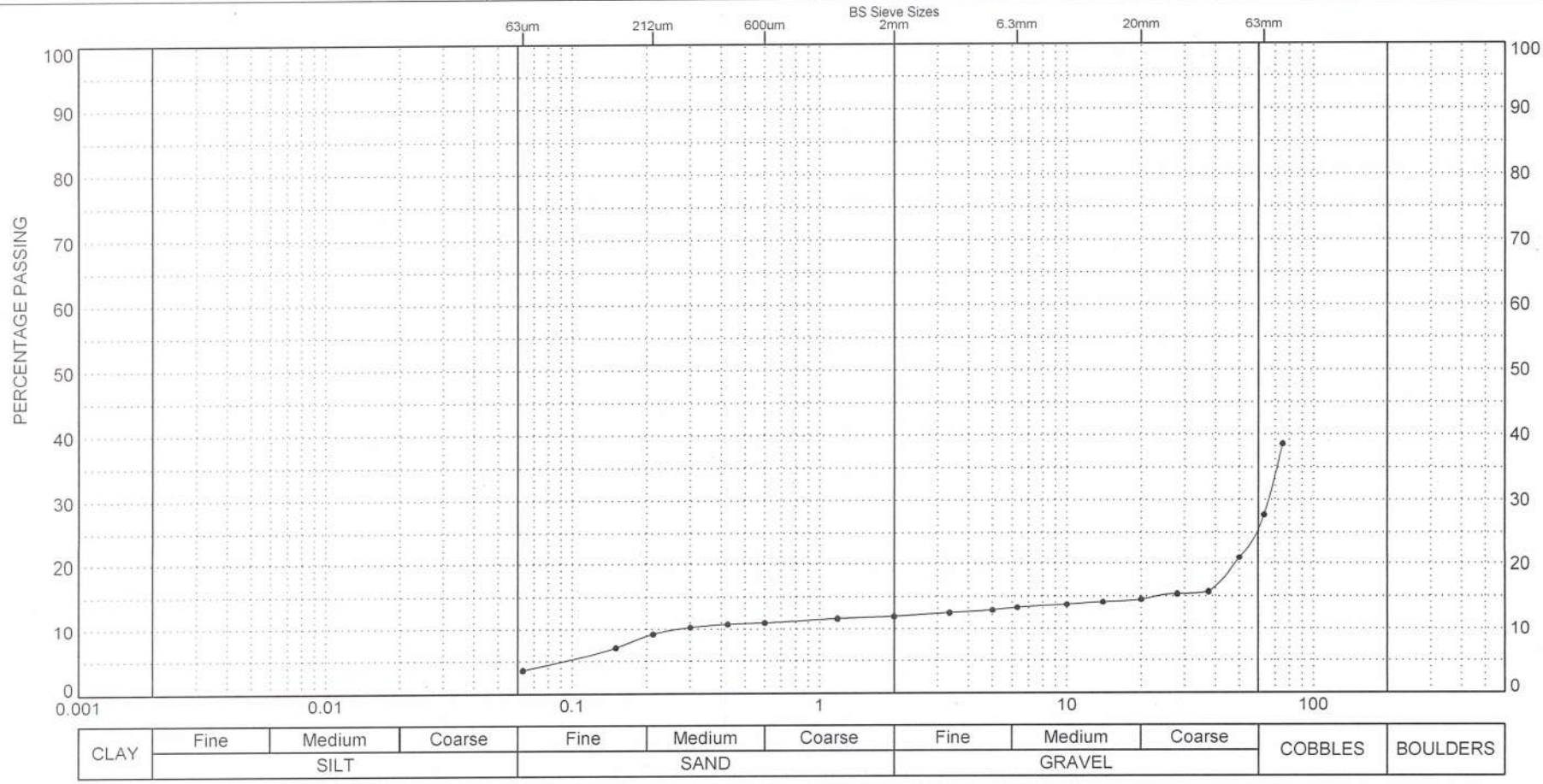
PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990
(Test deviated from standard due to insufficient sample mass)

Exploratory Hole No :- **TP006**	Depth (m) :- **1.50**	Sample Type & No :- **B7**	Specific Depth (m) :- **1.50**	Date Tested :- **04/09/2019**



Sieve Size (mm)	Passing (%)
75	38.6
63	27.7
50	20.9
37.5	15.6
28	15.3
20	14.5
14	14.1
10	13.7
6.3	13.2
5	12.8
3.35	12.4
2	11.9
1.18	11.6
0.6	11.0
0.425	10.8
0.3	10.3
0.212	9.2
0.15	7.2
0.063	3.7

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(b)/TP006/B7/1.50		M. SELKIRK	

Client :-	Contract Title :-	AEG Contract No :-
Leeds City Council	A629 Halifax Road Ainley Top	4208L(b)

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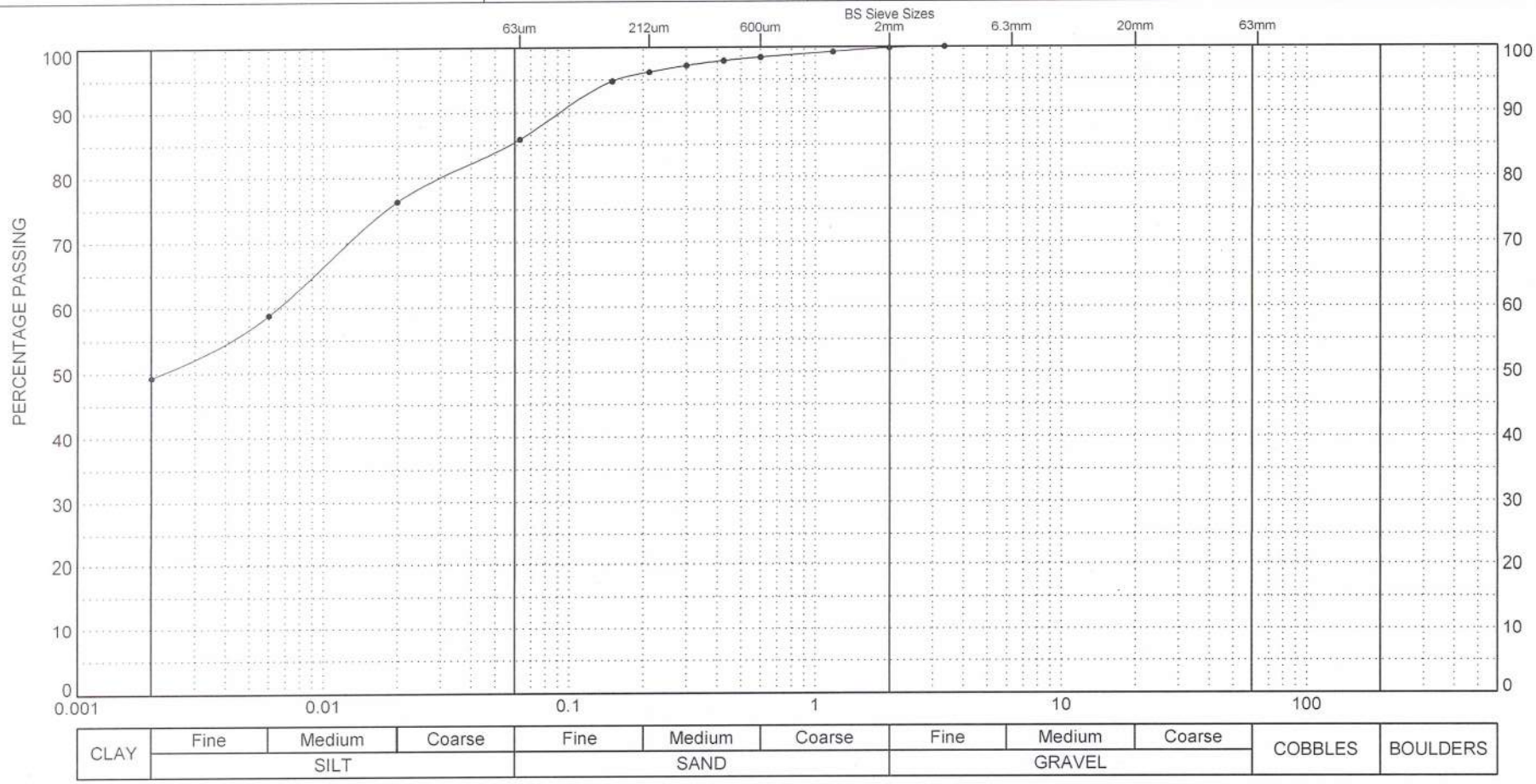
PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- **TP009**	Depth (m) :- **0.60**	Sample Type & No :- **B5**	Specific Depth (m) :- **0.60**	Date Tested :- **05/09/2019**



Sieve Size (mm)	Passing (%)
3.35	100.0
2	99.8
1.18	99.2
0.6	98.4
0.425	97.9
0.3	97.2
0.212	96.2
0.15	94.8
0.063	85.9
0.02	76.3
0.006	58.9
0.002	49.3

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(b)/TP009/B5/0.60	MSelkirk	M. SELKIRK	

Client :-	Contract Title :-	AEG Contract No :-
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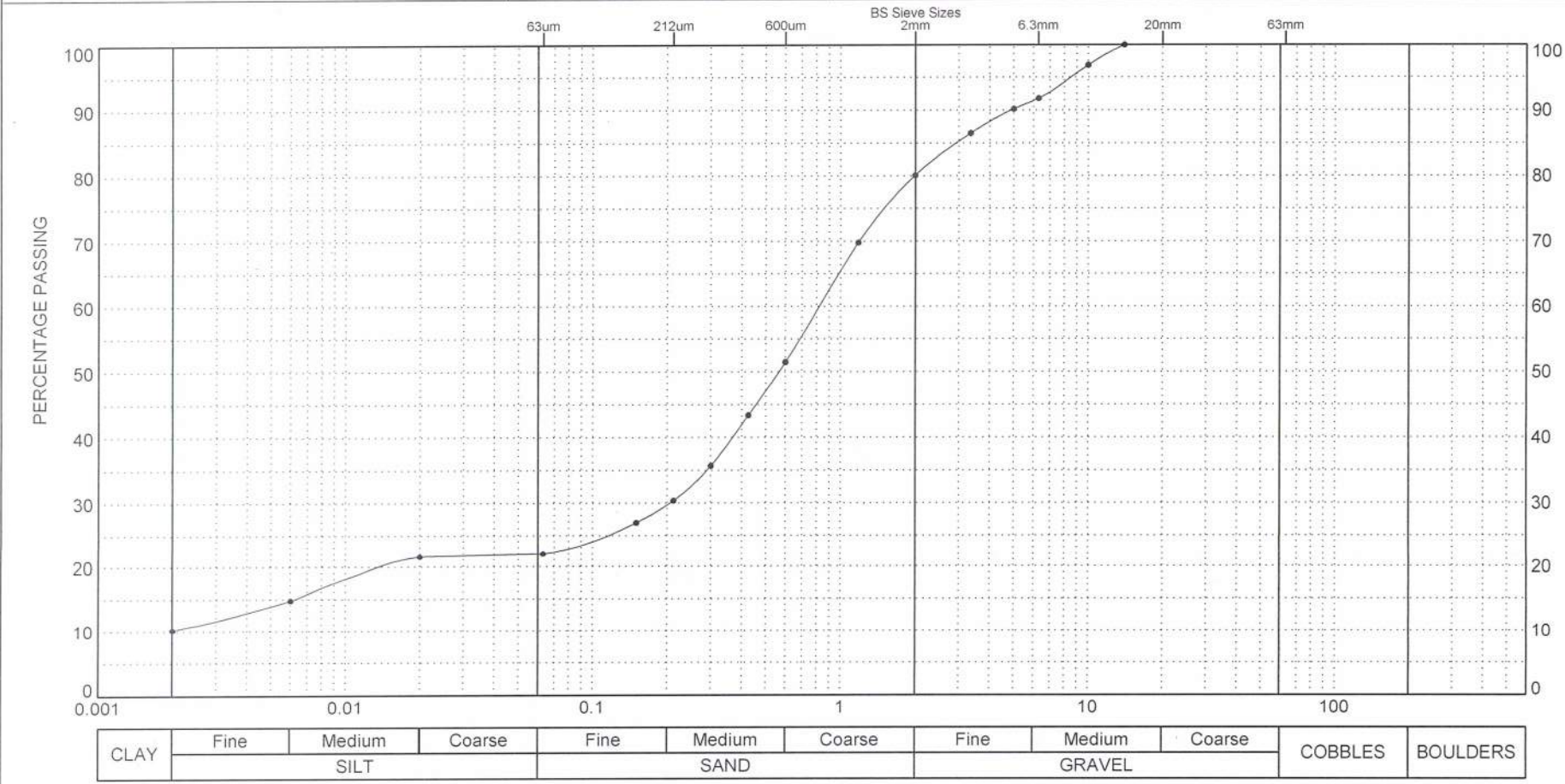
PARTICLE SIZE DISTRIBUTION

BS1377 : Part 2 : Clause 9.2 & 9.4 : 1990

Exploratory Hole No :- **TP009**	Depth (m) :- **2.60**	Sample Type & No :- **B9**	Specific Depth (m) :- **2.60**	Date Tested :- **05/09/2019**



Sieve Size (mm)	Passing (%)
14	100.0
10	96.9
6.3	91.8
5	90.2
3.35	86.5
2	80.1
1.18	69.8
0.6	51.5
0.425	43.4
0.3	35.7
0.212	30.4
0.15	27.0
0.063	22.1
0.02	21.6
0.006	14.8
0.002	10.2

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(b)/TP009/B9/2.60	M Selkirk	M. SELKIRK	

Client :-	Contract Title :-	AEG Contract No :-
Leeds City Council	A629 Halifax Road Ainley Top	4208L(b)

UKAS TESTING 1367

Certificate of Analysis

Certificate Number 19-17467

11-Sep-19

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

Our Reference 19-17467

Client Reference 4208L(b)

Order No LA2207

Contract Title A629 Halifax Road Ainley Top

Description 2 Soil samples.

Date Received 06-Sep-19

Date Started 06-Sep-19

Date Completed 11-Sep-19

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

Notes 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

MCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-17467
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH007	9	2.2	1559426	11/09/2019	Black dark grey gravelly, sandy CLAY
TP009	11	3.6	1559427	11/09/2019	Black dark grey clayey, sandy GRAVEL including some COAL (sample matrix outside MCERTS scope of accreditation)

Summary of Chemical Analysis
Soil Samples

Our Ref 19-17467
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

			Lab No	1559426	1559427
			Sample ID	BH007	TP009
			Depth	2.20	3.60
			Other ID	9	11
			Sample Type	B	B
			Sampling Date	02/07/19	04/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Inorganics					
Calorific Value	DETSC 5008	1	MJ/kg	4.9	21.1

Key: n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 19-17467
Client Ref 4208L(b)
Contract A629 Halifax Road Ainley Top

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1559426	BH007 2.20 SOIL	02/07/19	PT 1L		
1559427	TP009 3.60 SOIL	04/07/19	PT 1L		

Key: P-Plastic 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 19-16297

29-Aug-19

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

Our Reference 19-16297

Client Reference 4208L (B)

Order No LA2207

Contract Title A629 Halifax Road Ainley Top

Description 17 Soil samples.

Date Received 22-Aug-19

Date Started 22-Aug-19

Date Completed 29-Aug-19

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

Notes 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

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 19-16297
Client Ref 4208L (B)
Contract Title A629 Halifax Road Ainley Top

			Lab No	1551383	1551384	1551385	1551386	1551387	1551388	1551389	1551390	1551391	1551392	1551393
			Sample ID	BH002R	BH002R	BH002R	BH002R	BH002R	BH002R	BH002R	BH002R	BH003R	BH003R	BH003R
			Depth	2.20	3.20	4.40	5.20	6.40	7.40	8.65	9.70	2.70	3.70	4.70
			Other ID											
			Sample Type	C	C	C	C	C	C	C	C	C	C	C
			Sampling Date	21/08/19	21/08/19	21/08/19	21/08/19	21/08/19	21/08/19	21/08/19	21/08/19	21/08/19	21/08/19	21/08/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**											
Inorganics														
pH	DETSC 2008#		pH	5.5	6.4	5.8	6.3	8.0	5.7	5.7	5.4	5.4	5.3	5.7
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	12	40	11	15	15	< 10	15	< 10	< 10	15	< 10

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

Summary of Chemical Analysis
Soil Samples

Our Ref 19-16297
Client Ref 4208L (B)
Contract Title A629 Halifax Road Ainley Top

			Lab No	1551394	1551395	1551396	1551397	1551398	1551399
			Sample ID	BH003R	BH003R	BH003R	BH003R	BH003R	BH003R
			Depth	5.70	6.70	7.70	8.70	9.60	10.55
			Other ID						
			Sample Type	C	C	C	C	C	C
			Sampling Date	21/08/19	21/08/19	21/08/19	21/08/19	21/08/19	21/08/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Inorganics									
pH	DETSC 2008#		pH	6.5	5.5	6.2	5.6	6.3	6.8
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	< 10	17	12	< 10	< 10	17

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

Information in Support of the Analytical Results

Our Ref 19-16297
Client Ref 4208L (B)
Contract A629 Halifax Road Ainley Top

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1551383	BH002R 2.20 SOIL	21/08/19	PT 1L		
1551384	BH002R 3.20 SOIL	21/08/19	PT 1L		
1551385	BH002R 4.40 SOIL	21/08/19	PT 1L		
1551386	BH002R 5.20 SOIL	21/08/19	PT 1L		
1551387	BH002R 6.40 SOIL	21/08/19	PT 1L		
1551388	BH002R 7.40 SOIL	21/08/19	PT 1L		
1551389	BH002R 8.65 SOIL	21/08/19	PT 1L		
1551390	BH002R 9.70 SOIL	21/08/19	PT 1L		
1551391	BH003R 2.70 SOIL	21/08/19	PT 1L		
1551392	BH003R 3.70 SOIL	21/08/19	PT 1L		
1551393	BH003R 4.70 SOIL	21/08/19	PT 1L		
1551394	BH003R 5.70 SOIL	21/08/19	PT 1L		
1551395	BH003R 6.70 SOIL	21/08/19	PT 1L		
1551396	BH003R 7.70 SOIL	21/08/19	PT 1L		
1551397	BH003R 8.70 SOIL	21/08/19	PT 1L		
1551398	BH003R 9.60 SOIL	21/08/19	PT 1L		
1551399	BH003R 10.55 SOIL	21/08/19	PT 1L		

Key: P-Plastic T-Tub

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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

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

POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De^2 (mm^2)	Point Load (IS) (MN/m^2)	Size Factor	Point Load Index (IS50) (MN/m^2)	Type	Date Tested
BH002 R	4.45	Diametral	151.9	101.3	7.4	10261.7	0.72	1.37	0.991	Sandstone	10/09/2019
BH002 R	4.70	Irregular Lump	106.8	36.8	4.5	5004.1	0.9	1.17	1.051	Sandstone	10/09/2019
BH002 R	5.10	Diametral	173.8	100.2	12.1	10040.0	1.21	1.37	1.648	Sandstone	10/09/2019
BH002 R	5.85	Diametral	191.6	103.2	16.4	10650.2	1.54	1.39	2.134	Sandstone	10/09/2019
BH002 R	6.30	Irregular Lump	105.4	53.9	6.0	7233.4	0.83	1.27	1.053	Sandstone	10/09/2019
BH002 R	10.00	Axial	100.3	49.7	6.7	6347.0	1.06	1.23	1.302	Sandstone/Siltstone	10/09/2019
BH002 R	10.10	Axial	99.2	71.4	4.7	9018.2	0.52	1.33	0.696	Sandstone/Siltstone	10/09/2019
BH003 R	4.60	Axial	95.7	49.5	1.1	6031.5	0.18	1.22	0.222	Mudstone	10/09/2019
BH003 R	4.75	Axial	99.6	58.6	0.9	7431.3	0.12	1.28	0.155	Mudstone	10/09/2019
BH003 R	5.20	Axial	106.2	41.4	1.6	5598.0	0.29	1.2	0.343	Mudstone	10/09/2019
BH003 R	5.25	Axial	107.4	27.0	2.3	3692.1	0.62	1.09	0.68	Siltstone	10/09/2019
BH003 R	6.00	Axial	103.8	38.9	2.0	5141.1	0.39	1.18	0.458	Mudstone/Siltstone	10/09/2019
BH003 R	7.30	Diametral	164.9	102.5	9.6	10506.3	0.91	1.38	1.262	Sandstone/Siltstone	10/09/2019
BH003 R	8.10	Diametral	178.3	96.7	5.0	9350.9	0.53	1.35	0.719	Sandstone/Siltstone	10/09/2019

NOTES - +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

Date of issue :- 12/09/2019	Certificate No :- PL/4208L(b)/1	Signed :- MSelk	Name :- M. SELKIRK	Page 1 of 2
Client :- Leeds City Council	Contract Title :- A629 Halifax Road Ainley Top			AEG Contract No :- 4208L(b)

UKAS TESTING 1367

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

POINT LOAD STRENGTH INDEX

ISRM : 1985

Exploratory Hole No	Depth (m)	Type/ Orientation	Width (mm)	Platen Separation (mm)+	Failure Load (kN)*	De^2 (mm^2)	Point Load (IS) (MN/m^2)	Size Factor	Point Load Index (IS50) (MN/m^2)	Type	Date Tested
BH003 R	8.25	Irregular Lump	111.4	51.1	4.1	7248.0	0.57	1.27	0.719	Sandstone/Siltstone	10/09/2019

NOTES - +Tested specimen measured using calibrated vernier calipers *Loads of less than 10kN Outside of UKAS accreditation #-Invalid Failure (Did not pass through both points) !-Too soft to register a reading

Date of issue :- 13/09/2019	Certificate No :- PL/4208L(b)/2	Signed :- MSelr	Name :- M. SELKIRK	Page 2 of 2
Client :- Leeds City Council	Contract Title :- A629 Halifax Road Ainley Top			AEG Contract No :- 4208L(b)

UKAS TESTING 1367

Certificate of Analysis

Certificate Number	19-13084-1	23-Jul-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG	

Our Reference	19-13084-1
Client Reference	4208L(b)
Order No	CH1527
Contract Title	A629 Halifax Road Ainley Top
Description	4 Soil samples, 4 Leachate samples.

Date Received	10-Jul-19
Date Started	10-Jul-19
Date Completed	23-Jul-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	**This report supersedes 19-13084, 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

MCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING 2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-13084-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH002	3	0.3	1529545	16/07/2019	Brown gravelly, very sandy CLAY including odd organic matter
TP006	1	0.2	1529546	16/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets and numerous organic matter (Made ground - plastic)
TP006	4	0.6	1529547	16/07/2019	Brown slightly sandy CLAY
TP008	1	0.2	1529548	16/07/2019	Dark brown gravelly, sandy CLAY including odd rootlets

Summary of Chemical Analysis

Soil Samples

Our Ref 19-13084-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

			Lab No	1529545	1529546	1529547	1529548
			Sample ID	BH002	TP006	TP006	TP008
			Depth	0.30	0.20	0.60	0.20
			Other ID	3	1	4	1
			Sample Type	ES	ES	ES	ES
			Sampling Date	05/07/19	05/07/19	05/07/19	05/07/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	6.8	11	13	4.0
Barium	DETSC 2301#	1.5	mg/kg	140	93	54	67
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.6	0.5	< 0.2	0.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.7	1.5	0.1	0.3
Chromium	DETSC 2301#	0.15	mg/kg	32	50	25	39
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	32	92	37	28
Lead	DETSC 2301#	0.3	mg/kg	41	180	21	56
Mercury	DETSC 2325#	0.05	mg/kg	0.06	0.08	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	17	34	13	19
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	22	35	31	25
Zinc	DETSC 2301#	1	mg/kg	82	620	50	120
Inorganics							
pH	DETSC 2008#		pH	10.3	7.7	6.9	10.1
Cyanide, Total	DETSC 2130#	0.1	mg/kg	1.4	0.4	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	2.6	6.0	7.0	2.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	220	79	400	96
Sulphide	DETSC 2024*	10	mg/kg	140	20	< 10	120
Sulphur (free)	DETSC 3049#	0.75	mg/kg	8.6	< 0.75	< 0.75	< 0.75
Petroleum Hydrocarbons							
EPH (C10-C25)	DETSC 3311	10	mg/kg	680	46	< 10	65
EPH (C25-C40)	DETSC 3311	10	mg/kg	490	140	< 10	220

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 19-13084-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

			Lab No	1529545	1529546	1529547	1529548
			Sample ID	BH002	TP006	TP006	TP008
			Depth	0.30	0.20	0.60	0.20
			Other ID	3	1	4	1
			Sample Type	ES	ES	ES	ES
			Sampling Date	05/07/19	05/07/19	05/07/19	05/07/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	3.6	0.2	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	13	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	9.2	0.2	< 0.1	0.2
Fluorene	DETSC 3301	0.1	mg/kg	15	0.1	< 0.1	0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	89	0.8	< 0.1	0.7
Anthracene	DETSC 3301	0.1	mg/kg	25	0.2	< 0.1	0.2
Fluoranthene	DETSC 3301	0.1	mg/kg	120	1.1	< 0.1	1.2
Pyrene	DETSC 3301	0.1	mg/kg	120	1.2	< 0.1	1.2
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	60	0.6	< 0.1	0.6
Chrysene	DETSC 3301	0.1	mg/kg	67	0.7	< 0.1	0.6
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	36	0.6	< 0.1	0.8
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	21	0.4	< 0.1	0.3
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	49	0.6	< 0.1	0.7
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	35	0.8	< 0.1	0.8
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	4.9	0.6	< 0.1	0.2
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	32	0.6	< 0.1	0.6
Coronene	DETSC 3301*	0.1	mg/kg	3.7	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	700	8.6	< 1.6	8.3
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.

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-13084-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top
Sample Id TP006 1 0.20

Sample Numbers 1529546 1529549 1529550
Date Analysed 16/07/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values Inert Waste	SNRHW	Hazardous Waste
DETSC 2084* Total Organic Carbon	%	3.5	3	5	6
DETSC 2003# Loss On Ignition	%	9.4	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	0.06	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	190	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	8.6	100	n/a	n/a
DETSC 2008# pH	pH Units	7.7	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	1.3	0.67	0.003	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	6	3.9	< 0.02	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	0.04	< 0.03	< 0.004	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	1.1	0.3	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	12	3.6	0.024	0.05	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	4.3	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	0.9	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	2.7	0.62	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	1.4	0.35	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	12	4.5	0.024	0.057	4	50	200
DETSC 2055 Chloride as Cl	5200	710	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	230	< 100	0.46	0.38	10	150	500
DETSC 2055 Sulphate as SO4	3900	830	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	46000	15000	92	201.4	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	6400	< 2000	12.8	< 50	500	800	1000

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

Additional Information

DETSC 2008 pH	7	6.4
DETSC 2009 Conductivity uS/cm	65.8	20.8
* Temperature*	17	23

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.120

Stage 1

Volume of Leachant L2*	0.22
Volume of Eluate VE1*	0.199

Stage 2

Volume of Leachant L8*	0.96
Volume of Eluate VE2*	0.909

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 19-13084-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top
Sample Id TP006 4 0.60

Sample Numbers 1529547 1529551 1529552
Date Analysed 16/07/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values Inert Waste	SNRHW	Hazardous Waste
DETSC 2084* Total Organic Carbon	%	4.0	3	5	6
DETSC 2003# Loss On Ignition	%	5.4	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	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	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	< 0.16	< 0.16	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	4.4	2.1	< 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	0.5	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.6	< 0.4	< 0.004	< 0.02	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	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	< 0.09	< 0.09	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	4.7	3.3	0.009	0.035	4	50	200
DETSC 2055 Chloride as Cl	3500	840	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	10000	3300	20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	35000	10000	70	132.4	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	2400	< 2000	< 10	< 50	500	800	1000

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

Additional Information

DETSC 2008 pH	6.9	6.4
DETSC 2009 Conductivity uS/cm	50.4	14.4
* Temperature*	22	23

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.094

Stage 1

Volume of Leachant L2*	0.142
Volume of Eluate VE1*	0.122

Stage 2

Volume of Leachant L8*	0.752
Volume of Eluate VE2*	0.702

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 19-13084-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1529545	BH002 3 0.30	SOIL	NAD	none	Jordan Eadington
1529546	TP006 1 0.20	SOIL	NAD	none	Jordan Eadington
1529547	TP006 4 0.60	SOIL	NAD	none	Jordan Eadington
1529548	TP008 1 0.20	SOIL	NAD	none	Jordan Eadington

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 19-13084-1
Client Ref 4208L(b)
Contract A629 Halifax Road Ainley Top

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1529545	BH002 0.30 SOIL	05/07/19	GJ 60ml x3, PT 1L x2		
1529546	TP006 0.20 SOIL	05/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L		
1529547	TP006 0.60 SOIL	05/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L		
1529548	TP008 0.20 SOIL	05/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L		
1529549	TP006 0.20 LEACHATE	05/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L		
1529550	TP006 0.20 LEACHATE	05/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L		
1529551	TP006 0.60 LEACHATE	05/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L		
1529552	TP006 0.60 LEACHATE	05/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L		

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 19-12872

15-Jul-19

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

Our Reference 19-12872

Client Reference 4208L(b)

Order No CH1527

Contract Title A629 Halifax Road Ainley Top

Description 5 Soil samples, 4 Leachate samples.

Date Received 08-Jul-19

Date Started 08-Jul-19

Date Completed 15-Jul-19

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

Notes 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

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 19-12872
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

	Lab No	1528317	1528318	1528319	1528320	1528321
	Sample ID	BH001	BH001	TP005	TP009	TP009
	Depth	0.30	1.20	0.20	0.20	0.60
	Other ID	3	6	1	1	4
	Sample Type	ES	ES	ES	ES	ES
	Sampling Date	04/07/19	04/07/19	04/07/19	04/07/19	04/07/19
	Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Metals						
Arsenic	DETSC 2301#	0.2	mg/kg	43	9.5	11	9.2	6.0
Barium	DETSC 2301#	1.5	mg/kg	55	49	48	87	50
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.6	1.1	0.3	0.3	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.3	0.1	0.2	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	26	27	16	32	30
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	39	34	20	110	40
Lead	DETSC 2301#	0.3	mg/kg	24	55	42	58	21
Mercury	DETSC 2325#	0.05	mg/kg	0.07	0.09	0.10	0.07	< 0.05
Nickel	DETSC 2301#	1	mg/kg	5.9	11	8.9	18	15
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	0.7	0.6	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	35	31	32	43	36
Zinc	DETSC 2301#	1	mg/kg	26	63	46	96	49
Inorganics								
pH	DETSC 2008#			6.4	7.2	6.2	5.5	6.0
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	0.3	0.5	0.5	0.1
Organic matter	DETSC 2002#	0.1	%	1.3	3.4	6.4	4.1	1.6
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	42	130	33	11	12
Sulphide	DETSC 2024*	10	mg/kg	40	44	52	56	32
Sulphur (free)	DETSC 3049#	0.75	mg/kg	29	< 0.75	< 0.75	< 0.75	< 0.75
Petroleum Hydrocarbons								
EPH (C10-C25)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10
EPH (C25-C40)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 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 19-12872
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

			Lab No	1528317	1528318	1528319	1528320	1528321
			Sample ID	BH001	BH001	TP005	TP009	TP009
			Depth	0.30	1.20	0.20	0.20	0.60
			Other ID	3	6	1	1	4
			Sample Type	ES	ES	ES	ES	ES
			Sampling Date	04/07/19	04/07/19	04/07/19	04/07/19	04/07/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
PAHs								
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	0.1	0.2	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.4	1.2	0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.2	0.4	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	0.8	2.5	0.2	0.1	0.1
Pyrene	DETSC 3301	0.1	mg/kg	0.8	2.6	0.8	0.3	0.2
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.4	1.2	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	0.5	1.2	0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.4	1.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.4	0.6	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	0.7	1.6	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	0.5	1.3	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.1	0.2	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	0.3	1.0	< 0.1	< 0.1	< 0.1
Coronene	DETSC 3301*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	5.7	16	< 1.6	< 1.6	< 1.6
Phenols								
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 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.

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-12872
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top
Sample Id BH001 3 0.30

Sample Numbers 1528317 1528322 1528323
Date Analysed 15/07/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084* Total Organic Carbon	%	0.7	3	5	6
DETSC 2003# Loss On Ignition	%	5.9	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	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	5.7	100	n/a	n/a
DETSC 2008# pH	pH Units	6.4	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	10	4.6	0.02	0.054	0.5	2	25
DETSC 2306 Barium as Ba	5.8	2.7	< 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	8	3.5	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	14	5.9	0.028	0.071	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	3.7	1.4	< 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	6.1	2.8	0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	3.1	0.98	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	1.4	0.56	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	5.7	2.5	0.011	0.03	4	50	200
DETSC 2055 Chloride as Cl	8500	1500	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	300	210	0.6	2.23	10	150	500
DETSC 2055 Sulphate as SO4	20000	3000	40	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	80000	22000	160	303.8	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	9100	2400	18.2	< 50	500	800	1000

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

Additional Information

DETSC 2008 pH	7.6	7.4
DETSC 2009 Conductivity uS/cm	115	31.3
* Temperature*	21	22

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.103

Stage 1

Volume of Leachant L2*	0.169
Volume of Eluate VE1*	0.149

Stage 2

Volume of Leachant L8*	0.825
Volume of Eluate VE2*	0.764

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 19-12872
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top
Sample Id TP009 1 0.20

Sample Numbers 1528320 1528324 1528325
Date Analysed 15/07/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084* Total Organic Carbon	%	2.4	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	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	5.5	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	0.31	< 0.16	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	0.65	0.65	< 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	0.9	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	1.7	< 0.4	< 0.004	< 0.02	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	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	0.7	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.35	0.11	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	1.4	< 1.3	0.003	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	530	430	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	120	< 100	0.24	0.19	10	150	500
DETSC 2055 Sulphate as SO4	1000	770	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	8000	< 5000	16	< 50	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	3500	< 2000	< 10	< 50	500	800	1000

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

Additional Information

DETSC 2008 pH	8.6	7.6
DETSC 2009 Conductivity uS/cm	11.5	6.8
* Temperature*	22	22

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.112

Stage 1

Volume of Leachant L2*	0.195
Volume of Eluate VE1*	0.174

Stage 2

Volume of Leachant L8*	0.892
Volume of Eluate VE2*	0.832

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 19-12872
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1528317	BH001 3 0.30	SOIL	NAD	none	Colin Patrick
1528318	BH001 6 1.20	SOIL	NAD	none	Colin Patrick
1528319	TP005 1 0.20	SOIL	NAD	none	Colin Patrick
1528320	TP009 1 0.20	SOIL	NAD	none	Colin Patrick
1528321	TP009 4 0.60	SOIL	NAD	none	Colin Patrick

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 19-12872
Client Ref 4208L(b)
Contract A629 Halifax Road Ainley Top

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1528317	BH001 0.30 SOIL	04/07/19	GJ 60ml x3, PT 1L x2		
1528318	BH001 1.20 SOIL	04/07/19	GJ 60ml x3, PT 1L x2		
1528319	TP005 0.20 SOIL	04/07/19	GJ 60ml x3, PT 1L		
1528320	TP009 0.20 SOIL	04/07/19	GJ 60ml x3, PT 1L		
1528321	TP009 0.60 SOIL	04/07/19	GJ 60ml x3, PT 1L		
1528322	BH001 0.30 LEACHATE	04/07/19	GJ 60ml x3, PT 1L x2		
1528323	BH001 0.30 LEACHATE	04/07/19	GJ 60ml x3, PT 1L x2		
1528324	TP009 0.20 LEACHATE	04/07/19	GJ 60ml x3, PT 1L		
1528325	TP009 0.20 LEACHATE	04/07/19	GJ 60ml x3, PT 1L		

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

Certificate of Analysis

Certificate Number 19-12867

15-Jul-19

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

Our Reference 19-12867

Client Reference 4208L(b)¸

Order No CH1527

Contract Title A629 Halifax Road Ainley Top

Description 2 Soil samples, 2 Leachate samples

Date Received 08-Jul-19

Date Started 08-Jul-19

Date Completed 15-Jul-19

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

Notes 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

UKAS TESTING
2139

Summary of Chemical Analysis

Soil Samples

Our Ref 19-12867
Client Ref 4208L(b)¸
Contract Title A629 Halifax Road Ainley Top

			Lab No	1528284	1528285
			Sample ID	TP001	TP001
			Depth	0.20	0.50
			Other ID	1	4
			Sample Type	ES	ES
			Sampling Date	02/07/19	02/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	10	7.4
Barium	DETSC 2301#	1.5	mg/kg	240	37
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4	0.6
Cadmium	DETSC 2301#	0.1	mg/kg	0.5	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	14	27
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	43	24
Lead	DETSC 2301#	0.3	mg/kg	310	32
Mercury	DETSC 2325#	0.05	mg/kg	0.06	0.05
Nickel	DETSC 2301#	1	mg/kg	19	12
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	0.9
Vanadium	DETSC 2301#	0.8	mg/kg	59	42
Zinc	DETSC 2301#	1	mg/kg	96	47
Inorganics					
pH	DETSC 2008#			8.5	10.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.2	0.2
Organic matter	DETSC 2002#	0.1	%	1.8	2.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	140	79
Sulphide	DETSC 2024*	10	mg/kg	36	24
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75	< 0.75
Petroleum Hydrocarbons					
EPH (C10-C25)	DETSC 3311	10	mg/kg	510	< 10
EPH (C25-C40)	DETSC 3311	10	mg/kg	510	< 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 19-12867
Client Ref 4208L(b)¸
Contract Title A629 Halifax Road Ainley Top

			Lab No	1528284	1528285
			Sample ID	TP001	TP001
			Depth	0.20	0.50
			Other ID	1	4
			Sample Type	ES	ES
			Sampling Date	02/07/19	02/07/19
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
PAHs					
Naphthalene	DETSC 3301	0.1	mg/kg	1.8	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	7.4	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	3.9	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	11	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	72	0.1
Anthracene	DETSC 3301	0.1	mg/kg	26	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	90	0.2
Pyrene	DETSC 3301	0.1	mg/kg	79	0.3
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	34	0.2
Chrysene	DETSC 3301	0.1	mg/kg	37	0.2
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	24	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	14	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	32	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	23	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	4.2	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	21	< 0.1
Coronene	DETSC 3301*	0.1	mg/kg	3.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	480	< 1.6
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 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 19-12867
Client Ref 4208L(b),
Contract Title A629 Halifax Road Ainley Top
Sample Id TP001 4 0.50

Sample Numbers 1528285 1528293 1528294
Date Analysed 15/07/2019

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084* Total Organic Carbon	%	1.1	3	5	6
DETSC 2003# Loss On Ignition	%	5.2	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	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	10.2	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	0.45	0.26	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	7.4	2	< 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	0.51	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	2.4	0.6	0.005	< 0.02	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	1.6	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.61	0.43	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.65	0.25	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.58	0.31	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	7.3	3.3	0.015	0.04	4	50	200
DETSC 2055 Chloride as Cl	13000	1600	26	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	120	< 100	0.24	0.2	10	150	500
DETSC 2055 Sulphate as SO4	42000	7200	84	130.5	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	120000	23000	240	393	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	6200	< 2000	12.4	< 50	500	800	1000

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

Additional Information

DETSC 2008 pH	8.4	8.2
DETSC 2009 Conductivity uS/cm	174	33.4
* Temperature*	21	21

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.114

Stage 1

Volume of Leachant L2*	0.201
Volume of Eluate VE1*	0.191

Stage 2

Volume of Leachant L8*	0.909
Volume of Eluate VE2*	0.849

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 19-12867
Client Ref 4208L(b)¸
Contract Title A629 Halifax Road Ainley Top

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1528284	TP001 1 0.20	SOIL	NAD	none	Colin Patrick
1528285	TP001 4 0.50	SOIL	NAD	none	Colin Patrick

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 19-12867
Client Ref 4208L(b)¸
Contract A629 Halifax Road Ainley Top

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1528284	TP001 0.20 SOIL	02/07/19	GJ 60ml x3, PT 1L x2		
1528285	TP001 0.50 SOIL	02/07/19	GJ 60ml x3, PT 1L x2		
1528293	TP001 0.50 LEACHATE	02/07/19	GJ 60ml x3, PT 1L x2		
1528294	TP001 0.50 LEACHATE	02/07/19	GJ 60ml x3, PT 1L x2		

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

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

Certificate of Analysis

Certificate Number	19-12790-1	15-Jul-19
Client	Allied Exploration & Geotechnics Limited Unit 25 Stella Gill Industrial Estate Pelton Fell DH2 2RG	

Our Reference	19-12790-1
Client Reference	4208L(b)
Order No	CH1527
Contract Title	A629 Halifax Road Ainley Top
Description	12 Soil samples, 12 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 19-12790, 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

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
BH003	3	0.3	1527741	12/07/2019	Dark brown gravelly, clayey SAND
BH003	6	0.8	1527742	12/07/2019	Brown sandy CLAY
BH004	3	0.4	1527743	12/07/2019	Dark brown sandy CLAY including some rootlets
BH005	6	1.2	1527744	12/07/2019	Brown sandy CLAY
BH006	3	0.8	1527745	12/07/2019	Brown sandy CLAY
BH007	3	0.2	1527746	12/07/2019	Dark brown gravelly, clayey SAND including some rootlets
BH007	6	1.2	1527747	12/07/2019	Brown sandy CLAY
TP002	1	0.2	1527748	12/07/2019	Dark brown gravelly, clayey SAND
TP002	4	0.6	1527749	12/07/2019	Dark brown gravelly, sandy CLAY
TP004	4	1.3	1527750	12/07/2019	Dark brown gravelly, sandy CLAY
TP007	1	0.2	1527751	12/07/2019	Dark brown gravelly, sandy CLAY
TP007	4	0.6	1527752	12/07/2019	Dark brown sandy CLAY

Summary of Chemical Analysis

Soil Samples

Our Ref 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

			Lab No	1527741	1527742	1527743	1527744	1527745	1527746
			Sample ID	BH003	BH003	BH004	BH005	BH006	BH007
			Depth	0.30	0.80	0.40	1.20	0.80	0.20
			Other ID	3	6	3	6	3	3
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	03/07/19	03/07/19	01/07/19	03/07/19	02/07/19	02/07/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	9.5	4.6	5.3	1.0	1.1	9.0
Barium	DETSC 2301#	1.5	mg/kg	93	43	52	24	46	93
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.3	0.2	< 0.2	< 0.2	< 0.2	0.2
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.3	0.1	< 0.1	< 0.1	0.3
Chromium	DETSC 2301#	0.15	mg/kg	19	9.7	26	21	23	32
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	32	14	24	16	23	24
Lead	DETSC 2301#	0.3	mg/kg	78	33	23	15	20	63
Mercury	DETSC 2325#	0.05	mg/kg	0.09	< 0.05	< 0.05	< 0.05	< 0.05	0.08
Nickel	DETSC 2301#	1	mg/kg	11	5.5	14	7.5	19	17
Selenium	DETSC 2301#	0.5	mg/kg	0.6	< 0.5	< 0.5	< 0.5	< 0.5	1.5
Vanadium	DETSC 2301#	0.8	mg/kg	27	13	34	21	24	46
Zinc	DETSC 2301#	1	mg/kg	91	41	50	30	59	89
Inorganics									
pH	DETSC 2008#			7.2	7.6	5.2	6.4	4.9	5.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.5	< 0.1	0.2	< 0.1	< 0.1	0.5
Organic matter	DETSC 2002#	0.1	%	3.0	1.3	6.6	0.5	0.5	4.5
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	73	71	13	19	26	13
Sulphide	DETSC 2024*	10	mg/kg	< 10	12	16	20	< 10	< 10
Sulphur (free)	DETSC 3049#	0.75	mg/kg	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	1.7
Petroleum Hydrocarbons									
EPH (C10-C25)	DETSC 3311	10	mg/kg	190	10	< 10	< 10	< 10	< 10
EPH (C25-C40)	DETSC 3311	10	mg/kg	460	51	< 10	< 10	< 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 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

			Lab No	1527741	1527742	1527743	1527744	1527745	1527746
			Sample ID	BH003	BH003	BH004	BH005	BH006	BH007
			Depth	0.30	0.80	0.40	1.20	0.80	0.20
			Other ID	3	6	3	6	3	3
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	03/07/19	03/07/19	01/07/19	03/07/19	02/07/19	02/07/19
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	4.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.6	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	2.3	< 0.1	< 0.1	< 0.1	< 0.1	0.1
Fluorene	DETSC 3301	0.1	mg/kg	2.5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	19	0.3	< 0.1	< 0.1	< 0.1	0.4
Anthracene	DETSC 3301	0.1	mg/kg	4.9	0.1	< 0.1	< 0.1	< 0.1	0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	22	0.7	0.1	< 0.1	< 0.1	0.6
Pyrene	DETSC 3301	0.1	mg/kg	21	0.8	< 0.1	< 0.1	0.1	0.8
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	10	0.2	< 0.1	< 0.1	< 0.1	0.3
Chrysene	DETSC 3301	0.1	mg/kg	11	0.3	< 0.1	< 0.1	< 0.1	0.2
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	8.3	0.3	< 0.1	< 0.1	< 0.1	0.3
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	4.5	0.2	< 0.1	< 0.1	< 0.1	0.3
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	10	0.3	< 0.1	< 0.1	< 0.1	0.3
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	7.7	0.2	< 0.1	< 0.1	< 0.1	0.3
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	1.6	< 0.1	< 0.1	< 0.1	< 0.1	0.3
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	7.6	0.2	< 0.1	< 0.1	< 0.1	0.3
Coronene	DETSC 3301*	0.1	mg/kg	0.9	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	140	4.1	< 1.6	< 1.6	< 1.6	4.4
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

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Summary of Chemical Analysis

Soil Samples

Our Ref 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

			Lab No	1527749	1527750	1527751	1527752
			Sample ID	TP002	TP004	TP007	TP007
			Depth	0.60	1.30	0.20	0.60
			Other ID	4	4	1	4
			Sample Type	ES	ES	ES	ES
			Sampling Date	03/07/19	03/07/19	03/07/19	03/07/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	18	6.9	9.4	4.5
Barium	DETSC 2301#	1.5	mg/kg	150	57	81	69
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.8	0.3	0.3	< 0.2
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.2	0.2	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	17	29	31	28
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	27	26	33	28
Lead	DETSC 2301#	0.3	mg/kg	37	33	41	20
Mercury	DETSC 2325#	0.05	mg/kg	0.18	0.06	0.08	< 0.05
Nickel	DETSC 2301#	1	mg/kg	10	23	26	27
Selenium	DETSC 2301#	0.5	mg/kg	3.2	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	33	33	40	31
Zinc	DETSC 2301#	1	mg/kg	27	91	74	62
Inorganics							
pH	DETSC 2008#			4.4	7.5	5.9	5.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	4.9	2.3	4.2	1.4
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	19	19	15	21
Sulphide	DETSC 2024*	10	mg/kg	< 10	12	20	< 10
Sulphur (free)	DETSC 3049#	0.75	mg/kg	17	< 0.75	< 0.75	< 0.75
Petroleum Hydrocarbons							
EPH (C10-C25)	DETSC 3311	10	mg/kg	44	13	< 10	< 10
EPH (C25-C40)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10

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Summary of Chemical Analysis

Soil Samples

Our Ref 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

			Lab No	1527749	1527750	1527751	1527752
			Sample ID	TP002	TP004	TP007	TP007
			Depth	0.60	1.30	0.20	0.60
			Other ID	4	4	1	4
			Sample Type	ES	ES	ES	ES
			Sampling Date	03/07/19	03/07/19	03/07/19	03/07/19
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.2	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.2	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.2	0.2	0.7	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.1	< 0.1	0.2	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	0.3	0.3	0.6	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	0.3	0.4	0.8	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.3	0.2	0.4	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	0.3	0.2	0.3	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.2	0.2	0.3	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.3	0.2	0.2	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	0.2	0.2	0.4	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	0.3	0.3	0.3	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.4	< 0.1	0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	0.5	0.2	0.2	< 0.1
Coronene	DETSC 3301*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	3.4	2.7	4.8	< 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.

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top
Sample Id BH003 3 0.30

Sample Numbers 1527741 1527753 1527754
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	%	2.8	3	5	6
DETSC 2003# Loss On Ignition	%	4.9	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	650	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	140	100	n/a	n/a
DETSC 2008# pH	pH Units	7.2	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	0.76	0.71	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	14	8.6	0.03	< 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	0.83	0.32	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	4.1	2	0.008	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	0.7	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.9	1.1	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	4.6	2.1	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	1.6	< 1.3	0.003	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	9100	2400	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	110	< 100	0.22	0.19	10	150	500
DETSC 2055 Sulphate as SO4	19000	6600	38	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	100000	48000	200	570.5	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	10000	4200	20	52.1	500	800	1000

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

Additional Information

DETSC 2008 pH	6.8	7.8
DETSC 2009 Conductivity uS/cm	144	68.3
* Temperature*	21	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*	0.208

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.*

WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top
Sample Id BH003 6 0.80

Sample Numbers 1527742 1527755 1527756
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	%	1.2	3	5	6
DETSC 2003# Loss On Ignition	%	1.9	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	61	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	4.1	100	n/a	n/a
DETSC 2008# pH	pH Units	7.6	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	0.46	0.72	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	11	5.1	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	0.78	0.8	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	2.5	2.3	0.005	0.023	2	50	100
DETSC 2306 Mercury as Hg	< 0.01	0.02	< 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	< 0.5	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.52	1.6	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	4.6	1.5	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	0.48	< 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	14000	2500	28	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	23000	5300	46	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	100000	33000	200	444.6	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	8100	5500	16.2	59.4	500	800	1000

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

Additional Information

DETSC 2008 pH	6.7	7.7
DETSC 2009 Conductivity uS/cm	149	47.6
* Temperature*	21	21

Mass of Sample Kg*	0.130
Mass of dry Sample Kg*	0.117

Stage 1

Volume of Leachant L2*	0.221
Volume of Eluate VE1*	0.2

Stage 2

Volume of Leachant L8*	0.935
Volume of Eluate VE2*	0.885

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 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top
Sample Id BH006 3 0.80

Sample Numbers 1527745 1527757 1527758
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	%	0.6	3	5	6
DETSC 2003# Loss On Ignition	%	2.8	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	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	4.9	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	< 0.16	< 0.16	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	4.5	2.1	< 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	0.34	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.5	< 0.4	< 0.004	< 0.02	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	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	0.7	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	< 0.09	< 0.09	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	4.2	< 1.3	0.008	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	2000	890	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	7200	1700	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	22000	7600	44	100.8	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	< 2000	< 2000	< 10	< 50	500	800	1000

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

Additional Information

DETSC 2008 pH	6.8	8
DETSC 2009 Conductivity uS/cm	31.4	10.8
* Temperature*	21	21

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.118

Stage 1

Volume of Leachant L2*	0.213
Volume of Eluate VE1*	0.203

Stage 2

Volume of Leachant L8*	0.942
Volume of Eluate VE2*	0.882

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 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top
Sample Id BH007 6 1.20

Sample Numbers 1527747 1527759 1527760
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	%	1.4	3	5	6
DETSC 2003# Loss On Ignition	%	4.6	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	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	6.0	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	0.42	< 0.16	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	3.1	0.68	< 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	1.7	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	1.1	< 0.4	< 0.004	< 0.02	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	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.86	0.13	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	2.3	< 1.3	0.005	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	3000	500	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	6700	1200	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	27000	5900	54	90	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	5600	2100	11.2	< 50	500	800	1000

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

Additional Information

DETSC 2008 pH	7	7.9
DETSC 2009 Conductivity uS/cm	38.5	8.5
* Temperature*	20	21

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.105

Stage 1

Volume of Leachant L2*	0.174
Volume of Eluate VE1*	0.154

Stage 2

Volume of Leachant L8*	0.838
Volume of Eluate VE2*	0.768

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WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top
Sample Id TP002 1 0.20

Sample Numbers 1527748 1527761 1527762
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	%	8.9	3	5	6
DETSC 2003# Loss On Ignition	%	11	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	30	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	4.7	100	n/a	n/a
DETSC 2008# pH	pH Units	5.4	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	0.62	0.74	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	0.98	0.78	< 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	0.63	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	2.5	0.9	0.005	< 0.02	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	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.79	0.46	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.23	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.25	< 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	1100	700	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	1600	830	< 20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	12000	5600	24	67.4	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	5600	2300	11.2	< 50	500	800	1000

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

Additional Information

DETSC 2008 pH	6.7	7.8
DETSC 2009 Conductivity uS/cm	16.4	8
* Temperature*	22	21

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.123

Stage 1

Volume of Leachant L2*	0.23
Volume of Eluate VE1*	0.219

Stage 2

Volume of Leachant L8*	0.986
Volume of Eluate VE2*	0.946

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WASTE ACCEPTANCE CRITERIA TESTING
ANALYTICAL REPORT

Our Ref 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top
Sample Id TP002 4 0.60

Sample Numbers 1527749 1527763 1527764
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	%	8.2	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	44	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	3.4	100	n/a	n/a
DETSC 2008# pH	pH Units	4.4	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	0.22	< 0.16	< 0.002	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	2.5	1.4	< 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	0.49	< 0.25	< 0.02	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.8	< 0.4	< 0.004	< 0.02	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	< 1.1	< 1.1	< 0.02	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.5	< 0.5	< 0.02	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.2	< 0.09	< 0.01	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	0.29	< 0.17	< 0.01	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.32	< 0.25	< 0.006	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	2.8	< 1.3	0.006	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	1100	500	< 20	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 100	< 0.02	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	10000	3700	20	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	27000	14000	54	162.7	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 100	< 0.2	< 1	1	n/a	n/a
* Dissolved Organic Carbon	4200	< 2000	< 10	< 50	500	800	1000

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

Additional Information

DETSC 2008 pH	6.3	7.5
DETSC 2009 Conductivity uS/cm	38	19.9
* Temperature*	22	21

Mass of Sample Kg*	0.140
Mass of dry Sample Kg*	0.120

Stage 1

Volume of Leachant L2*	0.219
Volume of Eluate VE1*	0.209

Stage 2

Volume of Leachant L8*	0.958
Volume of Eluate VE2*	0.907

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Summary of Asbestos Analysis

Soil Samples

Our Ref 19-12790-1
Client Ref 4208L(b)
Contract Title A629 Halifax Road Ainley Top

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1527741	BH003 3 0.30	SOIL	NAD	none	Colin Patrick
1527742	BH003 6 0.80	SOIL	NAD	none	Colin Patrick
1527743	BH004 3 0.40	SOIL	NAD	none	Colin Patrick
1527744	BH005 6 1.20	SOIL	NAD	none	Colin Patrick
1527745	BH006 3 0.80	SOIL	NAD	none	Colin Patrick
1527746	BH007 3 0.20	SOIL	NAD	none	Colin Patrick
1527749	TP002 4 0.60	SOIL	NAD	none	Colin Patrick
1527750	TP004 4 1.30	SOIL	NAD	none	Colin Patrick
1527751	TP007 1 0.20	SOIL	NAD	none	Colin Patrick
1527752	TP007 4 0.60	SOIL	NAD	none	Colin Patrick

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 19-12790-1
Client Ref 4208L(b)
Contract A629 Halifax Road Ainley Top

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1527741	BH003 0.30 SOIL	03/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527742	BH003 0.80 SOIL	03/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527743	BH004 0.40 SOIL	01/07/19	GJ 60ml x3, PT 1L		
1527744	BH005 1.20 SOIL	03/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527745	BH006 0.80 SOIL	02/07/19	GJ 60ml x3, PT 1L x2		
1527746	BH007 0.20 SOIL	02/07/19	GJ 60ml x3, PT 1L x2		
1527747	BH007 1.20 SOIL	02/07/19	GJ 60ml x3, PT 1L x2		
1527748	TP002 0.20 SOIL	03/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527749	TP002 0.60 SOIL	03/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527750	TP004 1.30 SOIL	03/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527751	TP007 0.20 SOIL	03/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527752	TP007 0.60 SOIL	03/07/19	GJ 250ml x2, GJ 60ml x2, PT 1L x2		
1527753	BH003 0.30 LEACHATE	03/07/19	No containers logged		Cannot evaluate
1527754	BH003 0.30 LEACHATE	03/07/19	No containers logged		Cannot evaluate
1527755	BH003 0.80 LEACHATE	03/07/19	No containers logged		Cannot evaluate
1527756	BH003 0.80 LEACHATE	03/07/19	No containers logged		Cannot evaluate
1527757	BH006 0.80 LEACHATE	02/07/19	No containers logged		Cannot evaluate
1527758	BH006 0.80 LEACHATE	02/07/19	No containers logged		Cannot evaluate
1527759	BH007 1.20 LEACHATE	02/07/19	No containers logged		Cannot evaluate
1527760	BH007 1.20 LEACHATE	02/07/19	No containers logged		Cannot evaluate
1527761	TP002 0.20 LEACHATE	03/07/19	No containers logged		Cannot evaluate
1527762	TP002 0.20 LEACHATE	03/07/19	No containers logged		Cannot evaluate
1527763	TP002 0.60 LEACHATE	03/07/19	No containers logged		Cannot evaluate
1527764	TP002 0.60 LEACHATE	03/07/19	No containers logged		Cannot evaluate

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.

APPENDIX 3

GAS AND GROUNDWATER MONITORING

RECORD OF GAS MONITORING

Scheme:	Ainley Top Highway Improvements, Huddersfield
Scheme No:	446367
Client:	Kirklees Council
Instrument Type:	Gas Data LMSxi Type G4.18 with flow pod*
Next Calibration:	01/12/2019

Leeds CITY COUNCIL

GEOTECHNICAL SECTION

Hole ID: BH002R

Top of response zone (m):	3.00	**Response zone strata: Lower Coal Measures bedrock**
Base of response zone (m):	8.00	

Monitoring Round No:	1	2	3	4	5	6
Date:	13/09/2019	07/10/2019	16/10/2019	23/10/2019	01/11/2019	
Time:	10:50	12:10	14:44	09:20	11:40	
Water level (m bgl):	5.98	4.37	4.36	4.79	4.50	
Atmospheric pressure (mb):	1010	987	976	992	966	
Differential pressure (Pa):	0.0	0.0	0.0	0.0	0.0	
CH4 [LEL] peak (%):	0.0	0.0	0.0	0.0	0.0	
CH4 peak (% v/v):	0.0	0.0	0.0	0.0	0.0	
CH4 steady state (% v/v):	0.0	0.0	0.0	0.0	0.0	
CO2 peak (% v/v):	0.0	0.0	0.7	0.2	0.6	
CO2 steady state (% v/v):	0.0	0.0	0.1	0.2	0.6	
O2 minimum (% v/v):	21.1	21.2	20.9	21.4	19.3	
O2 steady state (% v/v):	21.1	21.2	20.9	21.4	19.3	
H2S peak (ppm):	0.0	0.0	0.0	0.0	0.0	
CO peak (ppm):	0.0	0.0	0.0	0.0	0.0	
Gas flow peak (l/hr):	0.2	0.0	0.3	0.0	0.0	
Gas flow steady (l/hr):	0.0	0.0	0.0	0.0	0.0	
Weather conditions:	Cloudy	Cloudy	Clear	Clear	Rain	
Temperature (˚C):	15	10	6	10	8	
Wind (mph):	12	13	17	7	3	
Atmospheric pressure trend:	Rising	Falling	Steady	Falling	Falling	
Monitoring engineer:	HW	HW	HW	HW	HW	

Comments:

NR = Not recorded

13/09/2019: Bottom of well = 7.79m bgl.

* = until 01/11/2019 then used a Gas Data GFM436-1 (calibration due 15/10/2020)

RECORD OF GAS MONITORING

Scheme:	Ainley Top Highway Improvements, Huddersfield
Scheme No:	446367
Client:	Kirklees Council
Instrument Type:	Gas Data LMSxi Type G4.18 with flow pod*
Next Calibration:	01/12/2019

Leeds CITY COUNCIL

GEOTECHNICAL SECTION

Hole ID: BH003R

Top of response zone (m):	5.00	**Response zone strata: Lower Coal Measures bedrock**
Base of response zone (m):	16.00	

Monitoring Round No:	1	2	3	4	5	6
Date:	13/09/2019	07/10/2019	16/10/2019	16/10/2019	23/10/2019	01/11/2019
Time:	10:41	11:56	14:35	14:55	09:15	11:30
Water level (m bgl):	4.75	6.22	6.07	NR	6.05	5.94
Atmospheric pressure (mb):	1010	987	976	976	992	967
Differential pressure (Pa):	<<<	<<<	0.0	-1.0	0.0	681.0
CH4 [LEL] peak (%):	0.0	0.0	0.0	NR	0.0	0.0
CH4 peak (% v/v):	0.0	0.0	0.0	NR	0.0	0.0
CH4 steady state (% v/v):	0.0	0.0	0.0	NR	0.0	0.0
CO2 peak (% v/v):	0.2	0.1	0.9	NR	0.4	1.3
CO2 steady state (% v/v):	0.2	0.1	0.9	NR	0.4	1.3
O2 minimum (% v/v):	21.2	21.2	15.7	NR	21.1	13.9
O2 steady state (% v/v):	21.2	21.2	15.7	NR	21.1	13.9
H2S peak (ppm):	0.0	0.0	0.0	NR	0.0	0.0
CO peak (ppm):	0.0	0.0	0.0	NR	0.0	0.0
Gas flow peak (l/hr):	<<<	<<<	0.1	9.6	-9.6	93.4
Gas flow steady (l/hr):	<<<	<<<	0.0	-0.4	0.0	43.2
Weather conditions:	Cloudy	Cloudy	Clear	Clear	Clear	Rain
Temperature (˚C):	15	10	6	6	10	8
Wind (mph):	12	13	17	17	7	3
Atmospheric pressure trend:	Rising	Falling	Steady	Steady	Falling	Falling
Monitoring engineer:	HW	HW	HW	HW	HW	HW

Comments:

NR = Not recorded.

<<< = instrument scale was exceeded.

* = until 01/11/2019 then used a Gas Data GFM436-1 (calibration due 15/10/2020).

13/09/2019: Bottom of well = 15.05m bgl, borehole heard to be hissing.

07/10/2019: Bottom of well = 15.10m bgl, borehole heard to be hissing.

01/11/2019: Bottom of well = 15.65, bgl, borehole heard to be hissing.

RECORD OF GAS MONITORING

Scheme:	Ainley Top Highway Improvements, Huddersfield
Scheme No:	446367
Client:	Kirklees Council
Instrument Type:	Gas Data LMSxi Type G4.18 with flow pod*
Next Calibration:	01/12/2019

Leeds CITY COUNCIL
GEOTECHNICAL SECTION

Hole ID: BH005R

Top of response zone (m):	4.00	**Response zone strata: Lower Coal Measures bedrock**
Base of response zone (m):	10.00	

Monitoring Round No:	1	2	3	4	5	6
Date:	13/09/2019	07/10/2019	16/10/2019	23/10/2019	01/11/2019	
Time:	10:59	12:20	14:50	9:05	11:40	
Water level (m bgl):	0.53	0.00	0.00	0.00	0.00	
Atmospheric pressure (mb):	1010	987	976	992	967	
Differential pressure (Pa):	0.0	NR	NR	NR	NR	
CH4 [LEL] peak (%):	0.0	NR	NR	NR	NR	
CH4 peak (% v/v):	0.0	NR	NR	NR	NR	
CH4 steady state (% v/v):	0.0	NR	NR	NR	NR	
CO2 peak (% v/v):	0.0	NR	NR	NR	NR	
CO2 steady state (% v/v):	0.0	NR	NR	NR	NR	
O2 minimum (% v/v):	21.1	NR	NR	NR	NR	
O2 steady state (% v/v):	21.1	NR	NR	NR	NR	
H2S peak (ppm):	0.0	NR	NR	NR	NR	
CO peak (ppm):	0.0	NR	NR	NR	NR	
Gas flow peak (l/hr):	0.4	NR	NR	NR	NR	
Gas flow steady (l/hr):	0.1	NR	NR	NR	NR	
Weather conditions:	Cloudy	Cloudy	Clear	Clear	Rain	
Temperature (˚C):	15	10	6	10	8	
Wind (mph):	12	13	17	7	3	
Atmospheric pressure trend:	Rising	Falling	Steady	Falling	Falling	
Monitoring engineer:	HW	HW	HW	HW	HW	

Comments:

NR = Not recorded

* = until 01/11/2019 then used a Gas Data GFM436-1 (calibration due 15/10/2020)

13/09/2019: Bottom of well = 11.00m bgl.

07/10/2019: Monitoring well and cover flooded with surface water. Unable to measure gas.

16/10/2019: Monitoring well and cover flooded with surface water. Unable to measure gas.

23/10/2019: Monitoring well and cover flooded with surface water. Unable to measure gas.

01/11/2019: Monitoring well and cover flooded with surface water. Unable to measure gas.

APPENDIX 4

REVISED CONCEPTUAL SITE MODEL

	CONSEQUENCE			
PROBABILITY	Severe (4)	Moderate (3)	Mild (2)	Minor (1)
Highly Likely (18)	Very High Risk (72)	High Risk (54)	Moderate Risk (36)	Moderate/Low Risk (18)
Likely (10)	High Risk (40)	Moderate Risk (30)	Moderate/Low Risk (20)	Low Risk (10)
Low Likelihood (8)	Moderate Risk (32)	Moderate/Low Risk (24)	Low Risk (16)	Very Low Risk (8)
Unlikely (5)	Moderate / Low Risk (20)	Low Risk (15)	Very Low Risk (10)	Very Low Risk (5)

Definitions:	Very High Risk	There is a high probability that sever harm could arise to a designated receptor from an identified hazard, OR there is evidence that severe harm to a designated receptor is currently happening.
	>60	
	High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Urgent investigation (If not already undertaken).
	>35	
	Moderate Risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, if is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk.
	>17	
	Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is unlikely that this harm, if realised would at worst normally be mild. (LCC WOULD NOT CONSIDER IN THIS CASE THAT AN INTRUSIVE INVESTIGATION IS NECESSARY).
	>9	
	Very Low Risk	There is a low possibility that harm could arise to a rector. In the event of such harm being realised it is not lily to be severe.
	>0	

Probability	Criteria
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and is almost inevitable over the longer term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likeyhood	There is a pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the shorter term.
Unlikely	There is a pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Note: Refer to Conceptual Model Risk matrix & terminology for risk classification system

Leeds CITY COUNCIL

City Development, Geotechnical Section, Tel: 0113 222 4444

CONCEPTUAL SITE MODEL TABLE

Client: LCC
Project: A629 Ainley Top
Scheme No: 446367

Appendix 4

Source	Potential Hazard	Pathways	Potential Receptor	Probability and Risk Number	Consequences Risk Number	Risk Score	FURTHER Investigation Reccomended	Comments
Made ground, (Redundant cellars) Undefined buried waste,(historical fill in quaries local to the site) Shallow coal or mine workings Historical industries local to the site(depots and textile mills)	Metals, oils, fuel PAH, TPH, asbestos, sharps,	Dermal contact, ingestion and inhalation of dust, fibres and soils.	Current site users	Low likelihood (8)	Mild Risk(2)	(16) Low Risk	No	Low Ellivations Detected
			Future site users	Low likelihood (8)	Mild Risk(2)	(16) Low Risk	No	Low elivations predominantly detected in surface soils that will be removed.
			Ground workers including ground investigation, utility providers construction and or demolition.	Low Likelihood (8)	Mild Risk(2)	(16) Low Risk	No	No asbestos identified or ellivations requiring work to stop or speciallist PPE.
		Ingress of contaminants i.e.PAHs into pipes, drinking water or services.	Services or their users	Low likelihood (8)	Mild Risk(2)	(16) Low Risk	No	No specific targeting for areas of services considered necessary.
		Leachability of contaminants within or off site.	Surface Aquifer (No significant superficial deposits recorded)	Low likelihood (8)	Mild Risk(2)	(16) Low Risk	No	Assesment of site soils and leachates infer low levels of potential contamination and a low potential for soils to leach.
			Underlying Aquifer (Secondary A). No Source Protection Zones or abstractions within 240m,	Low likelihood (8)	Mild Risk(2)	(16) Low Risk	No	
			Surface water features (Within site Area)	Low likelihood (8)	Mild Risk(2)	(16) Low Risk	No	
	Ground gasses, vapours	Inhalation of dust or vapours.	Structures/persons above or adjacent to the proposals.	Unlikely (5)	Moderate Risk (3)	(15) Low Risk	No	Initial ground gas monitoring not completed as wells flooded or experiancing barometric pumping. Up to five records in one location for both high and low asmospheric conditions with no significant ellivations. No sizable hydrocarpon contaminations noted during the site works and. No Onsite Radon Risk.
		Migration of gasses or vapours via ground faults or below ground structures.		Unlikely (5)	Moderate Risk (3)	(15) Low Risk	No	
	Note: Refer to Conceptual Model Risk matrix & terminology for risk classification system							