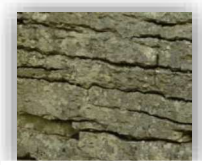

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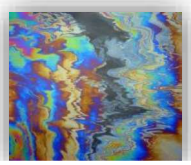

REMEDIATE

REGENERATE

TECHNICAL REPORT

GROUND INVESTIGATION
AT
NEW WHARF
52 WAKEFIELD ROAD
HUDDERSFIELD
FOR
KHELA (UK) LIMITED

REPORT NO. NE3527A
DECEMBER 2016

SUB SURFACE NORTH EAST LIMITED
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CONTENTS

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GROUND INVESTIGATION AT NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD

CLIENT: KHELA (UK) LIMITED

ENGINEER: SIMBA CONSULTANTS

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1. INTRODUCTION

This report has been prepared in accordance with an email, dated 13th July 2016, from the Client.

The brief was set out in our estimate, ref. E4936A and dated 13th July 2016, with amendments as the investigation proceeded and includes:

- 2 No. cable percussive boreholes
- Geotechnical laboratory testing
- Contamination analysis
- Installation of standpipes followed by groundwater and ground gas monitoring
- Provision of an interpretative report on the above.

1.1 Site Location and Description

The site is located at the New Wharf Public House, 52 Wakefield Road, Huddersfield, HD1 3AQ, as indicated on Figure 1. The approximate National Grid Reference of the centre of the site is 415010 416411.

The area of investigation comprises a two storey stone built disused public house, including cellar, covering half of the site to the east and north. The southern half of the site comprises bituminous macadamed surfacing including a paved area with a small open-sided shelter.

1.2 Proposed Development and Purpose of the Ground Investigation

We understand that it is proposed to develop the site with a four to five storey student accommodation block, as shown on Figure 3.

The purpose of the investigation was to obtain an indication of the ground conditions, at the positions of the boreholes, to assess the likelihood of a general pattern of strata being present below the site and to establish the load bearing characteristics of the strata deriving if possible an assessment of the suitability of appropriate founding techniques.

In addition a contamination assessment was required in order to determine necessary precautions and/or remedial measures required for the proposed development and to ascertain the need for any further sampling and analysis. Ground gas monitoring and assessment was also required to determine necessary precautions and/or remedial measures.

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2. INVESTIGATION

2.1 Investigation Details

Two 140mm diameter boreholes were put down by cable percussive boring techniques at the positions determined and set out by the Client and Sub Surface North East Limited, as shown on Figure 2. The boreholes were put down to depths of between 3.10 and 4.60 metres, samples taken were logged in accordance with BS EN ISO 14688-1: 2002 and BS EN ISO 14689-1: 2003 and the resulting Borehole Records are appended.

2.2 Sub Surface Detail

Details of the strata encountered in the ground investigation are given on the appended Borehole Records. The exploratory holes found made ground overlying sand and gravel. The depths of strata found were as follows:

TABLE 1 STRATA

Expl. Hole No.	Depth of Made Ground (m)	Depth of Sand and Gravel (m)	Depth of Hole (m)
BH1	2.60	4.60	4.60
BH2	2.40	3.10	3.10

BH = Borehole

A general summary of the strata found is as follows:

2.2.1 Made Ground

In BH1 a paving slab was encountered to 0.05m overlying concrete and stone to 0.50m. Beneath the concrete and stone dark brown slightly clayey sandy fine to coarse gravel sized fragments of stone, brick, and concrete with low stone cobble content was encountered to 1.50m overlying a dark brown ashy gravelly slightly sandy silty clay. Gravel sized fragments are fine to coarse clinker, stone and brick encountered to 2.60m.

In BH2 bituminous macadam surfacing was encountered to 0.10m overlying a dark grey slightly ashy clayey sandy fine to coarse gravel sized fragments of stone and bituminous macadam to 1.00m. Brown and dark brown clayey medium to coarse sand and fine to coarse gravel sized fragments of stone, brick, and concrete was then encountered to 2.40m.

2.2.2 Granular Deposits

Beneath the made ground in BH1 at 2.60m and BH2 at 2.40m a brown clayey fine to coarse sand and fine to coarse quartz and sandstone gravel was encountered to the termination of both boreholes at 4.60m and 3.10m respectively, beyond which no further progress was possible.

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2.2.3 Groundwater

A summary of groundwater entries and levels are tabulated below:

TABLE 2 GROUNDWATER

Expl. Hole No.	Water Entry Depth (m)	Rate of Inflow	Water Levels After 20 Minutes (m)	Depth Sealed (m)
BH1	3.80	Slow	3.20	4.40

No groundwater was encountered in the remainder of the exploratory holes although it should be noted that they were only left open for a short period of time and groundwater levels and rates of inflow and may be subject to seasonal and/ or climatic variations.

Monitoring of standpipes installed in BH1 and BH2 between 4.50m and 3.10m respectively, and found groundwater to be at 3.37 metres depth in BH1 with BH2 found to be dry.

3. SAMPLING, TESTING AND MONITORING

3.1 Sampling

Small disturbed and bulk disturbed samples were retained for the strata encountered and were subjected to careful examination and hand penetrometer / hand shear vane tests, where appropriate.

The samples will be retained for a period of one month after the issue of this report, for reference purposes, and then disposed of unless otherwise instructed.

3.2 Field Testing

Nine Standard Penetration Tests (SPTs) were performed in the boreholes, the results of which are recorded on the appended Standard Penetration Test Results Sheet with 'N' values and indicative states of compaction and shear strength, where appropriate, given on the appended Borehole Records.

3.3 Installations and Monitoring

On completion of BH1 and BH2 hdpe standpipes were installed to depths of 4.50 and 3.10 metres respectively. The standpipes are slotted from 1.00 metres depth, have an internal diameter of 50mm and have removable quick release gas valves to enable both ground gas and groundwater monitoring and sampling to be undertaken. Details of the installations are given on the appended Borehole Records.

Monitoring of the standpipes for ground gas and groundwater has been undertaken on six scheduled occasions using portable equipment. A Gas Data GFM 435 was used for monitoring methane, carbon dioxide, oxygen, gas flows and atmospheric pressure. The results of the monitoring is given on the appended Ground Gas and Groundwater Monitoring Results sheet.

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3.4 Laboratory Testing

The following laboratory tests were carried out in accordance with BS.1377: 1990, where applicable, and the results are appended.

- Particle size distribution by wet sieve analysis
- Soluble sulphate content and pH value tests

Contamination analyses have been performed on two soil samples to determine: pH and concentrations of sulphate, sulphide, cyanide, arsenic, boron (soluble), cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, zinc, speciated total petroleum hydrocarbons (TPHs), the speciated polynuclear aromatic hydrocarbons (PAHs) suite, the benzene/ ethylbenzene/ toluene/ xylene (BTEX) suite and phenols. In addition both soil samples were subjected to an asbestos screen. Further, one soil sample was subject to analysis to determine pH and water soluble concentrations of magnesium, sulphate, chloride, nitrate, ammonium, and sulphate.

One leachate samples has been prepared in accordance with the Environment Agency protocol and contamination analyses have been performed to determine: pH and concentrations of sulphate, sulphide, cyanide, arsenic, boron (soluble), cadmium, chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, zinc, speciated TPHs, the speciated PAHs suite, the BTEX suite and phenols.

4. APPRAISAL AND RECOMMENDATIONS

4.1 Comments on the Profile

At the outset it should be appreciated that only a small proportion of the area to be developed has been sampled and consequently the recommendations made and opinions expressed in this report can only be applied to such conditions as were encountered in the exploratory holes.

The exploratory holes indicate a nature and degree of similarity to the extent that we consider them likely to be representative of the natural ground conditions. However, no guarantee can be given.

Details of the findings of the investigation are given on the appended Borehole Records and a summary of the ground conditions is given in Section 2.2.

4.2 Foundations

We understand that it is proposed to develop the site with a four to five storey student accommodation block. However, at the time of writing this report no specific details regarding proposed foundations and design loadings were available and consequently the recommendations given are in general terms only.

The ground investigation found made ground to depths of 2.60m and 2.40m overlying very dense sand and gravel to the termination of the boreholes at depths of 4.60m and 3.10m beyond which no further progress was possible.

We would not recommend founding in the Made Ground in its present condition because of its inherent variability in consistency and compaction, and in parts the nature of its constituents.

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Providing there is sufficient load bearing capability we recommend that the proposed building is founded on strip footings for wall loads and pad foundations for column loads in the natural granular drift deposits.

It should be noted that in parts of the site the natural strata is at a depth of in excess of 2.60 metres and in these areas foundations should be taken down to a minimum 0.10 metres below the base of the Made Ground unless the NHBC guidelines indicate a greater depth.

In view of the depth of foundations required it is anticipated that trench fill will be used to bring levels back up to the surface. We would anticipate that trench fill would normally be economically viable providing foundation depths do not exceed about 2.50 to 3.00 metres.

Taking the results of the field and laboratory tests we have determined the safe bearing capacity of the natural strata, as follows:

TABLE 3 SAFE BEARING CAPACITY

Expl Hole No.	Depth (m)	SPT 'N' Value	Safe Bearing Pressure (kN/m^2)		Recommended Minimum Foundation Depth (m)
			Strip Footing	Square Pad	
BH1	3.15	70/150mm	600**	600**	2.70
	4.10	97/225m	600**	600**	
	4.55	52/50mm	600**	600**	
BH2	2.68	76/125mm	600**	600**	2.50
	3.05	58/50mm	600**	600**	

** For footings on granular strata, the safe bearing capacity given is based upon a footing width of less than 1.50 metres. For wider footings a reduction would be necessary.

From the safe bearing pressures given in Table 3, we recommend that values of 600 kN/m^2 for strip footings and square pads should not be exceeded for the recommended minimum foundation depth given.

All formation levels should be carefully inspected by an experienced and qualified engineer to confirm the appropriateness of the design figures used with any soft, loose, or rubbly zones removed and replaced with lean mix concrete. The formation should then be blinded with lean mix concrete as soon as possible after exposure, if there is to be a delay before construction, to prevent water softening or disturbance.

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4.3 Floor Slab Construction

With regard to the design and construction of normal ground bearing floor slabs, it should be noted that due to the thickness of Made Ground there will be a risk of significant total and differential settlements, the extent of which will be a matter of chance rather than being assessable by calculation.

To obviate any significant damaging settlements we would recommend using a suspended floor slab with intermediate support designed on the same basis as the main foundations where the spans are too large for economical single suspended slab design.

4.4 Excavations and Groundwater

There should be no particular difficulties in excavating the strata indicated in the exploratory holes utilising an appropriate and suitably sized mechanical excavator.

It is recommended that all excavations to greater than 1.20 metres depth, or for shallower excavations where groundwater is encountered above this level, are closely supported, especially where man entry is required. Alternatively, where space permits, the excavations might be battered back to an appropriate angle.

Groundwater entry was recorded in BH1 at 3.80 metres depth and rose in 20 minutes to 3.20 metres depth. It should be noted that groundwater levels and rates of inflow may be subject to seasonal and/ or climatic variations.

Monitoring of standpipes installed in BH1 to 4.50m found groundwater to 3.37 metres depth.

Where groundwater is encountered to about 3.40 metres depth and accumulates in open excavations it is considered that it should be able to be removed by pumping from a filtered sump.

Care will need to be taken when reducing groundwater levels to ensure that adjoining/ nearby buildings, structures and services are not affected.

4.5 Buried Concrete

For the design of buried concrete the recommendations given in Building Research Establishment (BRE) Special Digest 1 (September 2005 revision), “Concrete in Aggressive Ground”, should be followed.

Determination of pH on the soil samples gave values in the range of 8.4 to 8.7 (alkaline).

Soluble sulphate concentrations were also determined for the soil samples and the results ranged from 0.01 to 0.94 g/l.

The results indicate that the Design Sulphate Class for the site should be DS-2.

Our knowledge of the site and ground conditions indicates that the site is “brownfield” with mobile groundwater. Consequently, in accordance with the Design Sulphate Class for the site together with the site and groundwater conditions an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-2 should be used as detailed on the appended extract.

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4.6 Contamination Considerations

At the outset it should be noted that this contamination investigation is a baseline survey in order to provide a contamination risk assessment. Based upon the findings additional sampling, analysis and assessment may be required.

Analysis of a suite of common determinants has been undertaken in the absence of historical evidence of the source of the Made Ground. However, the absence of other specific contaminants cannot be guaranteed.

4.6.1 Assessment (Soil)

In order to provide an assessment of the presence of contamination two soil samples have been analysed for a suite of determinants and the results are appended.

Levels of the determinants has been compared against published guideline values. The Department for Environment, Food and Rural Affairs (DEFRA) and the Environment Agency published soil guideline values (SGVs) for mercury, selenium, benzene, toluene, ethylbenzene and xylene on 31 March 2009, arsenic and nickel on 12 May 2009 and cadmium and phenols in June 2009. In July 2009 Generic Assessment Criteria (GACs) were published by Land Quality Management Limited (LQM) in conjunction with the Chartered Institute of Environmental Health (CIEH). Contaminated Land: Applications in Real Environments (CL:AIRE) guideline values were also published in December 2009 to supplement the above. DEFRA published in March 2014 Category 4 Screening Levels (C4SLs) for arsenic, cadmium, lead, hexavalent chromium, benzo(a)pyrene and benzene. In November 2014 Suitable for Use Levels (S4ULs) were then published by LQM/ CIEH which superseded the GACs. Updated S4ULs values for cadmium and phenols were published in July 2015 and for nickel in August 2015. The guideline values (SGVs, S4ULs, CL:AIRE and C4SLs) vary dependent upon the land use; allotment and residential use being the most sensitive and commercial/ industrial use being the least sensitive.

For the purposes of assessment, as the proposed development is student accommodation, contamination analyses have been compared with the guideline values for a standard land use of residential without plant uptake (without homegrown produce).

When compared with published guideline values for a standard land use of residential without plant uptake (without homegrown produce) the contamination analysis determined elevated levels of a number of Polynuclear Aromatic Hydrocarbons (PAHs), as tabulated below:

TABLE 4 ASSESSMENT OF SOIL CONTAMINATION

Determinant	Exp. Hole No.	Depth (m)	Determined Level (mg/kg)	S4UL (mg/kg)
benzo(a)anthracene	BH2	0.10	34	15
chrysene	BH2	0.10	39	32
benzo(b)fluoranthene	BH1 / BH2	0.50 / 0.10	5.1 / 45	4.0
benzo(a)pyrene	BH1 / BH2	0.50 / 0.10	3.7 / 35	3.2
dibenzo(ah)anthracene	BH1 / BH2	0.50 / 0.10	0.81 / 26	0.32

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An asbestos screen was undertaken on two soil samples and no asbestos was detected.

4.6.2 Assessment (Leachate)

To assess the leachability of contaminants, and the consequent pollution potential of the on-site material to "controlled waters", one sample of near surface soil/ Made Ground has been processed in accordance with the Environment Agency's protocol, the leachate analysed for a suite of determinants and the results are appended.

We have listed the samples where the levels of contamination have exceeded the Environment Agency's Environmental Quality Standards (EA EQS) and/ or the United Kingdom Drinking Water Standards (UK DWS), as follows:

TABLE 5 ASSESSMENT OF LEACHATE CONTAMINATION

Determinant	Expl. Hole No	Depth (m)	Recorded Level (µg/l)	EA EQS (µg/l)	UK DWS (µg/l)
Total TPH >C6-C40	BH2	1.50	160	-	10

The results of the leachate analysis indicate that "controlled waters" are potentially at risk from leachable Total Petroleum Hydrocarbons.

The levels of Total Petroleum Hydrocarbons are above the UK DWS but the UK DWS is a post treatment standard and as such is very stringent.
It should be noted that leachate analysis generally overestimates the levels of organic compounds and we therefore recommend that more reliance is placed on the analysis of water from the potentially affected "controlled waters" in this regard, and thus we recommend, if possible, a water sample is obtained for further testing.

4.6.3 Conclusions and Recommendations

Section 78a(2) of the Environmental Protection Act: 1990 as amended by the Contaminated Land (England) (Amendment) regulations 2012, and Section 86 of the Water Act 2003, defines CONTAMINATED LAND for the purposes of Part IIA as:

"any land which appears to the LOCAL AUTHORITY in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

(a) SIGNIFICANT HARM is being caused or there is a SIGNIFICANT POSSIBILITY of such harm being caused; or
(b) SIGNIFICANT POLLUTION OF CONTROLLED WATERS is being, or is likely to be, caused"

Before a LOCAL AUTHORITY can make the judgement that land appears to be CONTAMINATED LAND on the basis that SIGNIFICANT HARM is being caused, or that there is a SIGNIFICANT POSSIBILITY of such harm being caused, the LOCAL AUTHORITY must identify a SIGNIFICANT POLLUTANT LINKAGE. This means that each of the following has to be identified:

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(a) a CONTAMINANT;
(b) a relevant RECEPTOR (defined as living organisms, ecological systems, controlled waters or property); and
(c) a PATHWAY by means of which either:
  (i) the CONTAMINANT is causing SIGNIFICANT HARM to that RECEPTOR, or
  (ii) there is a SIGNIFICANT POSSIBILITY of such harm being caused by that CONTAMINANT to that RECEPTOR

It should be noted that the words in capitals have a legal definition within the legislation.

Without a clear identification of all three elements of the pollutant linkage, land cannot be identified as contaminated under the regime.

The National Planning Policy Framework states that, "after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990". Therefore, the general principles detailed above apply to this assessment.

Our assessment based on the results of the soil samples, indicates that elevated levels of Polycyclic Aromatic Hydrocarbons are present in the near surface Made Ground/ soils (source). The pathway from the source to site operatives during earthworks, the end users of the development, and any proposed planting (receptors) will need to be removed by precautions and/ or remedial measures.

The elevated contaminants found on site are particularly hazardous if they are in contact with the skin, ingested, usually by eating contaminated fruit and vegetables and/ or inhalation of dust, and in addition may hinder plant growth.

In gardens and areas of open space which are not covered by paving slabs, concrete and/or bituminous macadam surfaces, the end users should be protected from the contaminated materials and plants should be provided with a medium in which they can safely grow.

As much of the contaminated ground will be covered by buildings, hardstandings, car parks and roads for the proposed development we consider that no other surface protection will be necessary. However, in landscaped/ planted borders and open space areas we recommend that a 450mm blanket of imported clean topsoil/ subsoil should be placed to protect the end users of the development and to provide a medium in which plants may grow unhindered. In addition trees and bushes, due to their deeper root system, should be pit planted on and in clean topsoil.

Contaminated materials should, where possible, be retained on site. However, it should be appreciated that contaminated material left on site is the legal responsibility of the landowner, unless the person who created the contamination can be identified.

If waste materials are to be removed from the site, classification of the waste should be undertaken to determine the most appropriate tip to use and the associated costs. It should be noted that significant cost savings can sometimes be made on waste disposal by correct classification of the waste, a service that we can provide.

It should be noted that all vehicles carrying contaminated material should be securely sheeted and the wheels and undercarriages cleaned before leaving site to ensure that hazardous materials are not dropped onto public roads.

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S4ULs, C4SLs and CL:AIRE assume long term contact with contamination and assess chronic health risk. The risk of short term acute exposure to site personnel is dealt with in the remit of the Health and Safety Executive under the Health and Safety at Work Act: 1974 and Regulations made under the Act, including the Control of Substances Hazardous to Health (COSHH) Regulations. The levels of contamination and risk to site personnel should be considered under the Construction Design and Management (CDM) Regulations at the planning stage and in the development of the designers and contractors Health and Safety Plans and Method Statements. The risk of contact with on-site soils should be minimised and the following precautions should be taken as a minimum requirement.

Site personnel involved in earthworks and excavations should wear gloves, overalls, and boots and smoking should be prohibited.

Contamination with total petroleum hydrocarbons has been identified in the prepared leachate samples. If permeating rainfall or surface water run-off is able to mobilise the leachable contaminants identified in the on-site soils and put at risk “controlled waters” (including groundwater, surface water and water courses) precautions and/ or remedial measures will need to be put in place. Alternatively a quantitative risk assessment will have to be carried out to determine the risk to “controlled waters”.

Should it be necessary for groundwater to be pumped from on-site excavations the groundwater should be sampled and analysed and submitted to the appropriate waste water authority with a request for a discharge consent. Following receipt of a discharge consent groundwater is likely to be discharged to a sewer or to an off-site licensed discharge point.

4.7 Ground Gas Considerations

Ground gas monitoring has been undertaken on six scheduled occasions and the results of the monitoring visits are appended.

Ground gases: methane, carbon dioxide and oxygen and flow rate have been monitored and the ranges of ground gases and flow rate during the monitoring period are as follows:

TABLE 6 GROUND GAS CONCENTRATIONS AND FLOW RATE

Methane (% vol. In air)	Carbon Dioxide (% vol. in air)	Oxygen (% vol. in air)	Gas Flow Rate (litres/ hour)
0.0	<0.4	>20.1	<0.01

To date It can be seen from the monitoring that no elevated levels of methane or carbon dioxide, or depleted levels of associated oxygen, have been detected. In addition no gas flow has been detected.

Methane gas when present between 5% volume in air (Lower Explosive Limit - L.E.L.) and 15% volume in air (Upper Explosive Limit - U.E.L.) is potentially explosive and inflammable whilst carbon dioxide in conjunction with depleted oxygen is an asphyxiant. Both methane and carbon dioxide are a by-product of the anaerobic and aerobic decomposition of biodegradable materials.

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The levels of gas have been assessed in accordance with British Standard 8485, “Code of practice for the design of protective measures for methane and carbon dioxide gasses for new buildings”, published in June 2015 (BS.8485:2015).

The characteristic hazardous gas flow rate (Q_{hgs}) is calculated by dividing the maximum gas (methane or carbon dioxide) concentration by 100 and multiplying by the maximum flow rate in litres per hour (minimum 0.1 l/hr for Sub Surface monitoring equipment). For this site Q_{hgs} = [0.4/ 100] x 0.1 = 0.004 l/hr

BS.8485: 2015, Table 2, indicates that the site falls into Characteristic Situation 1 (CS1)

BS.8485: 2015, Table 4, indicates that for a CS1 and the type of development proposed a score of zero gives no protection and remedial measures required.

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4.8 General

In the preparation of this report no consideration has been given to
- the historical, geological, mining and/ or environmental setting of the site
- the possible effects of any mineral extraction, including coal, and geological faulting in the solid strata beneath the site

as this was outside our brief.

It should be noted that we have made recommendations for further investigation in Section 4.6.2 to address the elevated levels of total petroleum hydrocarbon found in BH2 at 1.50m. To address this a water sample should be obtained, if possible, from the installed standpipes for TPH analysis.

We recommend that consultation should be undertaken with the Local Authority Environmental Health Officer, the Local Authority Building Control Officer and the Coal Authority prior to development as the site is located within a Coal Mining Area.

We would be happy to undertake the above or alternatively the Client should undertake such consultations before proceeding.

We recommend that when developing a “brownfield site” a phased investigation is undertaken in order that each phase informs the next. A typical phased investigation comprises the following:
- Phase I: walkover survey and desk study report
- Phase II: ground investigation with report(s)
- Phase III: remediation statement report
- Phase IV: validation with report(s).

Following completion of the Phase II ground investigation and monitoring a Phase III remediation statement should be compiled and submitted to the Regulator for approval prior to development.

We trust that this report fulfils your present requirements but if you have any queries or we can be of further assistance please contact Mr David Simpson at our Ossett office.

SUB SURFACE CONSULTANTS LIMITED
REPORT No. NE3527
SEPTEMBER 2016

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GeoEnvironmental Engineer
For and on behalf of
Sub Surface Consultants Limited

C. A. Marsden B.Sc.(Hons.), C.Eng., M.I.C.E.
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INSITU TEST RESULTS

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Standard Penetration Test Results

Site : NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD

Client : KHELA (UK) LIMITED

Engineer : SIMBA CONSULTANTS

Job Number NE3527

Sheet 1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
BH1	1.00	1.15	1.45	SPT	1	2	1	1	2	1	N=5	
BH1	2.00	2.15	2.45	SPT	1	1	2	1	1	1	N=5	
BH1	3.00	3.15	3.30	SPT	10	15	31	39			70/150mm	
BH1	4.00	4.10	4.33	SPT	25		28	31	38		25*/100mm	
BH1	4.50	4.55	4.60	SPT	25		52				97/225mm 25*/50mm 52/50mm	
BH2	1.00	1.15	1.45	SPT	1	2	3	2	3	2	N=10	
BH2	2.00	2.15	2.45	SPT	3	4	4	6	12	19	N=41	
BH2	2.60	2.68	2.80	SPT	25		34	42			25*/75mm	
BH2	3.00	3.05	3.10	SPT	25		58				76/125mm 25*/50mm 58/50mm	

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Insitu Test Results

Site: NEW WHARF, 52 WAKEFIELD RD, HUDDERSFIELD

Client: KHELA (UK) LIMITED

Engineer: SIMBA CONSULTANTS

Job Number: NE3527A

Sheet: 1 / 1

Ground Gas and Groundwater Monitoring Results Sheet

Date	Hole No.	Methane (% Volume)	Carbon Dioxide (% Volume)	Oxygen (% Volume)	Gas Flow Rate (l/hr)	Atmospheric Pressure (m bars)	Depth to Groundwater (m)
20/07/2016	1	0.0	0.2	20.7	0.0	998	3.37
	2	0.0	0.2	20.7	0.0	998	DRY
09/08/2016	1	0.0	0.2	20.7	0.0	1015	3.60
	2	0.0	0.4	20.5	0.0	1015	DRY
16/08/2016	1	0.0	0.1	20.8	0.0	1007	3.60
	2	0.0	0.1	20.7	0.0	1007	DRY
30/09/2016	1	0.0	0.1	20.4	0.0	985	3.70
	2	0.0	0.4	20.1	0.0	985	DRY
13/10/2016	1	0.0	0.2	20.4	0.0	993	3.70
	2	0.0	0.2	20.4	0.0	993	DRY
31/10/2016	1	0.0	0.0	20.6	0.0	1002	3.70
	2	0.0	0.4	20.1	0.0	1002	DRY

Remarks: Elevated levels of methane and carbon dioxide and depleted levels of oxygen are shown in ***bold/italics.***

LABORATORY TEST RESULTS

SUB SURFACE
SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Laboratory Test Results

Site : NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD

Client : KHELA (UK) LIMITED

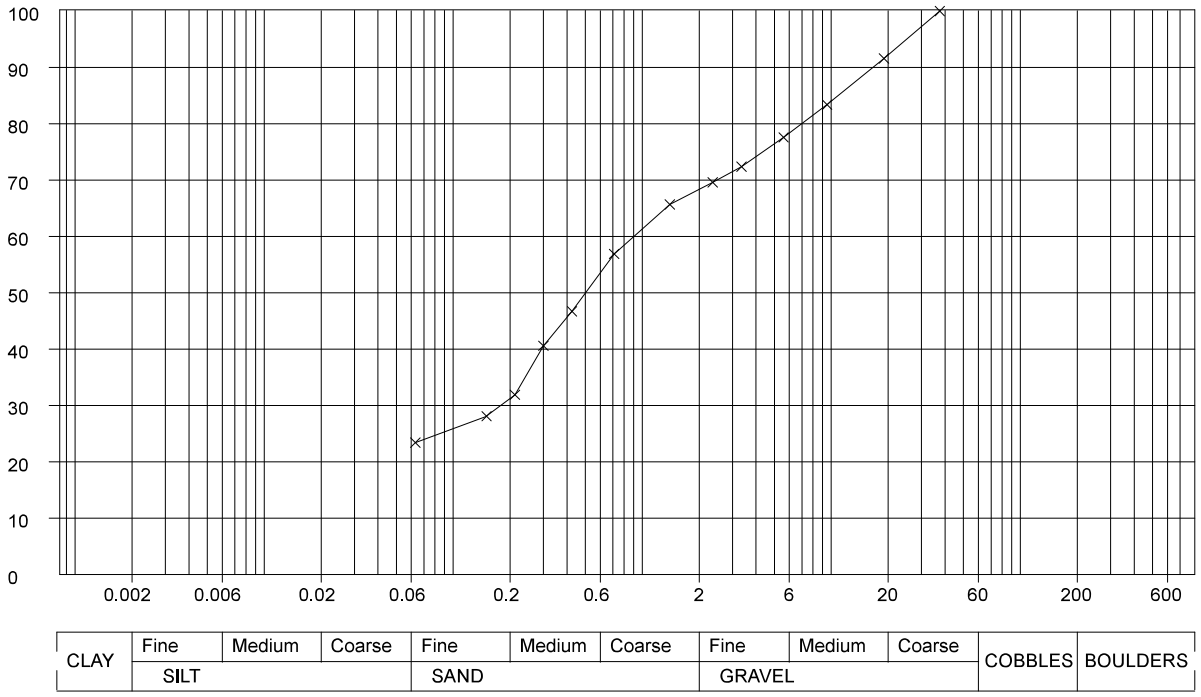
Engineer : SIMBA CONSULTANTS

Job Number NE3527

Sheet 1/2

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH1	3.50 - 4.00	B	Brown clayey very gravelly fine to coarse SAND. Gravel is subangular to rounded fine to coarse sandstone.



Sieve / Particle Size	% Passing
37.5 mm	100.0
19 mm	91.6
9.5 mm	83.4
5.6 mm	77.6
3.35 mm	72.4
2.36 mm	69.6
1.4 mm	65.7
710 µm	56.9
425 µm	46.7
300 µm	40.6
212 µm	31.9
150 µm	28.1
63 µm	23.4

Grading Analysis	
D85	11.4 mm
D60	953.1 µm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	31.6%
Sand	45.0%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

SUB SURFACE
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Laboratory Test Results

Site : NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD

Client : KHELA (UK) LIMITED

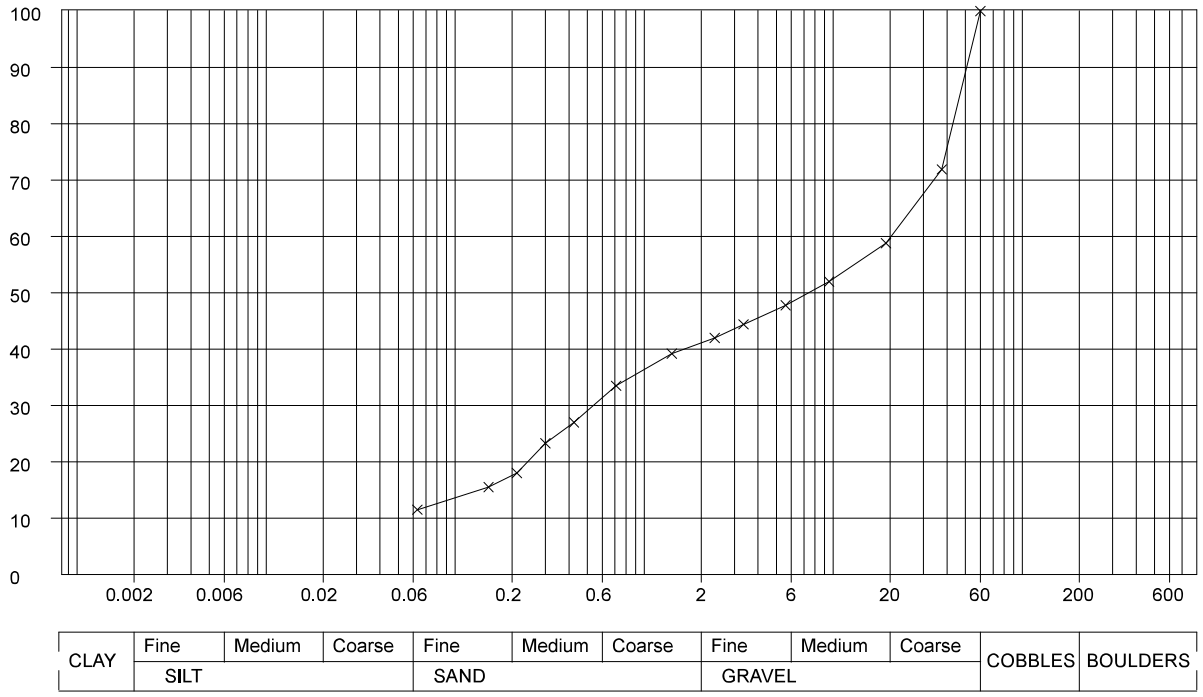
Engineer : SIMBA CONSULTANTS

Job Number NE3527

Sheet 2/2

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Trial Pit	Depth (m)	Sample	Laboratory Description
BH1	4.30	B	Brown clayey fine to coarse SAND and subangular to subrounded fine to coarse quartz and sandstone GRAVEL.



Sieve / Particle Size	% Passing
60 mm	100.0
37.5 mm	71.9
19 mm	58.8
9.5 mm	52.0
5.6 mm	47.8
3.35 mm	44.4
2.36 mm	42.0
1.4 mm	39.2
710 µm	33.5
425 µm	27.0
300 µm	23.3
212 µm	18.0
150 µm	15.5
63 µm	11.5

Grading Analysis	
D85	48.0 mm
D60	20.7 mm
D10	<63.0 µm
Uniformity Coefficient	-

Particle Proportions	
Cobbles + Boulders	-
Gravel	58.9%
Sand	29.6%
Silt	-
Clay	-

Method of Preparation : BS 1377:PART 1:1990:7.3 Initial preparation 1990:7.4.5 Particle size tests

Method of Test : BS 1377:PART 2:1990:9 Determination of particle size distribution

Remarks :

SUB SURFACE
SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Laboratory Test Results

Site : NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD

Client : KHELA (UK) LIMITED

Engineer : SIMBA CONSULTANTS

Job Number NE3527

Sheet 1 / 1

DETERMINATION OF THE pH VALUE AND THE SULPHATE CONTENT OF SOIL AND GROUNDWATER

Borehole/ Trial Pit	Depth (m)	Sample	Concentration of Soluble Sulphate			Percentage of sample passing 2mm Sieve %	pH	Classification	Laboratory Description
			Soil		Groundwater g /l				
			Total S03 %	S04 in 2:1 water:soil g /l					
BH1	1.00	B		0.94			8.7	DS-2	MADE GROUND: dark brown slightly clayey sandy angular to subangular fine to coarse gravel sized fragmnets of stone, brick and concrete.
BH1	4.30	B		0.01			8.4	DS-1	Brown clayey fine to coarse SAND and subangular to subrounded fine to coarse quartz and sandstone GRAVEL.
BH2	2.80	D		0.01			8.7	DS-1	Brown clayey very sandy angular to subangular fine to coarse sandstone GRAVEL.

Method of Preparation : BS 1377:PART 1:1990:7.5 Preparation of soil for chemical tests BS 1377:PART 3:1990:5.2, 5.3, 5.4 & 9.4

Method of Test : Laboratory in-house methods based on BS1377: Part 3 for contents of water soluble sulphate, total sulphate and pH.

Remarks : Classification relates to Design Sulphate Class of BRE Special Digest 1 (2005)

SUB SURFACE
SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Laboratory Test Results

Site: NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD

Job No. NE3527

Client: KHELA (UK) LIMITED

Sheet: 1/1

Engineer: SIMBA CONSULTANTS

DETERMINATION OF PARAMETERS FOR ASSESSMENT OF PYRITIC GROUND AND BURIED CONCRETE

Hole No	Depth (m)	Sample	pH (no units)	Soluble Sulphate 2:1 (g/l)	Total Sulphate (%)	Total Sulphur (%)	Magnesium 2:1 (g/l)	Chloride 2:1 (g/l)	Nitrate 2:1 (g/l)	Ammonia 2:1 (g/l)	Descriptions
BH1	1.00	D	8.7	0.94							MADE GROUND: dark brown and reddish brown slightly clayey sandy angular to subangular fine to coarse gravel sized fragments of stone, brick and concrete with low stone cobble content.
BH1	4.30	B	8.4	0.02							Very dense brown clayey fine to coarse SAND and subangular to subrounded fine to coarse quartz and sandstone GRAVEL.
BH2	2.80	D	8.7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	Very dense brown clayey very sandy angular to subangular fine to coarse sandstone GRAVEL.

Remarks :

Bold pH values indicate acidic ground.

AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) SITE CLASSIFICATION

Table C1 Aggressive Chemical Environment for Concrete (ACEC) classification for natural ground locations[a]

Sulfate				Groundwater		
Design Sulfate Class for Location	2:1 water/soil extract[b]	Groundwater	Total potential sulfate[c]	Static water	Mobile water	ACEC Class for location
1	2 (SO_4 mg/l)	3 (SO_4 mg/l)	4 (SO_4 %)	5 (pH)	6 (pH)	7
DS-1	<500	<400	<0.24	≥2.5		AC-1s
					>5.5d	AC-1[d]
					2.5 - 5.5	AC-2z
DS-2	500 - 1500	400 - 1400	0.24 - 0.6	>3.5		AC-1s
					>5.5	AC-2
				2.5-3.5		AC-2s
					2.5 - 5.5	AC-3z
DS-3	1600-3000	1500-3000	0.7 - 1.2	>3.5		AC-2s
					>5.5	AC-3
				2.5 - 3.5		AC-3s
					2.5 - 5.5	AC-4
DS-4	3100 - 6000	3100 - 6000	1.3 - 2.4	>3.5		AC-3s
					>5.5	AC-4
				2.5 - 3.5		AC-4s
					2.5 - 5.5	AC-5
DS-5	>6000	>6000	>2.4	>3.5		AC-4s
				2.5 - 3.5	≥2.5	AC-5

Notes

a Applies to locations on sites that comprise either undisturbed ground that is in its natural state (ie not brownfield - Table C2) or clean fill derived from such ground

b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous Digests (Box C7).

c Applies only to locations where concrete will be exposed to sulfate ions (SO_4) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance (Appendix A1 and Box C8).

d For flowing water that is potentially aggressive to concrete owing to high purity or an aggressive carbon dioxide level greater than 15mg/l (Section C2.2.3), increase the ACEC Class to AC-2z.

Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static
- Concrete placed in ACEC Classes that included the suffix 'z' primarily have to resist acid conditions and may be made with any of the cements or combinations listed in Table D2 on page 42.

Table C2 Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations[a]

Sulfate						Groundwater		
Design Sulfate Class for Location	2:1 water/soil extract[b]		Groundwater		Total potential sulfate[c]	Static water	Mobile water	ACEC Class for location
1	2 (SO_4 mg/l)	3 (Mg mg/l)	4 (SO_4 mg/l)	5 (Mg mg/l)	6 (SO_4 %)	7 (pH)[d]	8 (pH)[d]	9
DS-1	<500		<400		<0.24	≥2.5		AC-1s
							>6.5[d]	AC-1
							5.5 - 6.5	AC-2z
							4.5 - 5.5	AC-3z
							2.5 - 4.5	AC-4z
DS-2	500 - 1500		400 - 1400		0.24 - 0.6	>5.5		AC-1s
							>6.5	AC-2
						2.5 - 5.5		AC-2s
							5.5 - 6.5	AC-3z
							4.5 - 5.5	AC-4z
							2.5 - 5.5	AC-5z
DS-3	1600 - 3000		1500 - 3000		0.7 - 1.2	>5.5		AC-2s
							>6.5	AC-3
						2.5 - 5.5		AC-3s
							5.5 - 6.5	AC-4
							2.5 - 5.5	AC-5
DS-4	3100 - 6000	≤1200	3100 - 6000	≤1000	1.3 - 2.4	>5.5		AC-3s
							>6.5	AC-4
						2.5 - 5.5		AC-4s
							2.5 - 6.5	AC-5
DS-4m	3100 - 6000	>1200[e]	3100 - 6000	>1000[e]	1.3 - 2.4	>5.5		AC-3s
							>6.5	AC-4m
						2.5 - 5.5		AC-4ms
							2.5 - 6.5	AC-5m
DS-5	>6000	≤1200	>6000	≤1000	>2.4	>5.5		AC-4s
						2.5 - 5.5	≥2.5	AC-5
DS-5m	>6000	>1200[e]	>6000	>1000[e]	>2.4	>5.5		AC-4ms
						2.5 - 5.5	≥2.5	AC-5m

Notes

a Brownfield sites are those sites, or parts of sites, that might contain chemical residues produced by or associated with industrial production (Section C5.1.3).

b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous Digests (Box C7).

c Applies only to locations where concrete will be exposed to sulfate ions (SO_4) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance (Appendix A1 and Box C8).

d An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content (Section C5.1.3).

e The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000 mg/l and 17000 mg/l). This allows 'm' to be omitted from the relevant ACEC Classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static.
- Concrete placed in ACEC Classes that included the suffix 'z' primarily have to resist acid conditions and may be made with any of the cements or combinations listed in Table D2 on page 42.
- Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.

CONTAMINATION ANALYSIS RESULTS

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Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

UKAS TESTING
2183

Final Report

Report No.:	16-17632-1
Initial Date of Issue:	29-Jul-2016
Client	Sub Surface
Client Address:	3 Peel Street Preston Lancashire PR2 2QS
Contact(s):	Simon Gabbatt
Project	NE3527 New Wharf Pub, Huddersfield

Quotation No.:		**Date Received:**	25-Jul-2016
Order No.:		**Date Instructed:**	25-Jul-2016
No. of Samples:	6		
Turnaround (Wkdays):	5	**Results Due:**	29-Jul-2016
Date Approved:	29-Jul-2016		

Approved By:

Redacted

Details: Keith Jones, Technical Manager

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Results - Leachate

Project: NE3527 New Wharf Pub, Huddersfield

Client: Sub Surface			**Chemtest Job No.:**		16-17632
Quotation No.:			**Chemtest Sample ID.:**		327794
Order No.:			Client Sample Ref.:		BH2
			Client Sample ID.:		799
			Sample Type:		SOIL
			Top Depth (m):		1.50
			Bottom Depth (m):		2.00
			Date Sampled:		19-Jul-2016
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
pH	U	1010		N/A	9.6
Sulphate	U	1220	mg/l	1.0	15
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050
Sulphide	U	1325	mg/l	0.050	< 0.050
Arsenic (Dissolved)	U	1450	µg/l	1.0	9.4
Boron (Dissolved)	U	1450	µg/l	20	< 20
Cadmium (Dissolved)	U	1450	µg/l	0.080	< 0.080
Chromium (Dissolved)	U	1450	µg/l	1.0	< 1.0
Copper (Dissolved)	U	1450	µg/l	1.0	2.6
Mercury (Dissolved)	U	1450	µg/l	0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1.0	< 1.0
Lead (Dissolved)	U	1450	µg/l	1.0	2.7
Selenium (Dissolved)	U	1450	µg/l	1.0	1.1
Zinc (Dissolved)	U	1450	µg/l	1.0	4.5
Chromium (Hexavalent)	U	1490	µg/l	20	< 20
TPH >C6-C10	N	1670	µg/l	0.10	< 0.10
TPH >C10-C21	N	1670	µg/l	0.10	92
TPH >C21-C40	N	1670	µg/l	0.10	71
Total TPH >C6-C40	U	1670	µg/l	10	160
Naphthalene	U	1700	µg/l	0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10
Pyrene	U	1700	µg/l	0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10
Chrysene	U	1700	µg/l	0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10
Total Of 16 PAH's	U	1700	µg/l	2.0	< 2.0
Benzene	U	1760	µg/l	1.0	< 1.0

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Results - Leachate

Project: NE3527 New Wharf Pub, Huddersfield

Client: Sub Surface			**Chemtest Job No.:**		16-17632
Quotation No.:			**Chemtest Sample ID.:**		327794
Order No.:			Client Sample Ref.:		BH2
			Client Sample ID.:		799
			Sample Type:		SOIL
			Top Depth (m):		1.50
			Bottom Depth (m):		2.00
			Date Sampled:		19-Jul-2016
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Toluene	U	1760	µg/l	1.0	< 1.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0
Total Phenols	U	1920	mg/l	0.030	< 0.030

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Results - Soil

Project: NE3527 New Wharf Pub, Huddersfield

Client: Sub Surface					**Chemtest Job No.:**	16-17632	16-17632	16-17632	16-17632	16-17632
Quotation No.:					**Chemtest Sample ID.:**	327791	327792	327793	327795	327796
Order No.:					Client Sample Ref.:	BH1	BH1	BH1	BH2	BH2
					Client Sample ID.:	788	789	796	797	803
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.00	4.30	0.10	2.80
					Bottom Depth (m):	1.00	1.45	4.50	1.00	3.00
					Date Sampled:	19-Jul-2016	19-Jul-2016	19-Jul-2016	19-Jul-2016	19-Jul-2016
					Asbestos Lab:	COVENTRY			COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
ACM Type	U	2192		N/A		-			-	
Asbestos Identification	U	2192	%	0.001		No Asbestos Detected			No Asbestos Detected	
Moisture	N	2030	%	0.020		7.0	10	11	9.2	5.8
pH	U	2010		N/A		8.5	8.7	8.4	9.9	8.7
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40		0.79			0.82	
Magnesium (Water Soluble)	N	2120	g/l	0.010						< 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010			0.94	0.013		< 0.010
Total Sulphur	U	2175	%	0.010						< 0.010
Chloride (Water Soluble)	U	2220	g/l	0.010						< 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010						< 0.010
Cyanide (Total)	U	2300	mg/kg	0.50		< 0.50			< 0.50	
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50		6.1			60	
Ammonium (Water Soluble)	U	2120	g/l	0.01						< 0.01
Sulphate (Total)	U	2430	%	0.010		0.51			0.58	
Sulphate (Acid Soluble)	U	2430	%	0.010						< 0.010
Arsenic	U	2450	mg/kg	1.0		14			15	
Cadmium	U	2450	mg/kg	0.10		0.16			0.29	
Chromium	U	2450	mg/kg	1.0		11			15	
Copper	U	2450	mg/kg	0.50		29			28	
Mercury	U	2450	mg/kg	0.10		0.27			< 0.10	
Nickel	U	2450	mg/kg	0.50		16			16	
Lead	U	2450	mg/kg	0.50		110			88	
Selenium	U	2450	mg/kg	0.20		0.21			0.22	
Zinc	U	2450	mg/kg	0.50		34			65	
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50			< 0.50	
TPH >C6-C10	N	2670	mg/kg	1.0		< 1.0			< 1.0	
TPH >C10-C21	N	2670	mg/kg	1.0		70			610	
TPH >C21-C40	N	2670	mg/kg	1.0		130			1500	
Total TPH >C6-C40	U	2670	mg/kg	10		190			2100	
Naphthalene	U	2700	mg/kg	0.10		0.65			0.51	
Acenaphthylene	U	2700	mg/kg	0.10		0.31			1.6	
Acenaphthene	U	2700	mg/kg	0.10		0.73			2.6	
Fluorene	U	2700	mg/kg	0.10		0.57			2.3	
Phenanthrene	U	2700	mg/kg	0.10		5.3			43	
Anthracene	U	2700	mg/kg	0.10		1.3			14	
Fluoranthene	U	2700	mg/kg	0.10		8.5			81	

Chemtest
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Results - Soil

Project: NE3527 New Wharf Pub, Huddersfield

Client: Sub Surface			**Chemtest Job No.:**		16-17632	16-17632	16-17632	16-17632	16-17632
Quotation No.:			**Chemtest Sample ID.:**		327791	327792	327793	327795	327796
Order No.:			Client Sample Ref.:		BH1	BH1	BH1	BH2	BH2
			Client Sample ID.:		788	789	796	797	803
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.50	1.00	4.30	0.10	2.80
			Bottom Depth (m):		1.00	1.45	4.50	1.00	3.00
			Date Sampled:		19-Jul-2016	19-Jul-2016	19-Jul-2016	19-Jul-2016	19-Jul-2016
			Asbestos Lab:		COVENTRY			COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Pyrene	U	2700	mg/kg	0.10	8.5			84	
Benzo[a]anthracene	U	2700	mg/kg	0.10	3.9			34	
Chrysene	U	2700	mg/kg	0.10	5.1			39	
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	5.1			45	
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	1.9			17	
Benzo[a]pyrene	U	2700	mg/kg	0.10	3.7			35	
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	2.3			28	
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	0.81			5.4	
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	2.1			26	
Total Of 16 PAH's	U	2700	mg/kg	2.0	51			460	
Benzene	U	2760	µg/kg	1.0	< 1.0			< 1.0	
Toluene	U	2760	µg/kg	1.0	< 1.0			< 1.0	
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0	
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0			< 1.0	
o-Xylene	U	2760	µg/kg	1.0	< 1.0			< 1.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0			< 1.0	
Total Phenols	U	2920	mg/kg	0.30	< 0.30			< 0.30	

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

BOREHOLE RECORD SHEETS

SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Site	Borehole Number
NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD	BH1

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
LIGHT CABLE PERCUSSIVE	140mm to 4.40m		KHELA (UK) LIMITED	NE3527
	Location	**Dates**	**Engineer**	**Sheet**
	AS PLAN	18/07/2016	SIMBA CONSULTANTS	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
						0.05	MADE GROUND: paving slab (driller's description)			
						(0.45)	MADE GROUND: concrete and stone. (driller's description)			
0.50-1.00	B					0.50	MADE GROUND: dark brown and reddish brown slightly clayey sandy angular to subangular fine to coarse gravel sized fragments of stone, brick and concrete with low stone cobble content.			
1.00-1.45	SPT N=5			1,2/1,1,2,1		(1.00)				
1.00-1.45	D									
1.50-2.00	B					1.50	MADE GROUND: dark brown ashy gravelly slightly sandy silty clay. Gravel sized fragments are angular to subangular fine to coarse clinker, stone and brick.			
2.00-2.45	SPT N=5			1,1/2,1,1,1		(1.10)				
2.00-2.45	D									
2.60-3.00	B					2.60	Very dense brown clayey fine to coarse SAND and subangular to subrounded fine to coarse quartz and sandstone GRAVEL.			
3.00-3.30	SPT 70/150			10,15/31,39					▼1	
3.00-3.30	D									
3.50-4.00	B					(2.00)			▽1	
				Water strike(1) at 3.80m, rose to 3.20m in 20 mins, sealed at 4.40m.						
4.00-4.33	D									
4.00-4.33	SPT 25*/100 97/225			25/28,31,38						
4.30-4.50	B					4.60				
4.50-4.60	SPT 25*/50 52/50			25/52			Complete at 4.60m			
4.50-4.60	D			18/07/2016:						

Remarks

Hand dug inspection pit from GL to 1.00m to check for services - 1 Hr.
Chiselling from 3.00m to 4.60m - 2 Hrs.
No further progress possible.
On completion backfilled with arisings and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and gravel surround to 4.50m, a Bentonite seal from 1.00m 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.

Scale (approx)	Logged By
1:50	NM/MJE

Figure No. NE3527.BH1

SUB SURFACE

SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Site	Borehole Number
NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD	BH2

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
LIGHT CABLE PERCUSSIVE	140mm to 2.50m		KHELA (UK) LIMITED	NE3527
	Location	**Dates**	**Engineer**	**Sheet**
	AS PLAN	19/07/2016	SIMBA CONSULTANTS	1/1

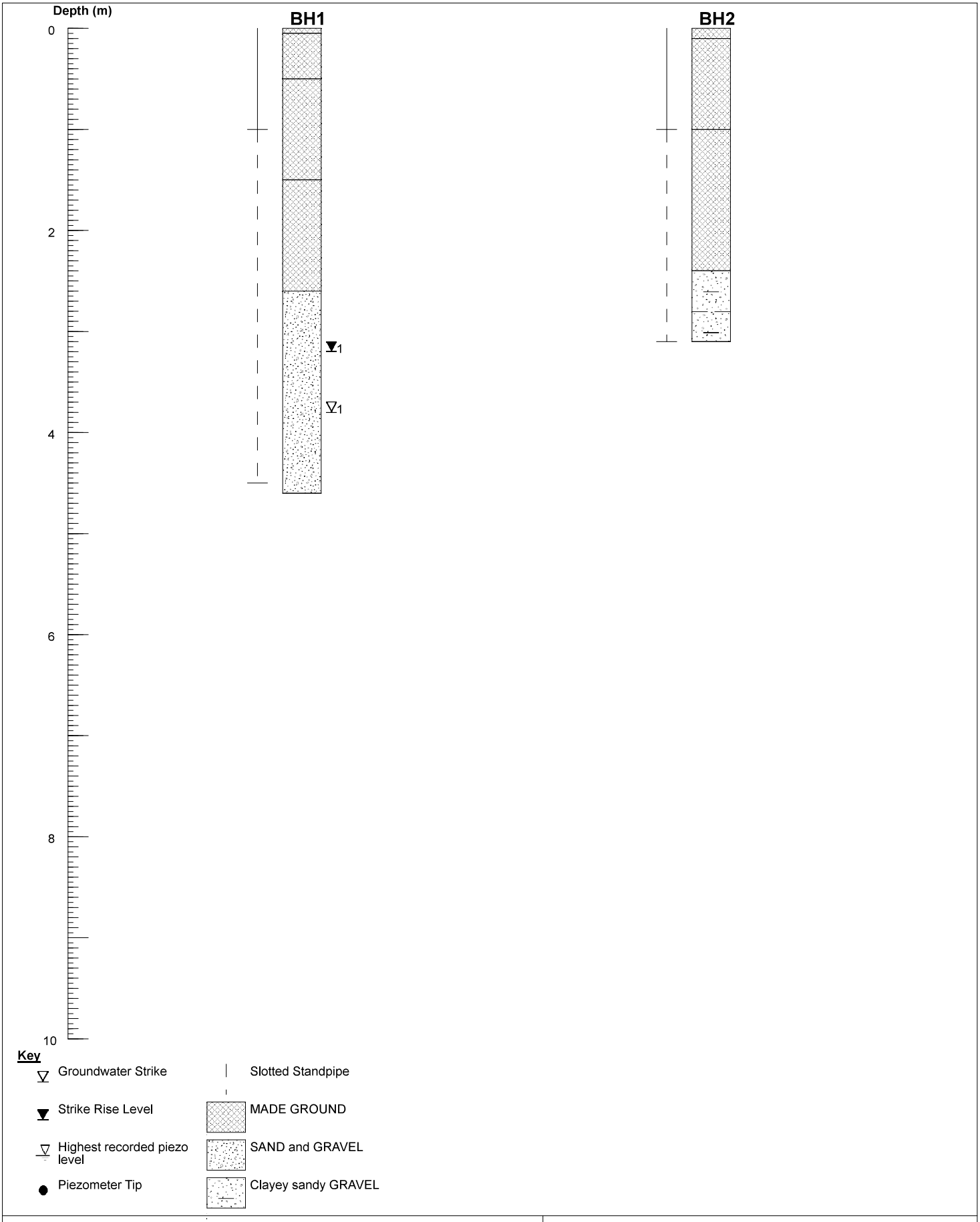
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10-1.00	B					0.10	MADE GROUND: bituminous macadam surfacing. (driller's description)			
						(0.90)	MADE GROUND: dark grey slightly ashy clayey sandy angular to subangular fine to coarse gravel sized fragments of stone and bituminous macadam.			
1.00-1.45	SPT N=10			1,2/3,2,3,2		1.00	MADE GROUND: brown and dark brown clayey medium to coarse sand and angular to subangular fine to coarse gravel sized fragments of stone, brick and concrete.			
1.00-1.45	D									
1.50-2.00	B									
						(1.40)				
2.00-2.45	SPT N=41			3,4/4,6,12,19						
2.00-2.45	D									
						2.40				
2.50-2.60	D						Very dense brown clayey very sandy angular to subangular fine to coarse sandstone GRAVEL.			
2.60-2.80	SPT 25*/75 76/125			25/34,42		(0.70)				
2.60-2.80	D									
2.80-3.00	D									
3.00-3.10	SPT 25*/50 58/50			25/58 19/07/2016:DRY		3.10	Complete at 3.10m			
3.00-3.10	D									

Remarks

Hand dug inspection pit from GL to 1.00m to check for services - 1 Hr.
Chiselling from 2.60m to 3.00m - 1 Hrs.
No further progress possible.
On completion backfilled with arisings and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and gravel surround to 3.10m, a Bentonite seal from 1.00m 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.

Scale (approx)	Logged By
1:50	NM/MJE

Figure No. NE3527.BH2

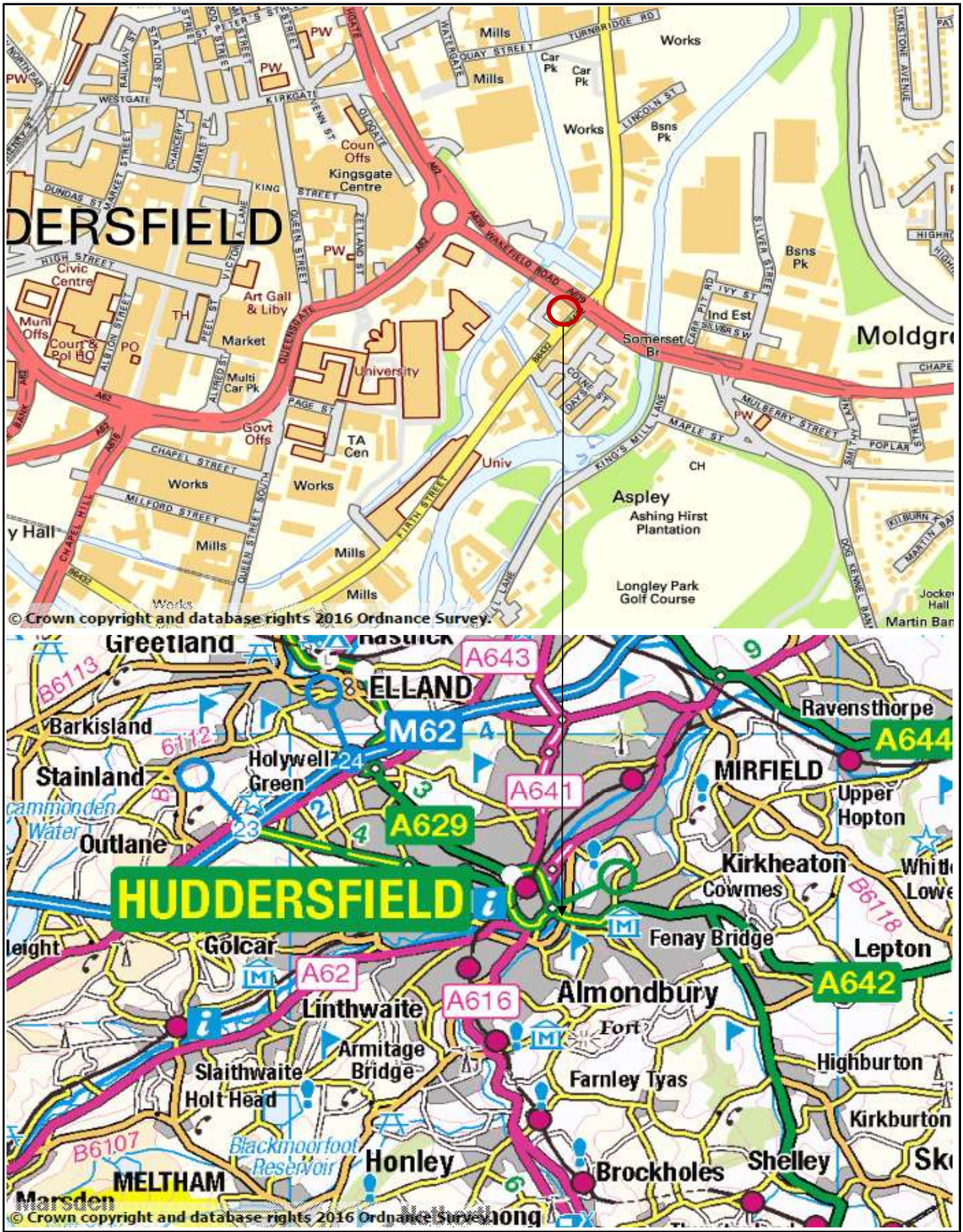


SUB SURFACE
SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Nominal Section

Site	Date Drawn	Date Checked	Sheet	Job Number
NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD	13/09/2016		1/1	NE3527
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
KHELA (UK) LIMITED			1:50[V]	NE3527.1

FIGURES



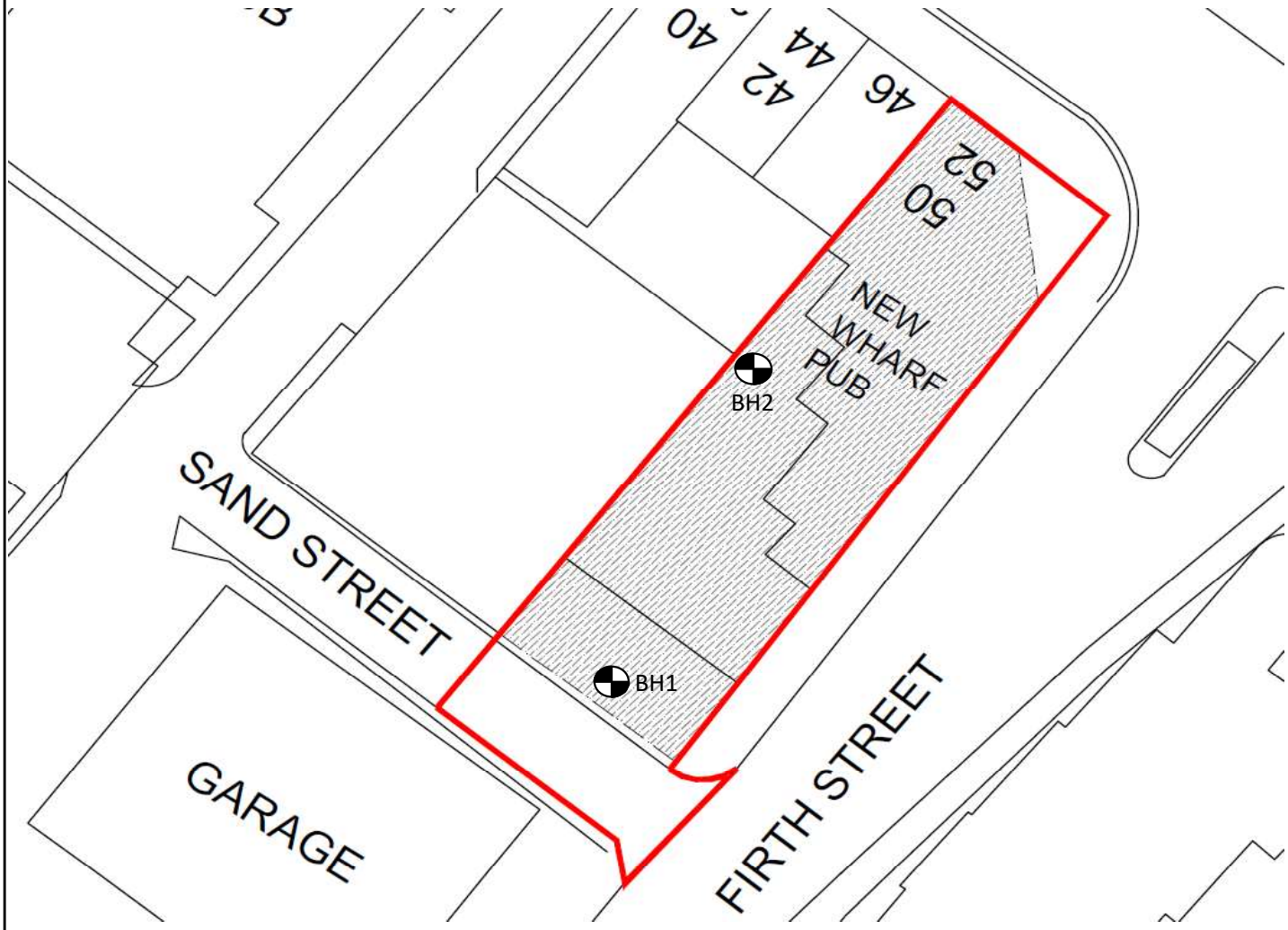
SUB SURFACE

SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS

3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

General Site Location
415010 416411

Site	Date Drawn	Date Checked	Orientation	Job No.
NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD	09/09/2016		N	NE3527
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
KHELA (UK) LIMITED	NM		-	1



SUB SURFACE SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	Borehole Location Plan			
Site NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD	Date Drawn 09-Sep-16	Date Checked	Orientation N	Job No. NE3527
Client KHELA (UK) LIMITED	Drawn By NM	Checked By	Scale _	Figure No. 2

PROPOSED GROUND FLOOR PLAN- (x4 studios- x1 two bed flats- x 3 one bed flats)
SCALE 1:200

PROPOSED FIRST FLOOR PLAN- (x6 studios - x2 two bed flats- x1 one bed flats)
SCALE 1:200

SUB SURFACE
SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Proposed Developments

Site	Date Drawn	Date Checked	Orientation	Job No.
NEW WHARF, 52 WAKEFIELD ROAD, HUDDERSFIELD	-			NE3527
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
KHELA (UK) LIMITED	-		_	3