

PHASE II GEO-ENVIRONMENTAL ASSESSMENT

TEARNE QUARRY, HOLLINGTON

HOLLINGTON STONE QUARRIES LTD

APRIL 2020



SUMMARY TABLE: PHASE II GEO-ENVIRONMENTAL ASSESSMENT		
SITE:	TEARNE QUARRY, HOLLINGTON	
CLIENT:	Hollington Stone Quarries Ltd	
DATE:	APRIL 2020	
REFERENCE:	IV.416.19	
DEVELOPMENT PROPOSAL:	Nine residential houses with associated gardens and parking along with access roads and service/utility infrastructure.-	
HUMAN HEALTH:	Remediation Required	Asbestos containing materials stored in western portion of site requiring removal and verification. Elevated levels of Ground Gas requiring Gas Protection Measures (CS-2).
CONTROLLED WATERS:	No Risk	
FLOOD RISK:	No Risk	
GAS RISK:	Protection Required	Elevated levels of Ground Gas requiring Gas Protection Measures (CS-2)
RADON GAS:	No Protection Required	
FOUNDATIONS:	Piled Foundation into underlying Helsby Sandstone Formation. It is considered likely that additional site works will be required for pile design purposes.	
FLOOR SLABS:	Suspended beam and block recommended	
CONCRETE:	DS-1 and AC-1	
COMMENTS:	Further site investigation required to confirm detail for piled foundations. Asbestos containing materials to be safely disposed of and underlying soils to be validated.	

Written		Scott Spencer MSc BSc Senior Geo-environmental Engineer
Authorised:		Richard Sutton MRICS <i>Director</i>
Date:	April 2020	
Version:	1.1	

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1.0 INTRODUCTION

1.1 PREAMBLE

This Phase II Geo-Environmental Assessment has been produced for Hollington Stone Quarries Ltd to provide a pre-development contamination and geotechnical assessment of the site known as Tearne Quarry, Hollington. The client has planning permission to develop the site with residential housing.

1.2 SITE LOCATION

The site is located approximately within the centre of the linear village of Hollington. The National Grid Reference (NGR) for the approximate centre of the site is SK 055 390. The site location, development proposal and site layout are illustrated in Appendix A.

1.3 PROJECT BRIEF

The brief for the Phase II Geo-Environmental Assessment incorporates:

- A review of the Phase I Desk Study Report No. 74418/57878 conducted by Kiwa Ltd.
- Provide a strategy for, and to implement, a Phase II Environmental and Geotechnical Assessment.
- Development of the Phase II Conceptual Model.
- To provide recommendations to mitigate against environmental risks.
- Provide geotechnical design for the proposed development.

1.4 DATA REFERENCES

- Phase I Desk Study Report No. 74418/57878 (Kiwa Ltd)
- British Geological Survey Online Geological Mapping.
- BRE (2001), BR414: Protective measures for housing on gas-contaminated land.
- BRE (2005), Special Digest 1: Concrete in aggressive ground.
- BRE (2015), BR211: Radon: Guidance on protective measures for new buildings.
- BSI (2013), BS 8576:2013 Guidance on investigations for Ground Gas - Permanent Gases and Volatile Organic Compounds (VOCs).
- BSI (2013), BS 10175:2011+A1:2013 Investigation of Potentially Contaminated Sites – Code of Practice.
- BSI (2015), BS 5930:2015 Code of practice for ground investigations.
- BSI (2015), BS 8485:2015 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
- CIRIA (2007), C665 Assessing risks posed by hazardous ground gases to buildings.
- CIRIA (2014), C733 Asbestos in soil and made ground: a guide to understanding and managing risks.
- CIRIA (2014), C735 Good practice on the testing and verification of protection systems for buildings against hazardous ground gases.
- DoE (1995), Industry profiles.
- EA/DEFRA (2004), CLR11: Model Procedures for the Assessment of Land Contamination.
- EA (2009), Science Report SC050021/SR3, Updated technical background to the CLEA model.
- EA (2015), Version 1.071 Contaminated land exposure assessment (CLEA) tool.
- HSE (2013), L143 Control of Asbestos Regulations 2012. Approved Code of Practice and guidance.
- LQM/CIEH (2009), The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment, 2nd edition.
- NHBC (2007), Guidance on Evaluation of Development Proposals on Sites where Methane and Carbon Dioxide are Present.
- NHBC/EA/CIEH (2008), R&D 66 Guidance for the Safe Development of Housing on Land Affected by Contamination.
- PHE-BGS (2011), Joint Indicative Atlas of Radon in Great Britain.

1.5 LIMITATIONS

This report has been produced in accordance with industry best practice at the time of writing.

Ivy House Environmental Ltd has, in the production of this report, relied upon information provided by third parties. Ivy House Environmental Ltd does not warrant the accuracy of this information and will not be responsible for any opinions which Ivy House Environmental has expressed, or conclusions which it has drawn, in reliance upon information which is subsequently proven to be inaccurate.

All statements and opinions provided in this report have been reported in good faith and are based on the information gained during, and restrictions imposed by, site investigation techniques used at the time. Ivy House Environmental cannot be held responsible for conditions not revealed by the investigation.

This report has been prepared for the sole use of the client and shall not be relied upon or transferred to third parties without the express written consent of Ivy House Environmental. Unauthorised third parties rely upon the information contained within this report at their own risk.

2.0 SUMMARY FINDINGS OF PHASE I REPORT

2.1 SUMMARY

A phase I Desk Study was conducted by KIWA in July 2018. The findings are summarised below;

- The whole site area has been quarried for building stone over a period of at least 100 years and is now backfilled with presumed inert engineered fill.
- An underground storage tank supplying diesel is present on site*
- The surrounding area has seen significant current and historic quarrying for building stone that have been backfilled with a combination of inert, industrial and small volumes of putrescible waste. These may be a source for potential ground gas that could impact the site.
- The site is underlain by the Helsby Sandstone Formation, and is located in a Source protection Zone 3 (Total Catchment).
- The Helsby Sandstone is classified as principal aquifer.
- The site is not in an area that requires Radon Measures to be implemented.
- Potential contaminants of concern include Heavy Metals, Total petroleum Hydrocarbons, PAH's, SVOC/VOCs and asbestos.

* Following conversations between Ivy House and the site owners it has been confirmed that the underground storage tank was instead an above ground that was placed immediately to the east of the garage building that is located along the western edge of the site.

2.2 ADDITIONAL

It is known within the last 25 years that two properties within Hollington have suffered significant damage from ground collapse. One of the affected properties lies approximately 200m to the west of the site.

It is thought that the instability was caused by the backfilling of unrecorded, historic stone quarries with non-engineered materials that have subsequently suffered secondary consolidation and localised subsidence.

3.0 PHASE II FIELDWORK

3.1 INTRODUCTION

The Phase II intrusive investigation was undertaken between the dates 14th February 2020 under the supervision of a suitably qualified Ivy House Environmental engineer and in general accordance with the Code of Practice for Site Investigations BS5930: 2015.

The Phase II investigation incorporated the following:

- The advancing of 7No window sample boreholes to a maximum depth of 7.70mbgl.
- The excavation of 6No trial pits to a maximum depth of 3.60mbgl.
- The analysis of 12No samples for a standard 'CLEA' screening suite and selected site specific determinands
- The analysis of 3No samples for geotechnical design criteria including Water Soluble Sulphate and pH.

Exploratory hole logs are contained in Appendix B.

3.2 RATIONALE

The Phase II investigation has been designed to facilitate an assessment of the general ground conditions across the site, including contaminant sources, pathways and receptors. The investigation has also been designed in consideration of the current site layout and access restrictions, the development proposal and health and safety issues, the rationale behind the location of each exploratory hole is detailed in table 1 below:

Table 1: Phase II Rationale

Hole ID	Location	Notes
TP1, TP2 and TP6	Area of potential above ground fuel tank	TPH/BTEX/MTBE suite
WS1-4, TP3-5, CPT1-3	General grid	CLEA Suite/Gas

3.3 LABORATORY ANALYSIS & TESTING

Selected soil samples were analysed at a specialist environmental laboratory or by field monitoring equipment as detailed in the following sections.

3.3.1 Chemical Analysis

A total of 12No samples of Made Ground were sent for analysis at a UKAS/MCERTS accredited laboratory.

The soil analysis results are contained in Appendix C.

3.3.2 Geotechnical Testing

Three samples of Made Ground were sent to a UKAS accredited laboratory and subjected to Water Soluble Sulphate and pH testing.

The geotechnical test results are contained in Appendix C.

3.3.3 Gas Monitoring and Sampling

Monitoring installations were installed in 4No window sample boreholes; gas monitoring was undertaken using a GA5000 gas analyser on 5No separate visits between the dates of

19/02/20 – 17/04/20. The analyser detects concentration by volume (%v/v) of Methane (CH₄), Carbon Dioxide (CO₂) and Oxygen (O₂) and flow rate and air pressure.

A further visit is required and shall be sent through as an addendum to the report on completion. The gas monitoring results are contained in Appendix D.

4.0 GROUND CONDITIONS

The intrusive investigation has revealed significant thicknesses of Made Ground across the site, generally overlying at depth, the Helsby Sandstone. The Made Ground is associated with the backfilling of historic quarrying. The site specific observations are detailed in the following sections.

4.1 MADE GROUND

Made ground materials were present at a depth range of G.L to >7.70mbgl. Made Ground generally consisted of silty slightly gravelly to gravelly Sand, presumed to represent stone quarry tailings.

4.2 SUPERFICIAL STRATA

Superficial Deposits were encountered along the eastern boundary of the site and generally comprised of weathered Helsby Sandstone Formation, consisting of slightly gravelly SAND.

4.3 SOLID STRATA

Solid strata of the Helsby Sandstone Formation were encountered at 2.8mbgl on the eastern boundary of the site but has remained unproven elsewhere. The Helsby Sandstone Formation generally consisted of weak thinly bedded fine to medium grained Sandstone with occasional gravel.

4.4 FIELD OBSERVATIONS

Table 2 illustrates the pertinent geological and contamination observations made during the intrusive investigation.

Table 2: Fieldwork Observations

Location	Depth/Strata	Observation
TP3	0.50-1.50m/MG	Tyre and wood fragments
TP1, 2 and 6	MG	Fuel bowsers at surface, Plastic pipe at 1.20m (TP2)
TP3 TP5	1-2.50m	Moderate collapse of Holes
WS1	4.70m	Potential void due to volume of backfill material required

Borehole WS1 was located adjacent to the northwest corner of the building located in the centre of the site. WS1 was completed to 4.80m and installed for gas monitoring purposes. The installation of a borehole at this depth would normally require approximately one/two bags of gravel and one bag of Bentonite, together with a 50mm pipe to replace the material removed during drilling. Seven bags of gravel were placed into the hole and were 'lost' before the borehole backfill progressed above 4.70mbgl.

Therefore, it is considered that a void exists below 4.70m in the vicinity of WS1. Due to the nature of historic quarry backfilling, generally end tipped with a lack of mechanical compaction, it is considered that there may be further voids located across the site within the Made Ground.

4.5 GROUNDWATER

Groundwater was not encountered in any of the exploratory holes during the site investigation. The monitoring visits have also not encountered groundwater with the exception of the first monitoring visit at WS2 on 19th February 2020 that recorded a groundwater level of 1.99m. It is considered that this a localised perched water body that may have arisen from the installation and drilling of the borehole.

5.0 GEOTECHNICAL ASSESSMENT

The geotechnical assessment considers the development proposal for 1No block of four, two storey terraced houses with gardens, 4No two storey detached houses and one detached house.

5.1 GEOTECHNICAL LABORATORY TESTING

The geotechnical results presented in Appendix F illustrate Water Soluble Sulphate and pH analysis results of 0.014-0.032g/ISO₄ and 7.2-8.5 respectively.

5.2 FOUNDATION DESIGN & FLOOR SLABS

Piled Foundations

It is considered that a piled foundation solution is the preferred solution for all of the buildings on site due to the depth of unconsolidated Made Ground and potential voids therein.

The depth of the Made Ground has been unable to be proven across the majority of the site. We consider that the piles should be designed to be end bearing and to found on the underlying Helsby Sandstone Formation.

The Helsby Formation was proven along the eastern boundary of the site at 2.50m and consisted of weak to moderately weak sandstone. However, the depth of the Helsby Formation was unable to be proven across the remainder of the site. It is considered that further investigation will be required to assess the depth and strength of the underlying sandstone to enable pile design and installation.

Based on the field strengths of the shallow Helsby Formation a conservative presumed allowable bearing pressure of **450kN/m²** is considered feasible.

Piles should be taken at least five times the pile diameter into the founding strata.

Either bored and cast in situ CFA (continuous flight auger) piles, or driven preformed piling techniques are considered suitable for the ground conditions at the site.

A specialist piling contractor should be consulted for selection of appropriate piling method.

An assessment should be made if driven piles are considered, as these may be subject to excessive noise or vibration which may be unacceptable to neighbouring properties.

If a piled foundation is adopted then a risk assessment will be required to assess the impact of penetrating the significant thickness of Made Ground and potentially creating a pathway through to the underlying Secondary A Aquifer.

Raft Foundations

Due to the presence of deep Made Ground and potential shallow voids within the Made Ground beneath the site, a raft foundation could be adopted.

Due to the low strength of the underlying reworked natural material, reinforcement will need to be provided within the raft design to account for differential settlement. Proof rolling of the sub formation level is also recommended prior to construction of the raft foundation.

Based on the lowest in situ SPT N Value recorded a conservative presumed allowable bearing pressure of **40kN/m²** is considered feasible within the made ground.

Based on the proposed positions of the residential dwellings, deepening due to tree influence should not be required. However, this assessment should be confirmed with a designated structural engineer following an arboricultural survey.

The above assessment should also be reviewed by the appointed structural engineer.

5.3 EXCAVATION & GROUNDWATER CONDITIONS

Groundwater was encountered at depth and therefore should not pose a threat to shallow excavations.

The site investigation has indicated that excavations within the Made Ground, that lies across the site, are liable to collapse at depths greater than 1.0m. Trial pits have indicated that moderate to significant collapses can be expected that may extend up to three times the width of the excavation. Therefore, shoring of service trenches and associated structures is recommended.

5.4 BURIED CONCRETE

Based on the recorded water-soluble sulphate concentrations and pH values it is considered appropriate to adopt a Basic Design Sulphate Class of DS-1, together with an Aggressive Chemical Environment of Concrete (ACEC) of AC-1 should be suitable.

6.0 CONTAMINATION ASSESSMENT

The guidance detailed in section 1.4 has been followed to ensure that the risk posed to identified receptors, as detailed in the conceptual site model, is reported according to accepted compliance criteria.

The Contaminated Land Exposure Assessment (CLEA) guidance and published Soil Guideline Values (SGV) have been incorporated with Generic Assessment Criteria (GAC), for determinands which do not have a published SGV, to provide a competent Tier 1 Assessment.

6.1 HUMAN HEALTH

Concentrations of determinands were not detected above their respective GACs. Therefore, it is considered that there is negligible risk to this receptor.

6.1.1 Asbestos Contamination

Asbestos fibres were not detected in any of the soil samples.

However, Asbestos containing materials (ACMs) were observed along the western edge of the site, to the north of the existing garage. The ACMs comprised of stored corrugated sheeting that were broken and in a poor state of repair. Removal of the ACMs and surface picking should be conducted with subsequent verification sampling of in-situ soils in this area.

6.2 CONTROLLED WATERS

The site is underlain by a Secondary A Aquifer.

No significant contamination was encountered, the risk is therefore considered negligible.

6.2.1 Hydrocarbon Contamination

Ivyhouse Environmental were informed by the Hollington Stone Quarries that an above ground storage tank (AST) was located immediately to the east of the existing garage building on the western edge of the site. Three Trial Pits were excavated to assess the contamination potentially associated with the AST. The investigation was hampered by the location of underground electrical cables, an electricity pole, existing structures and immovable parked vehicles. No Visible or olfactory evidence of contamination was discovered in the trial pits or surrounding area.

Analysis for TPHCWG/BTEX/PAH was undertaken for 4No soil samples from the Trial Pits in the vicinity of the UST; the analysis results are contained in Appendix C and illustrate that concentrations within the area did not exceed the relevant SGV/GACs.

6.2.2 Ground Gas and Soil Vapours

Six ground gas monitoring visits were undertaken at the site as part of the Phase II Investigation. The visits were coordinated to coincide with low and high pressure weather events.

Elevated levels carbon dioxide were found in WS2 with carbon dioxide values close to the threshold of 5%(v/v) in WS3. Low volumes of Methane were also observed in WS2. A summary of the results is presented in Table 3.

Table 3: Ground Gas and Soil Vapour Summary

Sample Location	Methane		Carbon Dioxide		Oxygen	Atmospheric Pressure (mbar)
	Max % (v/v)	Gas flow rate (l/r)	Max % (v/v)	Gas flow rate (l/r)	Min (% v/v)	Min/Max
WS1	0.0	<0.01	0.4	<0.01	20.1	974/1011
WS2	0.8	<0.01	10.7	<0.01	0.3	974/1011
WS3	0.0	<0.01	4.9	<0.01	14.2	974/1011
WS4	0.0	<0.01	0.4	<0.01	20.4	974/1011

The results of the initial gas monitoring are included in Appendix D.

A tentative Gas Screening Value (GSV) has been determined using the maximum recorded flow rate (0.01l/hr) and has been carried out for Carbon Dioxide with the worst value (10.9% by volume) adopted. A GSV for Methane has also been determined using the worst value (0.8%).

Concentrations of carbon dioxide and methane have been compared to the criteria outlined in CIRIA C665 where the gas screening value (GSV) (litres of gas per hour) is calculated.

The GSV is then assessed against the criteria within Table 8.5 of CIRIA C665. In adopting a worst-case assessment, using the highest gas concentration (carbon dioxide) of 10.7% v/v (WS2) and maximum flow of 0.1 l/hr (WS4), a GSV of 0.107 l/hr is derived. Low levels of methane (maximum 0.8%) were also recorded within WS2, GSV of 0.008l/hr.

This preliminary assessment places the site within 'Characteristic Gas Situation 2' (based upon modified Wilson and Card methodology). This is based upon a worst-case scenario, adopting the maximum recorded concentrations, and is skewed by the high gas volumes recorded in WS2.

A CS2 classification requires the use of either a reinforced cast in-situ concrete slab with a 1200g DPM and under floor venting or beam and block or pre-cast concrete with a 2000g DPM /reinforced gas membrane, subject to building control / NHBC approval.

An Amber 1 classification under the NHBC's 'Traffic Light Scheme' also contained within CIRIA C665 requires low-level gas protection measures, comprising a membrane and ventilated sub-floor void to create a permeability contrast to limit the ingress of gas into buildings. Ventilation of the sub-floor void should facilitate a minimum of one complete volume change per 24 hours.

Radon protection measures are not required for the proposed development.

7.0 PHASE II CONCEPTUAL SITE MODEL

The conceptual model for the site considers the development proposal for residential with gardens use and the information gathered during the Phase I and II assessments.

The site's former use as a quarry, now backfilled, and subsequent use as a storage and preparation yard for dressed stone with associated ancillary buildings, workshops and a above ground fuel storage tank are considered in respect to potential contaminative sources.

There are no registered landfills within 250m. However, there are numerous recorded and unrecorded backfilled quarries within 250m of the site that have been backfilled with a mix of quarry tailings, inert waste and low volumes of putrescible materials.

Contaminants of concern for the end user include Asbestos and Ground Gases (CO₂ and CH₄). Laboratory analysis of Made Ground samples illustrates that concentrations of Polycyclic Aromatic Hydrocarbons (PAHs), Total Petroleum Hydrocarbons and BTEX/MTBE are within Tier 1 thresholds for the proposed residential with gardens end use. No evidence of contamination related to the above ground storage tank was noted.

Pathways for the end user of the site include the ingestion of soil and vegetables, direct contact (dermal) with soil and soil dust; ingestion and inhalation of soil dust; inhalation of ground gas and asbestos fibres post removal of the ACM stored on site.

The source of the ground gases is presumed to be from putrescible or organic rich Made Ground that was not encountered during the site investigation

The primary receptors for the site are construction workers and end users of the site (Residents of completed development). The risk posed to human health receptors is considered medium, therefore remediation will be required.

For the environment (controlled waters) the primary receptor is the underlying Principle Aquifer (Helsby Sandstone Formation) underlying the site.

There were no identified contaminants of concern for controlled waters.

The primary pathway for controlled waters is the leaching and vertical migration of contaminants through the vadose zone to the saturated zone.

The risk posed to controlled waters is considered to be negligible as no contaminants of concern have been identified.

The development of the conceptual model is illustrated on Figure 6.1.

Figure 8.1: Phase II Conceptual Site Model

HUMAN HEALTH			
SOURCE	PATHWAY	RECEPTOR	SOLUTION
Asbestos containing materials stored on site. AST previously on site. Potentially contaminated Deep Seated Made Ground	Ingestion of soil and vegetables, direct contact (dermal) with soil and soil dust; ingestion and inhalation of soil dust, inhalation of asbestos fibres.	Construction Workers End Users (Residents)	Removal of Asbestos containing materials & verification sampling.
	Inhalation of soil vapours and ground gas (VOC, Carbon Dioxide, Methane).		Basic PPE for all workers (overalls, gloves, dust/vapour mask if required) and wash facilities/personal hygiene
			Characteristic Situation CS-2 Gas protection measures required.
CONTROLLED WATERS			
Potentially contaminated Deep Seated Made Ground	Leaching and vertical migration through the vadose zone to the saturated zone	Principal Aquifer - Helsby Sandstone Formation	Risk Assessment required to assess the impact to the Secondary A Aquifer if Piled Foundation Solution considered.

8.0 RISK MANAGEMENT & REMEDIATION

Previous sections have quantified the risk posed to identified receptors which, in some instances, require remediation to protect or reduce levels of risk. The following section details measures and recommendations for dealing with risks associated with soil, gas and groundwater contamination in respect to the development proposal of residential housing with gardens.

8.1 REMEDIATION TO PROTECT END USERS

Ground gas protection in accordance with Characteristic Situation 2 (CS-2) are required.

The Asbestos containing materials (ACMs) identified in the western section of the site will need to be removed from site.

The ACMs should be carefully removed, with minimal breakages or other damage to limit fibre release, and transferred to either an asbestos skip or into double-bagged and swan-necked specialist asbestos sacks. The ACMs should be disposed of at a suitably licenced facility.

It is recommended that the material within the vicinity of the stored ACMs is either removed and replaced with clean material or capped with 600mm of a clean imported validated soil.

8.2 REMEDIATION TO PROTECT CONTROLLED WATERS

No remediation is required to protect this receptor. However, a risk assessment will be required if a piled foundation solution is adopted.

8.3 REMEDIATION TO PROTECT CONSTRUCTION WORKERS

All construction workers should be provided with basic PPE (overalls, gloves, dust/vapour mask if required) and wash facilities/personal hygiene facilities.

8.4 REMEDIATION TO PROTECT CONSTRUCTION MATERIALS

No remediation required to protect this receptor.

8.5 WASTE MANAGEMENT

Made Ground and natural strata at the site can be generally classified as non-hazardous waste, or as suitable for use as recovery material without attracting landfill tax.

Additional WAC testing may be required or requested by the designated waste receiver.

9.0 RECOMMENDATIONS

Recommendations for further assessment of the site include:

- Ground gas protection measures (as per CS2) should be installed as specified. Independent verification of the installation is required.
- Asbestos picking; removal and verification sampling.
- Additional drilling works are likely to be required for pile design and installation purposes.
- A risk assessment will be required if a piled foundation solution is adopted to assess the risk to the underlying Secondary A Aquifer.
- Should a raft foundation solution be adopted it is recommended that additional investigation works are undertaken to delineate the void encountered in WS1 and to ensure further voids do not exist within influence of the building footprints

10.0 CONCLUSIONS

The Phase I and Phase II Assessment and the recommendations contained within has illustrated that the proposed development of the site for residential end use poses a risk to end users of the site.

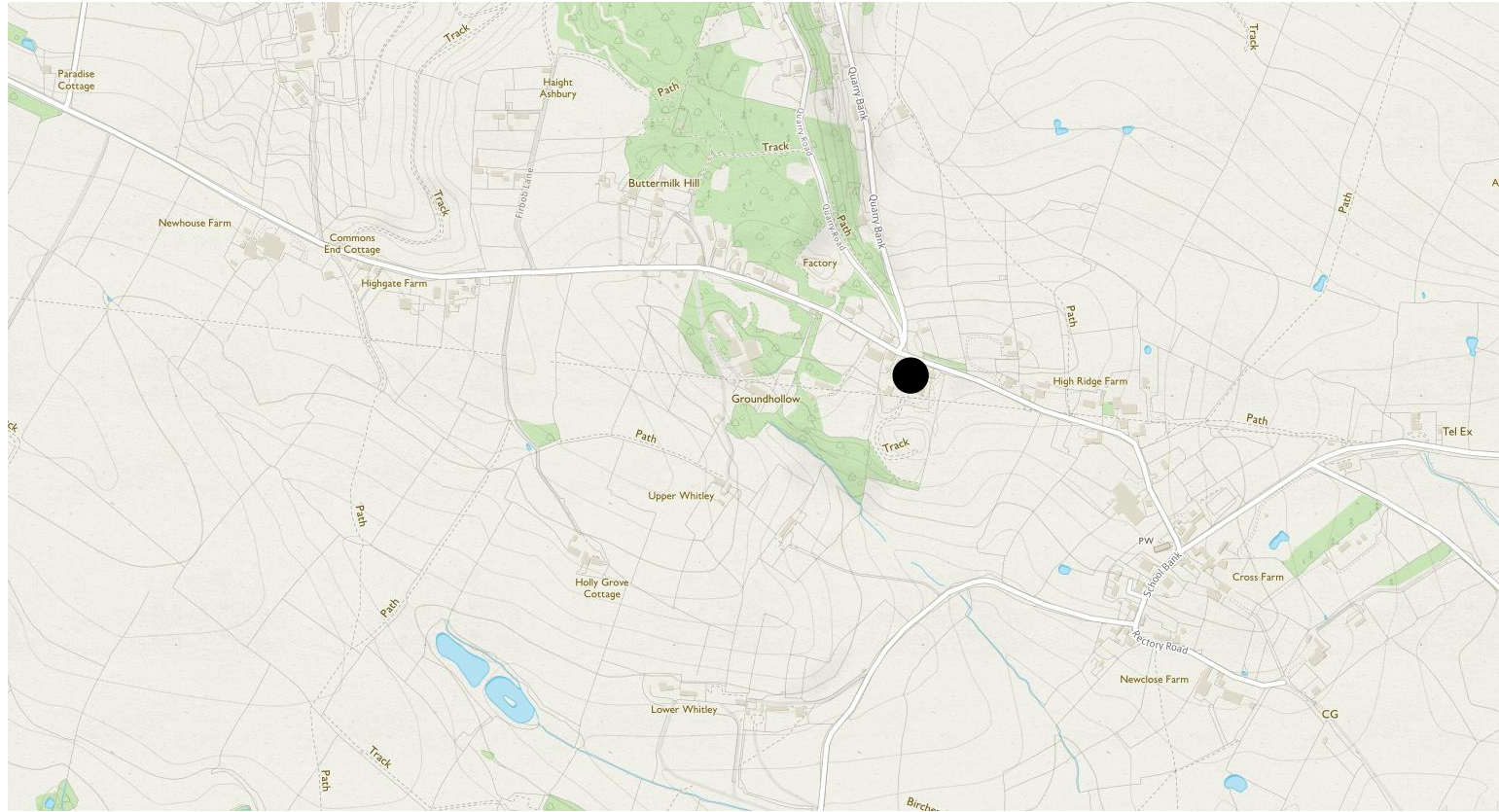
However, if the recommendations of this report are carried out to mitigate or remove all hazards presented in the conceptual model, the site can be made suitable for the proposed use.

Gas protection measures are required due to elevated levels of CO₂ within the deep Made Ground. A CS2 classification requires the use of either a reinforced cast in-situ concrete slab with a 1200g DPM and under floor venting or beam and block or pre-cast concrete with a 2000g DPM / reinforced gas membrane, subject to building control / NHBC approval.

It is considered that either a piled or raft foundation solution could be utilised for the development with a slab design based on the designated gas protection.

APPENDIX A





KEY:



Approximate Site Location



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TITLE:

Site Location Plan

PROJECT:

Tearne Quarry, Hollington

PROJECT No:

IV.416.19

DATE:

04/2020

SCALE:

NTS

DRAWN:

SS

DWG No:

Figure 1

DO NOT SCALE



KEY:

DO NOT SCALE



Scotland Farm, Ockbrook, Derby, DE72 3RX
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TITLE:

Proposed Site Layout

PROJECT:

Tearne Quarry, Hollington

PROJECT No:

IV.416.19

DATE:

04/2020

SCALE:

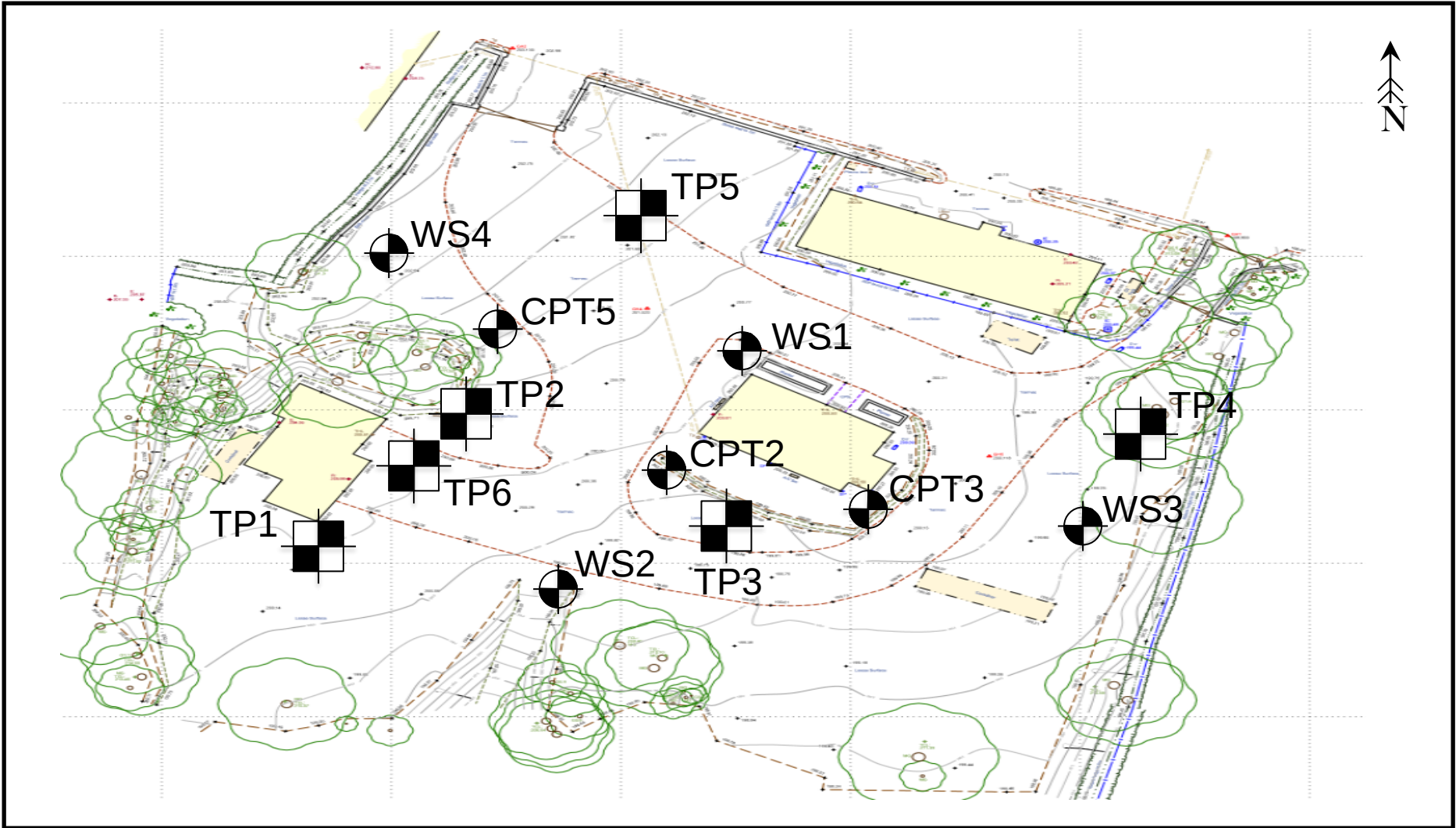
NTS

DRAWN:

SS

DWG No:

Figure 2



KEY:

 Boreholes

 Trial Pits

DO NOT SCALE

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environmental

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TITLE: Exploratory Hole Location Plan		
PROJECT: Tearne Quarry, Hollington		
PROJECT No: IV.416.19	DATE: 04/2020	
SCALE: NTS	DRAWN: SS	DWG No: Figure 3



Asbestos Sheets stored on site



Above Ground Fuel Storage Tank (AST)



Existing Buildings on Site



Quarry to South showing potential depth of Backfilled Quarry

KEY:

DO NOT SCALE



TITLE:

Development Proposal

PROJECT:

Tearne Quarry, Hollington

PROJECT No:

IV.416.19

DATE:

04/2020

SCALE :

NTS

DRAWN :

SS

DWG No:

Figure 4

APPENDIX B



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Excavation Method		Dimensions		Ground Level (mOD)		Client		Job Number	
Trial Pit						Hollington Stone Quarries Ltd		IV.416.19	
		Location		Dates 17/02/2020		Engineer S Spencer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.50	ES				(0.20) 0.20	MADE GROUND: Light brown gravelly sand with some cobbles. Gravels are fine to coarse angular sandstone. Cobbles are sandstone.			
						MADE GROUND: Reddish brown silty slightly gravelly Sand. Gravel is fine to coarse angular sandstone and rounded quartz.			
1.00	B					Black plastic pipe at 1.20m, possible fuel line.			
2.00	ES				(2.80)				
3.00	B				3.00	Complete at 3.00m			
Plan						Remarks			
.	.	.	.	.	.				
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.	.	.	.	.	.	Scale (approx)		Logged By	
						1:50		Figure No.	
								IV.416.19.TP2	

 Scotland Farm, Ockbrook, Derby, DE72 3RX rps@ivyhouseenv.co.uk • www.ivyhouseenv.co.uk • 01332 661 987						Site Tearne Quarry, Hollington		Trial Pit Number TP3	
Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Hollington Stone Quarries Ltd		Job Number IV.416.19	
		Location		Dates 17/02/2020		Engineer S Spencer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.50	D				(0.30) 0.30	MADE GROUND: Very light brown sandy Gravel and Cobbles. Gravel is fine to coarse angular sandstone. Cobbles are sandstone.			
1.00	B				(0.70) 1.00	MADE GROUND: Reddish brown silty gravelly Sand and occasional cobbles. Gravel is fine to coarse angular sandstone and rare rounded quartz. Cobbles are angular sandstone. Rare wood fragments and glass. Locally clayey and dark grey brown. Tyre at 0.50m.			
1.50	D					MADE GROUND: Redish brown very silty Sand with occasional gravel. Gravel is fine to coarse angular veyr weak sandstone and rare rounded quartz. Locally clayey.			
2.50	D				(2.50)	Brick at 3.0m.			
					3.50	Complete at 3.50m			
Plan 						Remarks 1.20m to 2.50m Moderate collapse.			
						Scale (approx) 1:50		Logged By	
								Figure No. IV.416.19.TP3	

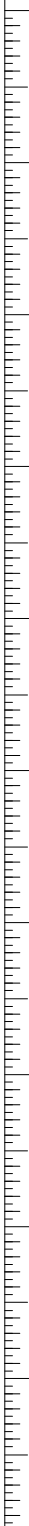
 Scotland Farm, Ockbrook, Derby, DE72 3RX rps@ivyhouseenv.co.uk • www.ivyhouseenv.co.uk • 01332 661 987						Site Tearne Quarry, Hollington		Trial Pit Number TP4	
Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Hollington Stone Quarries Ltd		Job Number IV.416.19	
		Location		Dates 17/02/2020		Engineer S Spencer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
1.00	B				(0.35)	MADE GROUND: Light brown and light greyish brown sandy to very sandy gravel and cobbles. Gravel is fine to coarse angular sandstone. Cobles are sandstone.			
					(0.35)	MADE GROUND: Reddish brown slightly clayey silty slightly gravelly Sand. Gravel is fine to coarse angular sandstone and occasional rounded quartz.			
2.50	B				(0.55)	Relic Topsoil: Dark brown silty gravelly Sand. Gravel is fine to coarse angular sandstone and rounded quartz. Abundant roots.			
					(0.80)	MADE GROUND: Reddish brown slightly clayey very silty slightly gravelly Sand. Gravel is fine to coarse very weak sand and occasional quartz. rare to occasional roots.			
					(0.80)	Possible MADE GROUND: Orangish brown silty gravelly Sand. Gravel is fine to coarse angular sandstone and rounded quartz.			
					(0.80)	Orangish brown to yellowish brown very sandy GRAVEL and COBBLES. Gravel is fine to coarse angular sandstone. Cobbles are sandstone.			
					(0.80)	Weak to moderately weak thinly bedded very light brown, yellowish brown and reddish brown fine to medium grained SANDSTONE with rare fine rounded quartz gravel.			
						Complete at 2.90m			
Plan 						Remarks			
						Scale (approx) 1:50		Logged By	
						Figure No. IV.416.19.TP4			

 Scotland Farm, Ockbrook, Derby, DE72 3RX rps@ivyhouseenv.co.uk • www.ivyhouseenv.co.uk • 01332 661 987						Site Tearne Quarry, Hollington		Trial Pit Number TP5	
Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Hollington Stone Quarries Ltd		Job Number IV.416.19	
		Location		Dates 17/02/2020		Engineer S Spencer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
1.50	D				0.08 0.15 (0.45) 0.60	Tarmac. MADE GROUND: Light brown slightly sandy Gravel. Gravel is fine to coarse angular to subangular limestone. MADE GROUND: Light brown slightly clayey silty slightly gravelly Sand. Gravel is fine to coarse angular sandstone and occasional rounded quartz. MADE GROUND: Orangish brown very gravelly Sand with abundant cobbles and boulders. Cobbles and boulders are sandstone. Boulders up to 0.50m.			
2.50	D				2.60	Complete at 2.60m			
Plan						Remarks 1.0m to 1.50m Slight collapse 1.50m to 2.50m Major collapse.			
						Scale (approx) 1:50		Logged By	
								Figure No. IV.416.19.TP5	

 Scotland Farm, Ockbrook, Derby, DE72 3RX rps@ivyhouseenv.co.uk • www.ivyhouseenv.co.uk • 01332 661 967						Site Tearne Quarry, Hollington		Trial Pit Number TP6	
Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Hollington Stone Quarries Ltd		Job Number IV.416.19	
		Location		Dates 17/02/2020		Engineer S Spencer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
1.00	ES				0.10 (0.20) 0.30	Tarmac MADE GROUND: Greyish brown silty sandy Gravel. Gravel is fine to coarse angular to subangular limestone and sandstone. MADE GROUND: Reddish brown silty to very silty Sand with occasional fine angular sandstone and rare rounded quartz. Locally slightly clayey.			
2.00	ES				(3.30)				
3.00	ES				3.60	Complete at 3.60m			
Plan • • • • • • • • • •						Remarks 			
						Scale (approx) 1:50		Logged By	
								Figure No. IV.416.19.TP6	

 Scotland Farm, Ockbrook, Derby, DE72 3RX rps@ivyhouseenv.co.uk • www.ivyhouseenv.co.uk • 01332 661 967						Site Tearne Quarry, Hollington		Number CPT1		
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client Hollington Stone Quarries Ltd		Job Number IV.416.19		
		Location		Dates 01/02/2020		Engineer S Spencer		Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water
0.00-0.90	SPT(C) N=16		2,5/4,4,4,4							
0.43-1.35	SPT(C) N=26		6,8/9,7,6,4							
0.90-1.80	SPT(C) N=29		4,7/7,8,7,7							
1.35-2.25	SPT(C) N=25		7,4/6,8,7,4							
1.80-2.70	SPT(C) N=15		3,4/7,4,2,2							
2.25-3.15	SPT(C) N=12		2,2/3,3,3,3							
2.70-3.60	SPT(C) N=9		3,3/3,2,1,3							
3.15-4.05	SPT(C) N=8		2,3/2,2,2,2							
3.60-4.50	SPT(C) N=10		4,4/4,2,2,2							
4.05-4.95	SPT(C) N=10		4,5/4,2,2,2							
4.50-5.40	SPT(C) N=10		2,3/2,2,4,2							
4.95-5.85	SPT(C) N=23		2,4/9,7,3,4							
5.40-6.40	SPT(C) N=28		4,4/8,9,7,4							
5.95-6.85	SPT(C) N=15		4,3/3,4,4,4							
6.40-7.40	SPT(C) N=21		4,7/7,4,5,5							
6.95-7.85	SPT(C) N=21		4,7/6,5,5,5							
7.40-7.85	SPT(C) N=17		7,6/5,4,4,4			Complete at 7.40m				
Remarks							Scale (approx)	Logged By	Figure No. IV.416.19.CPT1	
							1:50	ss		

IVY HOUSE environmental Scotland Farm, Ockbrook, Derby, DE72 3RX rps@ivyhouseenv.co.uk • www.ivyhouseenv.co.uk • 01332 661 967						Site Tearne Quarry, Hollington		Number CPT2	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client Hollington Stone Quarries Ltd		Job Number IV.416.19	
		Location		Dates 01/02/2020		Engineer S Spencer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.00-0.45	SPT(C) N=16		1,2/5,5,4,2						
0.45-0.90	SPT(C) 16/0		3,2/4,4,4,4						
0.90-1.35	SPT(C) N=18		4,4/4,4,5,5						
1.35-1.80	SPT(C) N=17		7,5/5,4,4,4						
1.80-2.25	SPT(C) N=21		4,4/4,4,6,7						
2.25-2.70	SPT(C) N=8		4,3/2,2,2,2						
2.70-3.15	SPT(C) N=13		2,2/2,3,4,4						
3.15-3.60	SPT(C) N=18		3,6/6,4,4,4						
3.60-4.05	SPT(C) N=17		4,6/5,4,4,4						
4.05-4.50	SPT(C) N=17		4,4/4,5,4,4						
4.50-4.95	SPT(C) N=18		4,6/6,4,4,4						
4.95-5.40	SPT(C) N=12		4,3/4,3,2,3						
5.40-5.90	SPT(C) N=11		4,4/4,3,2,2						
5.95-6.40	SPT(C) N=11		4,3/2,3,2,4						
6.35-6.80	SPT(C) N=11		4,4/3,2,2,4						
6.90-7.35	SPT(C) N=16		4,7/4,4,4,4						
7.35-7.80	SPT(C) N=7		3,2/2,1,2,2						
7.70-8.15	SPT(C) N=10		4,4/4,2,2,2			Complete at 7.70m			
Remarks							Scale (approx)	Logged By	
							1:50	ss	
							Figure No. IV.416.19.CPT2		

Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client Hollington Stone Quarries Ltd		Job Number IV.416.19	
		Location		Dates 01/02/2020		Engineer S Spencer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.00-0.45	SPT(C) N=20		2,3/5,6,4,5						
0.45-0.90	SPT(C) N=37		7,5/4,13,10,10						
0.90-1.35	SPT(C) N=20		8,7/9,3,4,4						
1.35-1.80	SPT(C) N=6		2,2/2,1,2,1						
1.80-2.25	SPT(C) N=38		4,10/13,13,6,6						
2.25-2.70	SPT(C) N=17		4,5/4,3,6,4						
2.70-3.15	SPT(C) N=50		3,4/4,4,20,22						
						Complete at 3.15m			
Remarks								Scale (approx)	Logged By
								1:50	ss
								Figure No. IV.416.19.CPT3	

 IVY HOUSE environmental Scotland Farm, Ockbrook, Derby, DE72 3RX rps@ivyhouseenv.co.uk • www.ivyhouseenv.co.uk • 01332 661 987					Site Tearne Quarry, Hollington			Number WS1	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client Hollington Stone Quarries Ltd		Job Number IV.416.19	
		Location		Dates 14/02/2020		Engineer S Spencer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.50	D				(1.20)	MADE GROUND: Reddish brown silty slightly gravelly Sand. Gravel is fine to coarse angular sandstone.			
1.00-1.45	SPT N=17		4,3/4,4,5,4		1.20	MADE GROUND: Loose mottled light brown and reddish brown slightly silty gravelly SAND. Gravel is fine to coarse angular sandstone.			
1.50	D								
2.00-2.45	SPT N=6		2,2/2,1,2,1						
2.50	D								
3.00-3.45	SPT N=5		1,2/2,1,1,1		(3.60)				
3.50	D								
4.00-4.45	SPT N=9		6,7/4,3,1,1						
4.50	D								
4.80-5.25	SPT N=50		25/42,8		4.80	Possible Void Complete at 4.80m			
Remarks Possible void at 4.70m. Severn bags of gravel 'lost' at base of hole.							Scale (approx) 1:50	Logged By SS	Figure No. IV.416.19.WS1

 Scotland Farm, Ockbrook, Derby, DE72 3RX rps@ivyhouseenv.co.uk • www.ivyhouseenv.co.uk • 01332 661 987						Site Tearne Quarry, Hollington		Number WS2	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client Hollington Stone Quarries Ltd		Job Number IV.416.19	
		Location		Dates 14/02/2020		Engineer S Spencer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.50	D1				(0.30) 0.30	MADE GROUND: Light brown and light grey brown silty gravelly Sand. Gravel is fine to coarse angular sandstone.			
1.00-1.45	SPT N=21		6,7/7,6,4,4		(1.50)	MADE GROUND: Reddish brown silty slightly gravelly Sand. Gravel is fine to coarse angular sandstone and rare rounded quartz. Medium dense			
1.50	D2				1.80				
2.00-2.45	SPT N=6		2,2/2,1,2,1		(1.50)	MADE GROUND: Soft greyish brown slightly and slightly gravelly Clay. Gravel is fine to coarse angular sandstone, rare brick. Loose			
2.50	D3				3.30				
3.00-3.45	SPT N=2		1,0/1,0,1,0		(1.70)	MADE GROUND: Loose reddish brown slightly clayey very silty slightly gravelly Sand. Gravel is fine predominantly rounded quartz, occasional very weak sandstone.			
3.50	D4				5.00				
4.00-4.45	SPT N=1		1,0/1,0,0,0		(2.70)	Presumed MADE GROUND.			
4.50	D5				7.70				
5.00-5.45	SPT N=1		1,0/1,0,0,0						
5.45-5.90	SPT N=6		0,0/1,1,2,2						
5.90-6.35	SPT N=7		1,1/2,1,2,2						
6.35-6.80	SPT N=16		2,3/4,4,4,4						
6.80-7.25	SPT N=20		4,5/5,5,5,5						
7.25-7.70	SPT N=40		7,8/8,10,11,11						
7.70-8.15	SPT N=50		7,10/11,14,14,11			Complete at 7.70m			
Remarks							Scale (approx) 1:50	Logged By SS	
							Figure No. IV.416.19.WS2		

 Scotland Farm, Ockbrook, Derby, DE72 3RX rps@ivyhouseenv.co.uk • www.ivyhouseenv.co.uk • 01332 661 967						Site Tearne Quarry, Hollington			Number WS3	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client Hollington Stone Quarries Ltd		Job Number IV.416.19		
		Location		Dates 14/02/2020		Engineer S Spencer		Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr	
0.50	D1				(1.20)	MADE GROUND: Reddish brown and greyish brown slightly clayey silty slughtly gravelly Sand. Gravcel is fine to coarse abgular sandstone and rare rounded quartz.				
1.00-1.75	SPT N=7		1/1,2,2,2		1.20	MADE GROUND: Loose mottled reddish brown and greyish brown silty gravelly sand. Gravel is fine to coarse angular sandstone and rounded quartz and quartzite. Predominantly sandstone from 1.60m.				
1.50	D2				(1.00)					
2.00-2.45	SPT N=50		13,12/45,5		2.20	Complete at 2.20m				
Remarks							Scale (approx) 1:50	Logged By		
							Figure No. IV.416.19.WS3			

 Scotland Farm, Ockbrook, Derby, DE72 3RX rps@ivyhouseenv.co.uk • www.ivyhouseenv.co.uk • 01332 661 987					Site Tearne Quarry, Hollington			Number WS4	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD)		Client Hollington Stone Quarries Ltd		Job Number IV.416.19	
		Location		Dates 14/02/2020		Engineer S Spencer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
1.00-1.45	SPT(C) N=15		6,5/7,6,1,1		(0.30) 0.30 (0.70) 1.00	MADE GROUND: Light greyish brown slightly clayey gravelly Sand. Gravel is fine to coarse angular sandstone and occasional rounded quartz. MADE GROUND: Loose Mottled orangish brown and reddish brown silty slightly gravelly Sand. Gravel is fine to coarse angular sandstone and occasional rounded quartz. MADE GROUND: Light greyish brown occasionally reddish brown sandy to very sandy Gravel. Gravel is fine to coarse angular sandstone.	 		
2.00-2.45	SPT(C) N=6		1,1/1,2,2,1						
3.00-3.45	SPT(C) N=9		1,2/2,2,3,2		(4.45)	Locally clayey			
4.00-4.45	SPT(C) N=14		2,4/5,6,2,1						
5.00-5.45	SPT(C) N=15		3,4/6,7,1,1		5.45	Complete at 5.45m			
Remarks							Scale (approx) 1:50	Logged By	
							Figure No. IV.416.19.WS4		

APPENDIX C





Scott Spencer
Ivy House Environmental Ltd
Scotland Farm
Ockbrook
Derby
DE72 3RX

i2 Analytical Ltd.
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Analytical Report Number : 20-88024

Project / Site name:	Tearne Quarry, Hollington	Samples received on:	18/02/2020
Your job number:	IV.416.19	Samples instructed on:	18/02/2020
Your order number:		Analysis completed by:	26/02/2020
Report Issue Number:	1	Report issued on:	26/02/2020
Samples Analysed:	15 soil samples		

Signed: 

Katarzyna Lewicka
Head of Reporting Section

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-88024

Project / Site name: Tearne Quarry, Hollington

Lab Sample Number				1448112	1448113	1448114	1448115	1448116
Sample Reference				TP1	TP6	TP6	TP2	WS4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	3.00	2.00	0.50
Date Sampled				17/02/2020	17/02/2020	17/02/2020	17/02/2020	17/02/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	15	15	15	10
Total mass of sample received	kg	0.001	NONE	0.52	0.52	0.50	0.55	1.2

Asbestos in Soil	Type	N/A	ISO 17025	-	-	-	-	-
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	-	-	8.3
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	-	-	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	-	-	0.020
Organic Matter	%	0.1	MCERTS	-	-	-	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	-	-	-	-
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	-	-	-
Chromium (hexavalent)	mg/kg	1.2	MCERTS	-	-	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-

Analytical Report Number: 20-88024

Project / Site name: Tearne Quarry, Hollington

Lab Sample Number	1448112	1448113	1448114	1448115	1448116
Sample Reference	TP1	TP6	TP6	TP2	WS4
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.50	1.50	3.00	2.00	0.50
Date Sampled	17/02/2020	17/02/2020	17/02/2020	17/02/2020	17/02/2020
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	2.0	< 2.0	< 2.0	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	19	< 10	< 10	11	-

Analytical Report Number: 20-88024

Project / Site name: Tearne Quarry, Hollington

Lab Sample Number				1448117	1448118	1448119	1448120	1448121
Sample Reference				TP1	TP4	WS1	TP3	TP3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				4.50	2.50	0.50	0.50	1.50
Date Sampled				17/02/2020	17/02/2020	17/02/2020	17/02/2020	17/02/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	8.3	8.5	11	14	15
Total mass of sample received	kg	0.001	NONE	1.2	1.0	1.2	1.2	1.3
Asbestos in Soil	Type	N/A	ISO 17025	-	-	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.6	8.5	8.4	7.7	8.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	210	740	170
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.026	0.014	0.016	0.023	0.025
Organic Matter	%	0.1	MCERTS	-	-	< 0.1	1.1	0.2

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	-	< 0.80	< 0.80	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	3.7	5.3	4.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	0.4	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	-	-	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	14	14	22
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	24	20	55
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	7.8	23	9.0
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	7.7	12	19
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	22	20	31
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	19	140	38

Analytical Report Number: 20-88024

Project / Site name: Tearne Quarry, Hollington

Lab Sample Number				1448117	1448118	1448119	1448120	1448121
Sample Reference				TP1	TP4	WS1	TP3	TP3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				4.50	2.50	0.50	0.50	1.50
Date Sampled				17/02/2020	17/02/2020	17/02/2020	17/02/2020	17/02/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 20-88024

Project / Site name: Tearne Quarry, Hollington

Lab Sample Number				1448122	1448123	1448124	1448125	1448126
Sample Reference				WS2	WS2	WS3	TP5	TP2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	0.50	0.50	0.50
Date Sampled				17/02/2020	17/02/2020	17/02/2020	17/02/2020	17/02/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	-
Moisture Content	%	N/A	NONE	14	11	11	16	-
Total mass of sample received	kg	0.001	NONE	1.3	1.1	1.4	1.3	-

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.2	7.8	7.9	8.1	-
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1600	2000	950	180	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.040	0.023	0.016	0.031	-
Organic Matter	%	0.1	MCERTS	1.8	< 0.1	1.1	< 0.1	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.23	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.41	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.33	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.24	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.21	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	1.42	-
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.4	1.8	4.7	4.0	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	3.4	< 0.2	-
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	14	6.5	15	16	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	6.8	54	30	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	20	3.1	53	8.9	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	9.1	13	7.4	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	22	11	20	27	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	47	13	77	15	-

Analytical Report Number: 20-88024

Project / Site name: Tearne Quarry, Hollington

Lab Sample Number				1448122	1448123	1448124	1448125	1448126
Sample Reference				WS2	WS2	WS3	TP5	TP2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.50	0.50	0.50	0.50
Date Sampled				17/02/2020	17/02/2020	17/02/2020	17/02/2020	17/02/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number : 20-88024

Project / Site name: Tearne Quarry, Hollington

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1448112	TP1	None Supplied	0.50	Brown loam and clay.
1448113	TP6	None Supplied	1.50	Brown loam and clay.
1448114	TP6	None Supplied	3.00	Brown loam and clay.
1448115	TP2	None Supplied	2.00	Brown loam and clay.
1448116	WS4	None Supplied	0.50	Brown loam and clay with gravel.
1448117	TP1	None Supplied	4.50	Brown loam and sand with gravel.
1448118	TP4	None Supplied	2.50	Brown loam and sand with gravel.
1448119	WS1	None Supplied	0.50	Brown loam and clay with gravel.
1448120	TP3	None Supplied	0.50	Brown loam and clay with gravel.
1448121	TP3	None Supplied	1.50	Brown loam and clay with gravel.
1448122	WS2	None Supplied	0.50	Brown clay and loam with gravel.
1448123	WS2	None Supplied	1.50	Brown clay and loam with gravel.
1448124	WS3	None Supplied	0.50	Brown clay and loam with gravel.
1448125	TP5	None Supplied	0.50	Brown loam and clay with gravel.
1448126	TP2	None Supplied	0.50	-

Analytical Report Number : 20-88024

Project / Site name: Tearne Quarry, Hollington

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
TP3		S	20-88024	1448120	b	Speciated EPA-16 PAHs in soil	L064-PL	b
TP3		S	20-88024	1448121	b	Speciated EPA-16 PAHs in soil	L064-PL	b
TP5		S	20-88024	1448125	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS1		S	20-88024	1448119	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS2		S	20-88024	1448122	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS2		S	20-88024	1448123	b	Speciated EPA-16 PAHs in soil	L064-PL	b
WS3		S	20-88024	1448124	b	Speciated EPA-16 PAHs in soil	L064-PL	b

APPENDIX D



GROUNDWATER / GAS MONITORING RECORD SHEET

Client:	Hollington Stone Quarries Ltd		Job No:	IV.416.19		Instruments Used:	GA5000		1 OF 6		
Project:	Tearne Quarry		Date:	19-Feb-20		Monitored By:	NEIL SMITH				
Weather:	RAIN		Temp (°C)	1C							
Installation No.	Peak ¹		Steady ²			Total gas flow rate (l/hr)	Atmospheric Pressure (mbar)	Minutes Monitored	Water Depth (mbgl)	Base Depth (m bgl)	Remarks
	CH ₄	CO ₂	CH ₄	CO ₂	O ₂						
	(% vol)	(% vol)	(% vol)	(% vol)	(% vol)						
W/S 01	0.0	0.4	0.0	0.4	20.9	NO FLOW	991	5	DRY	4800mm	
			H-2-S=1							GL	
w/s 03	0.0	2.6	0.0	1.0	19.7	NO FLOW	991	5	1990mm	2150mm	
			H-2-S=1						GL	GL	
w/s 02	0.8	10.0	0.8	10.0	0.3	NO FLOW	991	5	DRY	4300mm	
			H-2-S=0							GL	
W/S 04	0.0	0.3	0.0	0.2	21.1	NO FLOW	991	5	DRY	4500mm	
			H-2-S=1							GL	

¹ The peak reading is the maximum recorded level during a monitoring event.

² The steady reading is the level which remained constant after approximately 2 minutes.

GROUNDWATER / GAS MONITORING RECORD SHEET

Client:	Hollington Stone Quarries Ltd		Job No:	IV.416.19		Instruments Used:	GA5000		2 OF 6		
Project:	Tearne Quarry		Date:	03-Mar-20		Monitored By:	NEIL SMITH				
Weather:	Moderate wind		Temp (°C)	0C							
Installation No.	Peak ¹		Steady ²			Total gas flow rate (l/hr)	Atmospheric Pressure (mbar)	Minutes Monitored	Water Depth (mbgl)	Base Depth (m bgl)	Remarks
	CH ₄	CO ₂	CH ₄	CO ₂	O ₂						
	(% vol)	(% vol)	(% vol)	(% vol)	(% vol)						
W/S 01	0.0	0.4	0.0	0.4	20.2	NO FLOW	974	5	4350mm	4400mm	
			H-2-S=0						GL	GL	
W/S 02	0.8	9.4	0.8	9.4	0.3	NO FLOW	974	5	4700mm	4800mm	
			H-2-S=0						GL	GL	
W/S 03	0.0	4.9	0.0	4.9	14.2	NO FLOW	974	5	2100mm	2150mm	
			H-2-S=0						GL	GL	
W/S 04	0.0	0.2	0.0	0.2	20.2	NO FLOW	974	5	4650mm	4750mm	
			H-2-S=0						GL	GL	
NOTE :-	ALL	GROUND	WATER	FOUND	IS	FROM	HAVING TO	TAKE BUNGS	OUT AS LIDS	WERE FULL OF	
	WATER	FROM	THE VERY HEAVY	RAIN THEY	HAD IN	THE AREA					

¹ The peak reading is the maximum recorded level during a monitoring event.

² The steady reading is the level which remained constant after approximately 2 minutes.

GROUNDWATER / GAS MONITORING RECORD SHEET

Client:	Hollington Stone Quarries Ltd		Job No:	IV.416.19		Instruments Used:	GA5000		3 OF 6		
Project:	Tearne Quarry		Date:	16/3/2020		Monitored By:	NEIL SMITH				
Weather:	Clear		Temp (°C)	6C							
Installation No.	Steady ²					Total gas flow rate (l/hr)	Atmospheric Pressure (mbar)	Minutes Monitored	Water Depth (mbgl)	Base Depth (m bgl)	Remarks
	CH ₄	CO ₂	CH ₄	CO ₂	O ₂						
	(% vol)	(% vol)	(% vol)	(% vol)	(% vol)						
w/s 04	0.0	0.3	0.0	0.2	20.4	-0.2	998	5	DRY	4400mm	
				H-2-S=0						GL	
w/s 03	0.0	0.3	0.0	0.3	20.4	-0.3	998	5	DRY	2200mm	
				H-2-S=0						GL	
w/s 01	0.0	0.2	0.0	0.2	22.4	-0.2	996	5	DRY	4700mm	
				H-2-S=0						GL	
w/s 02	0.7	10.7	0.7	10.3	0.5	-0.3	996	5	DRY	4700mm	
				H-2-S=0						GL	

¹ The peak reading is the maximum recorded level during a monitoring event.

² The steady reading is the level which remained constant after approximately 2 minutes.

GROUNDWATER / GAS MONITORING RECORD SHEET

Client:	Hollington Stone Quarries Ltd		Job No:	IV.416.19		Instruments Used:	GA5000		4 OF 6		
Project:	Tearne Quarry		Date:	30/3/2020		Monitored By:	NEIL SMITH				
Weather:	Clear		Temp (°C)	2C							
Installation No.	Peak ¹		Steady ²			Total gas flow rate (l/hr)	Atmospheric Pressure (mbar)	Minutes Monitored	Water Depth (mbgl)	Base Depth (m bgl)	Remarks
	CH ₄	CO ₂	CH ₄	CO ₂	O ₂						
	(% vol)	(% vol)	(% vol)	(% vol)	(% vol)						
W/S 01	0.0	0.2	0.0	0.2	21.5	0.0	1010	5	DRY	4700mm	
				h-2-s=0							
W/S 02	0.0	5.5	0.0	5.5	10.4	-0.2	1011	5	DRY	4700mm	
				h-2-s=0							
W/S 03	0.0	1.0	0.0	1.0	20.4	-0.3	1011	5	DRY	2200mm	
				h-2-s=0							
W/S 04	0.0	0.4	0.0	0.4	21.4	-0.1	1010	5	DRY	4500mm	
				h-2-s=0							

¹ The peak reading is the maximum recorded level during a monitoring event.

² The steady reading is the level which remained constant after approximately 2 minutes.

GROUNDWATER / GAS MONITORING RECORD SHEET

Client:	Hollington Stone Quarries Ltd		Job No:	IV.416.19		Instruments Used:	GA5000		5 OF 6		
Project:	Tearne Quarry		Date:	15/4/2020		Monitored By:	NEIL SMITH				
Weather:	Clear		Temp (°C)	6C							
Installation No.	Peak ¹		Steady ²			Total gas flow rate (l/hr)	Atmospheric Pressure (mbar)	Minutes Monitored	Water Depth (mbgl)	Base Depth (m bgl)	Remarks
	CH ₄	CO ₂	CH ₄	CO ₂	O ₂						
	(% vol)	(% vol)	(% vol)	(% vol)	(% vol)						
W/S 01	0.0	0.2	0.0	0.2	20.0	0.1	998	5	DRY	4100mm	
				H-2-S=0					GL	GL	
W/S 02	0.4	10.4	0.4	10.4	0.3	0.1	998	5	DRY	5100mm	
				H-2-S=0					GL	GL	
W/S 03	0.0	0.2	0.0	0.2	19.7	0.1	999	5	DRY	2100mm	
				H-2-S=0					GL	GL	
W/S 04	0.0	0.7	0.0	0.7	19.8	0.1	998	5	DRY	4500mm	
				H-2-S=0					GL	GL	
									DRY		

¹ The peak reading is the maximum recorded level during a monitoring event.

² The steady reading is the level which remained constant after approximately 2 minutes.

GROUNDWATER / GAS MONITORING RECORD SHEET

Client:	Hollington Stone Quarries Ltd		Job No:	IV.416.19		Instruments Used:	GA5000				
Project:	Tearne Quarry		Date:	25/4/2020		Monitored By:	Neil Smith				
Weather:	Clear		Temp (°C)	15							
Installation No.	Peak ¹		Steady ²			Total gas flow rate (l/hr)	Atmospheric Pressure (mbar)	Minutes Monitored	Water Depth (mbgl)	Base Depth (m bgl)	Remarks
	CH ₄	CO ₂	CH ₄	CO ₂	O ₂						
	(% vol)	(% vol)	(% vol)	(% vol)	(% vol)						
W/S 01	0.0	0.2	0.0	0.2	20.1	-0.1	1017	5	DRY	4100mm	
				H-2-S=0					GL	GL	
W/S 02	0.4	10.1	0.8	10.1	0.4	-0.1	1017	5	DRY	5100mm	
				H-2-S=0					GL	GL	
W/S 03	0.0	1.1	0.0	1.1	19.6	-0.2	1017	5	DRY	2100mm	
				H-2-S=0					GL	GL	
W/S 04	0.0	0.3	0.0	0.3	19.8	-0.1	1017	5	DRY	4500mm	
				H-2-S=0					GL	GL	

¹ The peak reading is the maximum recorded level during a monitoring event.

² The steady reading is the level which remained constant after approximately 2 minutes.