



Kenworthy Road Worsbrough, Barnsley

Ground Investigation Report

On behalf of Berneslai Homes

Report 140470/GIR2
May 2014

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- A Proposed Development Plan**
- B SYMAS and Coal Authority Reports**
- C Exploratory Hole Plan**
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Executive Summary

SITE INFORMATION	Client	Berneslai Homes
	Site	Kenworthy Road
	Site Location	Kenworthy Road, Worsbrough, S70 4ET. NGR 434565, 405114
	Current Land Use	Disused. Formerly residential however the houses have recently been demolished.
	Proposed Development	Low rise residential.
GROUND INVESTIGATION	Previous Site Investigations	None.
	This site Investigation	Two Rotary Boreholes to 15m bgl with 2 x 50mm standpipes & gas valves to 3m and 4m.
	Monitoring	One gas and groundwater level monitoring visit completed.
	Ground Conditions	Thin Made Ground (1.2m) over mudstone in R03. In R04 a thin layer of clay was encountered to 0.7m bgl underlain by a 0.7m thick coal seam. Groundwater levels recorded between 1.19m and 2.25m bgl during monitoring in April 2014.
GEOTECHNICAL	Foundations	Strip footings suitable. Bearing capacity of 150kPa at 1.2m. Soils are non shrinkable.
	Floor Slabs	Suspended floors recommended.
	Natural Cavities & Mining	None identified.
	Roads	CBR 3%.
	Soakaways	Soakaway drainage unlikely to be feasible.
	Buried Concrete	DS1 & AC1.
LAND QUALITY	Risk Assessment Findings	No unacceptable risks to human health identified. No unacceptable risks to controlled waters identified. Basic radon protective measures are indicated by the current guidance.
	Remediation	None required for land contamination.
	Water Supply Pipework	The investigation has indicated no significant Contaminants of Concern. It is expected that standard pipework will be suitable

1 Introduction

In March 2014 Robson Liddle Ltd (RLL) was commissioned by Berneslai Homes to undertake a ground investigation at Worsbrough, Barnsley.

It is understood that the site is being considered for residential redevelopment. A provisional development layout has been provided by Berneslai Homes (reference drawing number 13-7-1020-PL-A-11 Rev A dated 29th August 2013) and is presented in Appendix A.

This report describes the work undertaken and presents the data obtained together with an evaluation of their significance in relation to the proposed works.

1.1 Scope of Works

The objectives of the investigation were to:

- Establish the environmental setting, including sensitivity in relation to human health, surface water, groundwater and ecological receptors.
- Develop a ground model for the site.
- Qualitatively assess the potential nature and extent of contamination and the environmental risks and liabilities which may be posed to identified receptors (human health and the environment).
- Assess any potential geotechnical risks.
- Provide geotechnical recommendations to assist in construction design.

To address these objectives Robson Liddle proposed the following scope of works:

- An intrusive ground investigation consisting of rotary boreholes, groundwater and gas monitoring and laboratory chemical and geotechnical testing.
- Reporting on findings of the ground investigation and presentation of results.
- Geotechnical recommendations in relation to the proposed development.
- Geo-environmental assessment and interpretation of the ground, ground gas and groundwater conditions.

1.2 Information Sources

During the production of this report the following sources have been reviewed:

- Subsurface North East Factual Report for Kenworthy Road, report reference NE3302
- Coal Authority Mining Report Ref 71000503744003, dated 13 March 2014
- South Yorkshire Mining Advisory Service (SYMAS) Mineral Report, ref M2321/1 dated 20th August 2012
- British Geological Survey Maps
- British Geological Survey website
- Information included on the Environment Agency
- BRE 211 "Guidance on protective measures for new buildings" 2007

1.1 Previous Investigations

Robson Liddle Ltd has not been made aware of any previous investigations which may have been undertaken at this site.

2 Site Location

Address: Kenworthy Road, Worsbrough, Barnsley

Postcode: S70 4ET

National Grid Reference: 434565, 405114

The site is located off Kenworthy Road within the Worsbrough area of Barnsley, approximately 1km south of Barnsley town centre as shown on Figure 1.



Figure 1 Site Location Plan

2.1 Site Description

The site is currently vacant, the former residential buildings having previously been demolished. It occupies an area of approximately 0.06ha and lies at an elevation of 166m AOD.

The site setting is shown on Figure 2.

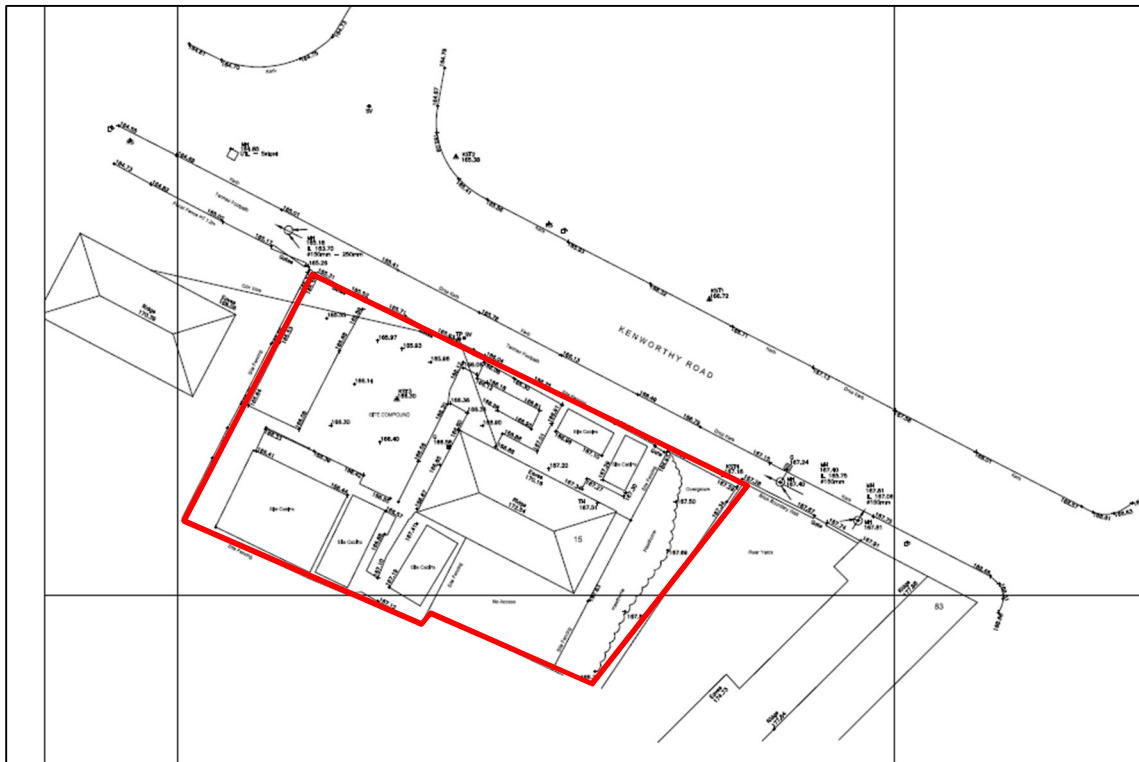


Figure 2 Site Plan

2.2 Surrounding Land-Use

The surrounding area is principally residential with recreational land present to the south.

3 Site Setting

3.1 Geology

The British Geological map for the area (Sheet 87 Barnsley) indicates that the site is underlain by Pennine Middle Coal Measures. There are no superficial deposits shown.

A SYMAS Mining report has been provided and it confirms:

- The site is underlain by the Pennine Middle Coal Measures.
- The Meltonfield Coal Seam (thickness 900mm at 1.4m below ground level, bgl) outcrops to the west of the site.
- There are no known geological faults affecting the site.
- Several mine entries are present in the surrounding area. A number of which are recorded to access the Meltonfield Coal Seam.
- Shallow mine workings are recorded in the area of the shafts. Further mine workings may be present beneath the site.
- The site is stable from deep mining subsidence.

A Coal Authority Report was provided for the site, this confirmed:

- The property is in the likely zone of influence from workings in 8 seams of coal at shallow to 490m depth, and last worked in 1975.
- The property is not in the likely zone of influence of any present underground coal workings.
- There are no known coal mine entries within, or within 20 metres of, the boundary of the property.
- The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.
- There are 3 claim(s) within 50 metres of the property boundary that do not match the property address.
- There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Copies of the SYMAS Mining Report and Coal Authority Report are included as Appendix B.

3.2 Hydrogeology

The Environment Agency classifies the bedrock geology at the site to be a Secondary A Aquifer. The site does not lie within a Source Protection Zone and there are no groundwater abstraction points within 1km of the site

The groundwater is assessed to be of low sensitivity to any potential sources of contamination.

3.3 Land Use History

At the time of the first mapping the site was undeveloped; however a quarry is present to the south east from around 1892. It remained undeveloped until the early 1960s when residential properties forming Kenworthy Road were constructed. It remained unchanged until recently when the residential houses were demolished.

3.4 Landfill Sites

There are no landfill sites within 500m of the site. Therefore the site is not considered to be at risk from landfill gas or leachate migration.

4 Ground Investigation

The intrusive investigation was designed and procured by Robson Liddle. The site works were undertaken by Subsurface North East. The ground investigation comprised two rotary boreholes utilising open holing techniques.

The purpose of the exploratory holes was to provide information on the near surface ground conditions across the site, to investigate the risk from shallow worked coal seams beneath the proposed developments and to allow monitoring wells to be installed for future gas monitoring.

The positions of the exploratory holes were intended to provide a reasonable coverage of the site for an assessment of general site ground conditions. However due to site restrictions, i.e. services, one of the boreholes had to be relocated.

The procedures followed in this site investigation are based on BS 5930:1999 + Annex 2:2010 - Code of Practice for Site Investigations.

The approximate positions of the exploratory holes are shown on the Exploratory Hole Location Plan Drawing 140470-D02 in Appendix C and the exploratory hole records are presented in Subsurface North East's Factual Report which is included in Appendix D.

4.1 Rotary Borehole

Two rotary boreholes were formed to a depth of 20m using open holing techniques and water flush medium in order to assess the presence of intact or worked coal seams.

A detailed description of all strata and groundwater encountered, samples, in situ tests and other pertinent information observed are included on the borehole logs in Subsurface North East's Factual Report which is presented in D.

4.2 Infiltration Testing

In order to determine the permeability of the ground to assess the suitability of soakaways for drainage at the site, infiltration testing was undertaken in one rotary borehole.

The borehole was partially filled with water with the rate of inflow sufficiently rapid so that the pit was filled in a short time. The rate of dissipation was then monitored to obtain a plot of water level over time.

Variations in soil conditions, areas of filled land, preferential underground seepage routes, variations in the level of groundwater and any geological factors likely to affect the long-term percolation and stability of the area surrounding the soakaway were assessed.

The results of the soakaway testing are included in Subsurface North East's Factual Report which is presented in Appendix D.

4.3 Installations

Gas / Groundwater monitoring wells designed to allow monitoring of ground gases and shallow groundwater within the superficial deposits were installed into all four boreholes, as detailed in **Error! Not a valid bookmark self-reference.** The response zone comprised slotted pipe with a 10mm inert gravel surround. The strata above the response zone were sealed with bentonite. Installation details for the monitoring wells are also shown in the relevant borehole logs in Subsurface North East's Factual Report which is presented in Appendix D.

Table 1 Summary of Monitoring Installations

Hole	Base (m bgl)	Dia. (mm)	Response Zone (m bgl)	Headworks
RO3	4.0	50	1.0 to 4.0	Gas valve, flush locked cover
RO4	3.0	50	1.0 to 3.0	Gas valve, flush locked cover

Note: the rotary holes were bentonite grouted from 20m to base of the installation

5 Laboratory Testing

5.1 General

All laboratory testing was scheduled by RLL and is summarised as follows:

5.2 Geotechnical Testing

Samples of soil retained from the exploratory holes were scheduled for geotechnical laboratory testing. The geotechnical analysis was carried out in accordance with BS1377: 1990 'Soils for Civil Engineering Purposes'. The following tests were carried out on selected samples:

- 2 Particle Size Distribution (PSD) tests
- 2 BRE SD1 sulphate suites

The results are presented in Subsurface North East's Factual Report which is presented in Appendix D.

5.3 Contamination Testing

One sample of soil was retained from the exploratory holes and was scheduled for chemical laboratory testing. The soil sample was analysed for the following:

Arsenic	Selenium
Boron (water soluble)	Zinc
Cadmium	pH
Chromium (total and VI)	Total Organic Carbon
Copper	Phenols
Lead	PAH (USEPA 16)
Mercury	TPH (CWG)
Nickel	Asbestos screen

The chemical analysis was undertaken by MCERTS and UKAS accredited laboratory Exova. Certificates of analysis are included in Subsurface North East's Factual Report which is presented in Appendix D.

6 Ground Conditions

6.1 General

The results of this investigation were consistent with the anticipated geology. Made Ground was encountered in both of the exploratory holes overlying the Pennine Middle Coal Measures. Within R4 an intact coal seam was encountered between 0.7m and 1.4m bgl. A summary of the strata encountered is presented in Table 2 and summarised in the sections 6.2 to 6.5. For full details of the strata encountered reference should be made to the exploratory hole logs in Subsurface North East's Factual Report which is presented in Appendix D.

Table 2 Ground Conditions

Stratum	Depth to top (m bgl)	
	RO3	RO4
Made Ground	0.00	0.00
Clay	-	0.50
Coal	-	0.70
Mudstone	1.20	1.40
Base of hole	15.00	15.00
Groundwater	-	7.50

6.2 Made Ground

Made Ground materials were encountered in both locations to depths ranging from 0.50m to 1.20m bgl. The materials generally comprised dark brown clay and gravel.

6.3 Pennine Middle Coal Measures

In R03 weak grading to moderately strong mudstone was encountered beneath the Made Ground at 1.20m bgl. In RO4 coal was between 0.7m and 1.4m bgl, underlain by stiff brown and grey clay and mudstone. .

6.4 Groundwater

A slight seepage was recorded in RO4 at 7.5m bgl during the intrusive works. . Monitoring of groundwater levels within the standpipes installed was undertaken on the 24th April 2014. The results are in Subsurface North East's Factual Report which is presented in Appendix D.

Table 3 Groundwater Monitoring Results

Hole	RO3	RO4
Depth to water	1.19m bgl	2.25 bgl

6.5 Field Observations of Contamination

No visual or olfactory evidence of contamination was encountered.

6.6 Soil Strength

The results of the Standard Penetration Tests (SPTs) gave values of 75 to 81 at around 1.5m in the weathered mudstone.

7 Geotechnical Assessment

7.1 Proposed Development

It is understood that the site is being considered for redevelopment with low rise residential properties with gardens and driveways. Preliminary proposed development layout plans were provided by NPS Barnsley. A copy of this plan is included in Appendix A.

7.2 Summary of Ground Conditions

The investigation identified between 0.5m and 1.2m of Made Ground over moderately strong mudstone. Within one of the boreholes (RO4) an intact coal seam was between 0.7m and 1.4m bgl.

During subsequent monitoring of the standpipes, groundwater was recorded at depths of 1.19m bgl (RO3) and 2.25m bgl (RO3).

7.3 Foundation Design Principles

The two primary factors controlling the performance of foundations are bearing capacity and settlement. Usually the settlement tolerances of the structure are considerably less than the settlement that would be expected as the ultimate bearing capacity of the soils is approached. Therefore it is usually tolerable settlement that dictates the bearing pressure for foundation design. In general, the ultimate bearing capacity is usually divided by a safety factor of 3 for an allowable bearing capacity in order to maintain total settlement within tolerable limits for most structures, which is generally accepted to be 25mm. However, it should be noted that total settlements are usually less than this value as the average actual imposed load will be less than the design load.

7.4 Foundation Design

Based on the ground conditions encountered, conventional spread foundations would be suitable for the proposed structure. These should be taken down through any Topsoil, Made Ground, clay deposits and coal and constructed within the mudstone bedrock. It is envisaged that foundation depths would be in the order of 1.20m to 1.50m bgl. The engineering descriptions and results of the in situ strength testing

(SPTs) suggests that the mudstone bedrock has more than sufficient bearing capacity to support loads typical of low rise residential structures.

The mudstone is non shrinkable and therefore there is no requirement to deepen foundations in accordance with NHBC Chapter 4.2.

Care must be taken where changes in strata are encountered at shallow depth and foundations that span from clay strata to bedrock would need some reinforcement to resist differential settlements.

All foundations should be inspected by a suitably qualified and competent person to ensure that foundations are placed in competent material capable of supporting the intended loads and below any desiccated clay soils.

7.4.1 Floor Slabs

The underlying soils near surface soils consisted of Made Ground, therefore a suspended floor slab is recommended.

Basic radon protection measures are considered necessary. An initial ground gas monitoring visit has been undertaken and this indicates that no additional gas protection measures would be required. For more details see Section 8.4.2.

7.4.2 Buried Structures

Notwithstanding the ground conditions revealed by the intrusive investigations, it is important to note that both foundation and ground floor slab construction could be significantly influenced by pre-existing subsurface construction, associated with the historical development of the site. This could include, for example, foundations, former cellars and underground services, which will need to be fully grubbed out beneath areas of new construction, in addition to other possible buried structures, infilled pits and channels.

7.5 Concrete Protection

Buried concrete classification is based on guidelines provided in BRE Special Digest 1 (BRE, 2005).

Chemical Analysis was undertaken on two soil samples for pH and a total potential sulphate suite (water soluble sulphate, total sulphate and total sulphur).

An assessment for total potential sulphate indicates that the soils are not considered to be pyritic and the design class should be based on soluble sulphates.

The pH values were 5.7 and 8.1 with water soluble sulphate concentrations of 50mg/l and 130mg/l. Therefore it is recommended that a Design Class of DS1 and AC1 should be assumed for buried concrete in accordance with BRE Special Digest 1 assuming mobile groundwater conditions.

7.6 Pavement Design

It is understood that permeable paving parking spaces will be provided to the frontage of the proposed development. No exploratory holes were located in this area but assuming similar ground conditions encountered in the boreholes a thin deposit of Made Ground is anticipated to be present. It is recommended that a basal geo-grid is used beneath a 300mm thick layer of well compacted granular fill. The formation level should be proof rolled to identify any loose or soft spots, which should be removed and replaced with compacted granular fill. The formation level will also need to be protected during inclement weather from deterioration; all slopes should be trimmed to falls to shed rain water and the surface sealed to limit infiltration.

7.7 Excavations

Conventional mechanical backhoe excavators should prove suitable for excavation within the Made Ground and weathered bedrock. The foundations to the existing structures might still remain and may require heavier plant to remove where they interfere with the proposed foundations.

Entry into shallow excavations by personnel should be minimised, and excavation stability should be assessed by suitably qualified and experienced staff and shoring used when required. Entry into deeper excavations should not be permitted unless full support is provided.

Groundwater was encountered as a seepage at 7.5m bgl during the investigation. During a subsequent monitoring visit a water table was recorded at approximately 1.19m to 2.25m bgl. The water levels may well represent perched water seeping into the installation rather than the water table itself.

The low permeability of the natural mudstone strata is likely to result in very low inflow rates and it is considered that groundwater control can be achieved by pumping.

7.8 Soakaway Drainage

Infiltration testing was undertaken in RO3 to give an indication of soil permeability. Over a period of 105 minutes the head of water only dropped 10cm indicating soakaway drainage is unlikely to be feasible at the site.

8 Contamination Risk Assessment

The primary legislative mechanism for contaminated land management in the UK is Part 2A of the Environmental Protection Act, 1990 (EPA). Part 2A was introduced into the EPA under Section 57 of the Environment Act 1995 to help deal with the substantial legacy of land contamination. It focuses on the identification and remediation of land which is in such a condition by reason of contamination that it gives rise to significant harm or the significant possibility of significant harm to certain named receptors, or gives rise to pollution of controlled waters or the likelihood of such pollution. Part 2A applies where there is unacceptable risk, assessed on the basis of the current use and the relevant circumstances of the land. It is not directed to assessing risks in relation to a future use of the land that would require a specific grant of planning permission.

The control of development and land use in the future is the responsibility of the planning system. A fundamental principle of sustainable development is that the condition of land, its use and its development should be protected from potential hazards. The National Planning Policy Framework (NPPF) requires the developer to obtain adequate site information to confirm that the site is suitable for its proposed use.

8.1 Soil Assessment

To ascertain a preliminary assessment of the contaminative nature of the near surface materials across the site, one soil sample was retained during the site investigation works and submitted for laboratory analysis. The chemical analysis was undertaken at Chemtest laboratories. The results are included in in Subsurface North East's Factual Report which is presented in Appendix D.

No elevated concentrations of contaminants were recorded at levels which are considered to present a risk to Human Health of current or future site users for the proposed end use, or construction workers.

8.2 Controlled Waters

The site has historically only been utilised for residential houses therefore the risk of land contamination which would present a risks to controlled waters (groundwater and surface water) is considered to be low.

The results of the soil analysis support this assessment with no significant sources of land contamination identified.

Consequently based on the information available the ground conditions present at the site are unlikely to pose a significant risk to controlled waters.

8.3 Water Pipelines

The current guidance on selection of materials for water supply pipes to be laid in contaminated land is contained in UKWIR Report 10/WM/03/02 (re-issued 2010) which sets out in Table 3.1 of that document threshold values for a selection of organic contaminants that may have a detrimental effect on pipes and fittings. However, the document is for guidance and is not mandatory and has not been adopted universally by all water suppliers.

In addition, various consultative technical bodies have expressed concern on the nature of the document and the methodologies proposed, which would result in significant cost and time implications for all site assessments. It is Robson Liddle Ltd's opinion that the guidance is not appropriate and it has not been followed as part of this report.

The site is brownfield and there is a presumption in the guidance that barrier pipe will be required. The investigation and assessment has indicated no elevated concentrations of contaminants with the potential to attack plastics and as such standard pipework may be suitable for the site. However, this investigation was not designed specifically for water pipe runs and because of conflicting and ambiguous guidance, confirmation should be sought from the water supply company at the earliest opportunity.

8.4 Ground Gas Assessment

8.4.1 Radon

The BRE 211 Radon Atlas indicates that the site is in a radon affected areas as between 1 and 3% of homes are above the action level of 200Bqm^{-3} . Without a site specific Radon Report, it must be assumed that Basic Radon Protection Measures should be incorporated into any development.

8.4.2 Landfill Gas

The risks associated with the ground gases methane (CH₄) and carbon dioxide (CO₂) are assessed using BS 8485:2007 (Code of practice for the characterisation and remediation from ground gas in affected developments) and guidelines from CIRIA 665 (Wilson et al 2007) and the NHBC (Boyle and Witherington 2007).

No current or historical landfills are known to exist within 250m of the site. No organic soils, evidence of buried biodegradable materials were identified on the site. Consequently the risks to end users from explosive or asphyxiating gases is considered low. However, as the site lies within an area where coal resources are present, one round of gas monitoring was undertaken to validate this assumption.

8.4.3 Results

The results of the gas monitoring are presented in Table 4.

Table 4 Gas Monitoring Results - Maximum recorded values

Borehole Ref:		RO3	RO4
Flow	Litres/hr	0.0	0.0
Methane	%	0.0	0.0
Carbon Dioxide	%	0.3	1.0
Oxygen	%	16.6	19.1
Atmospheric Pressure	mbars	1001	1001

Current UK best practice guidance suggests that the ground gas

Current UK best practice guidance suggests that the ground gas assessment and characterisation for a site is dealt with separately for different types of development. In the above guidance:

- ‘Situation A’ covers all forms of development (residential and industrial/commercial developments), other than low rise residential development; and
- ‘Situation B’ is defined as the specific development of low-rise (one to three storeys in height) housing with beam and block floors, vented sub-floor void and gardens.

Based on our understanding of the likely redevelopment of the site, Situation B would be appropriate.

For Situation B the NHBC have developed a characterisation system specific to low-rise housing development with a clear ventilated underfloor void. This is a risk-based approach that is designed to allow an identification of gas protection for a low-rise housing development by comparing the measured gas emission rates to generic “traffic lights” scenarios. The calculations need to be carried out for both methane and carbon dioxide, and the worst case adopted in order to establish the appropriate protection measures.

For methane, a maximum concentration of <0.1% was recorded with a maximum flow rate of <0 l/hr, giving a methane GSV of <0.001 l/hr. It is considered that “Green” situation would be appropriate.

For carbon dioxide, a maximum concentration of 1.0% was recorded with a maximum flow rate of <0 l/hr, giving a carbon dioxide GSV of <0.001 l/hr. It is considered that “Green” situation would be appropriate.

8.5 Site Conceptual Model

Following the generic quantitative risk assessment, a summary of the potential pollutant linkages identified for the site is presented in the Site Conceptual Model in Table 5.

Table 5 Site Conceptual Model

Potential Source and Pollutant	Pathway	Receptor	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.	
Geochemistry of underlying soils and made ground at the site. No sources identified	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Human Health – future users of the site e.g. residents and visitors.	Unlikely – no on-site sources of contamination identified.	Probability: Unlikely Consequence: Medium Magnitude: Low Risk	
		Human Health – Construction workers	Unlikely – no on-site sources of contamination identified.	Probability: Unlikely Consequence: Medium Magnitude: Low Risk	
	Indirect Contact - Vapour inhalation.	Human Health – future users of the site e.g. residents and visitors.	Unlikely – limited due to anticipated absence of on-site sources of contaminants with potential to generate vapour.	Probability: Unlikely Consequence: Low Magnitude: Low Risk	
		Human Health – Construction workers		Probability: Unlikely Consequence: Low Magnitude: Low Risk	
	Leaching and percolation.	Controlled Waters – groundwater (Secondary A Aquifer)	Unlikely – limited due to anticipated absence of on-site sources of contamination and low permeability of underlying strata (mudstone).	Probability: Unlikely Consequence: Medium Magnitude: Low Risk	
	Groundwater migration & run-off to surface waters carrying entrained sediment or diffuse contamination	Controlled Waters – No surface waters within 500m of the site.	Unlikely – no on-site sources of contamination identified.	Probability: Unlikely Consequence: Low Magnitude: Low Risk	
	Direct contact and/or leaching (inc sulphate, pH).	Buildings and Services – On site buildings and/or structures impacted by ground conditions	Unlikely – underlying geology not expected to be pyritic.	Probability: Unlikely Consequence: Medium Magnitude: Low Risk	
	Plant uptake.	Ecology - existing trees and landscaping on site.	Unlikely – No protected ecosystems on or in the vicinity of the site.	Probability: Unlikely Consequence: Low Magnitude: Low Risk	

Potential Source and Pollutant	Pathway	Receptor	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.	
Potential Geochemistry of underlying groundwater.	Lateral movement of groundwater	Controlled Waters – groundwater (Secondary A Aquifer)	Unlikely – limited due to anticipated absence of on-site sources of contamination and low permeability of underlying strata (mudstone).	Probability:	Low
		Controlled Waters – No surface waters within 500m of the site.	Unlikely – no on-site sources of contamination identified.	Consequence:	Medium
Ground gases. – see Section 8.3 for details	Permeation through ground and intrusion into buildings and structures on site.	Human Health – future users of the site e.g. residents and visitors.	Unlikely – no on-site sources of contamination identified. Basic radon protection measures are required.	Magnitude:	Low Risk
				Probability:	Low
				Consequence:	Low
				Magnitude:	Low Risk

8.6 Material Reuse

Based on the GQRA carried out the soil sampled does not pose a potential risk to human receptors and would be suitable for re-use.

The re-use of on-site soils may be undertaken either under the Environmental Permitting Regulations 2007 (EPR), in which case soils other than uncontaminated soils are classed as waste, or under the CL:AIRE Voluntary Code of Practice (CoP) which was published in September 2008 and is now widely accepted as an alternative regime to the EPR.

Under the EPR, material that is contaminated but otherwise suitable for re-use is also classified as waste and its re-use should be in accordance with the Environmental Permitting Regulations 2007 (EPR).

Under the CL:AIRE Voluntary Code of Practice (CoP) materials excavated on-site are not deemed contaminated if suitable for re-use at specified locations or generally within the site. Material that may have been classified as hazardous waste under the EPR may be re-used. The CoP regime requires that a 'Qualified Person' as defined under the CoP reviews the development of the Materials Management Plan, including review of Risk Assessments and Remediation Strategy/Design Statement together with documentation relating to Planning and Regulatory issues, and signs a Declaration which is forwarded to the Environment Agency and which confirms compliance with the CoP.

Based upon the data obtained from the ground investigation there would not be a requirement to take material off-site as long as a suitable Materials Management Plan (MMP) was in place.

9 Limitations and Uncertainties

9.1 General

This report has been prepared by Robson Liddle with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the Client.

The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true representative data with respect to site conditions. The information reported herein is based on the interpretation of data collected during the site investigation, pertaining specifically to the soil samples retained from the identified locations. Should additional information become available that may influence the opinions expressed in this report, Robson Liddle reserves the right to review such information and, if warranted, to alter the opinions accordingly.

The evaluation and conclusions do not preclude the existence of other site conditions and contamination, which could not reasonably have been revealed by the site investigation works undertaken at the time of writing. This report should be used for information purposes only and should not be construed as a comprehensive characterisation of all site conditions or potential contaminants.

This report has been prepared solely for the use of the client, and may not be relied upon by other parties without written consent from Robson Liddle.

Robson Liddle disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

10 General Notes

This report will be prepared for the exclusive use of the client named in the document and copyright will subsist with Robson Liddle Limited. Prior written permission must be obtained to reproduce all or part of the report. It will be prepared on the understanding that you will disclose its contents to parties directly involved in the current investigation, preparation and development of the site. Further copies may be obtained with the client's written permission from Robson Liddle Limited with whom a master copy of the document will be retained.

The report and /or opinion will be prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to us at the time of your enquiry. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Robson Liddle Limited. The assessment of the factual data will be provided to assist the client and his Engineer and/or advisors in the preparation of their designs.

The report will be based on the ground conditions encountered in the exploratory holes together with the results of field and laboratory testing in the context of the proposed development. There may be special conditions, appertaining to the site, however, which may not be revealed by the investigation, and which may not be taken into account in the report.

Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical data would be required to provide discussion and recommendation appropriate to these methods.

The accuracy of the results reported will depend upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristic of the strata as a whole. Where such measurements are critical, the technique of the investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the company where necessary.

Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on possible presence of a feature based on either

visual, verbal, written, cartographical, photographic or published evidence, this will be for guidance only and no liability can be accepted for its accuracy.

Ground conditions should be monitored during the construction of the works and the recommendations of the report re-evaluated in the light of these data by the supervising geotechnical engineers.

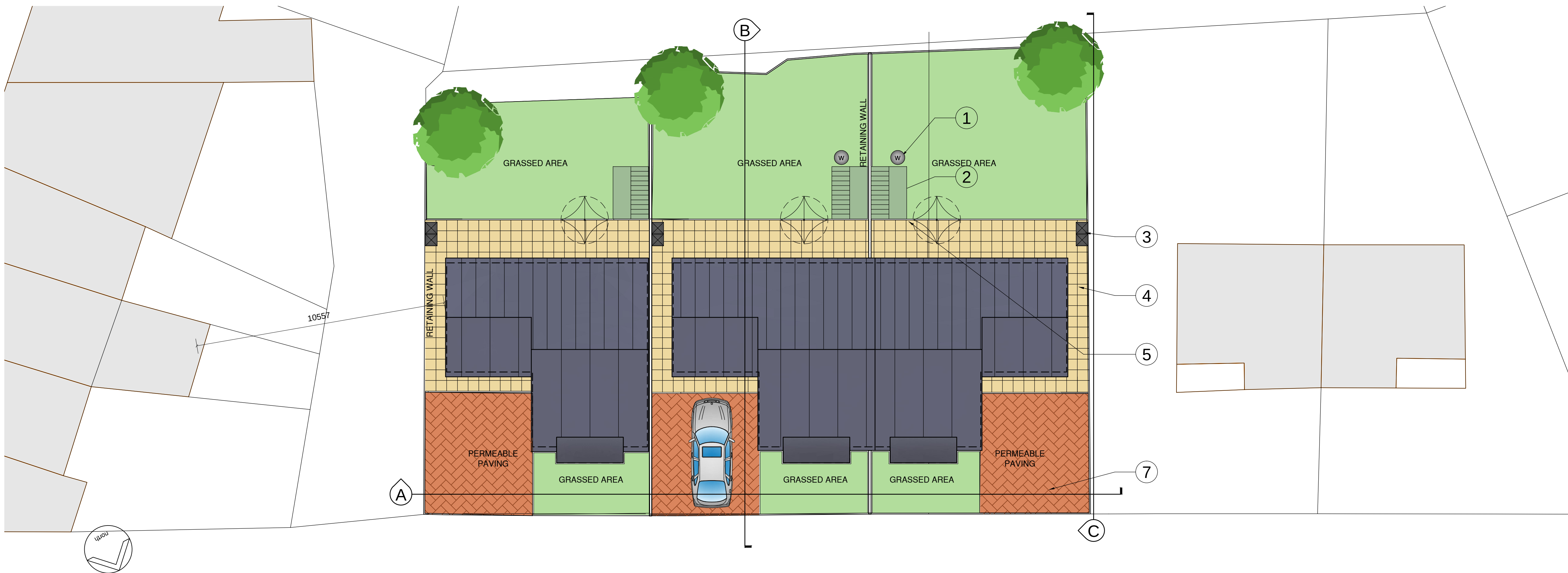
Any comments on groundwater conditions will be based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of the boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.

Unless specifically stated, the investigation will not take into account of possible effects of mineral extraction.

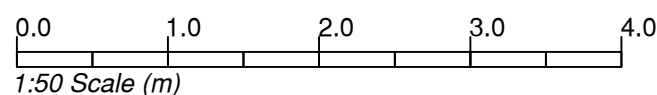
The economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical considerations hence its evaluation will be outside the scope of the report.

Appendix A

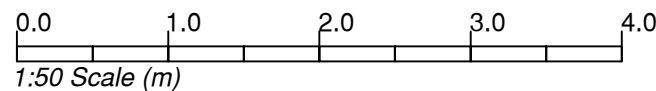
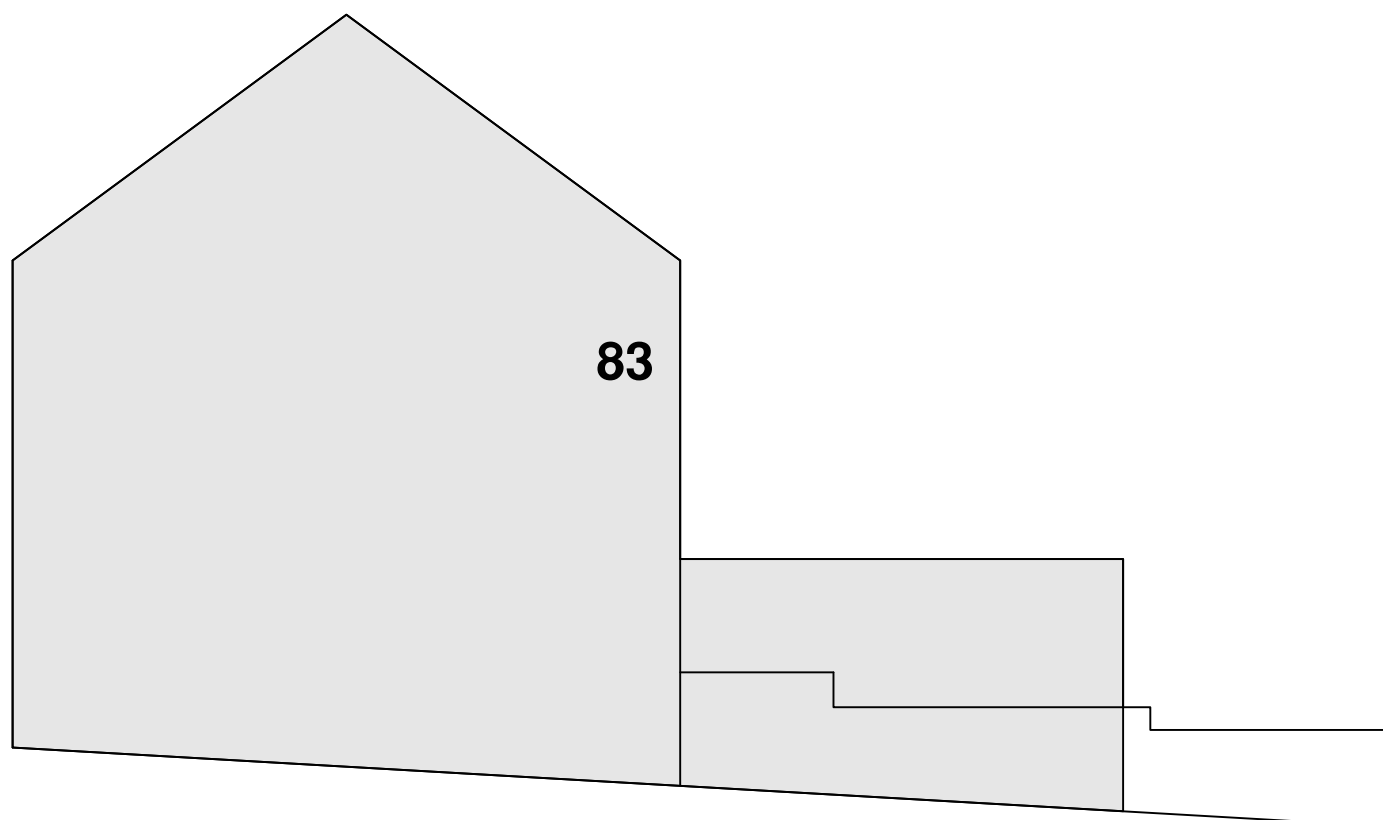
Proposed Development Plan



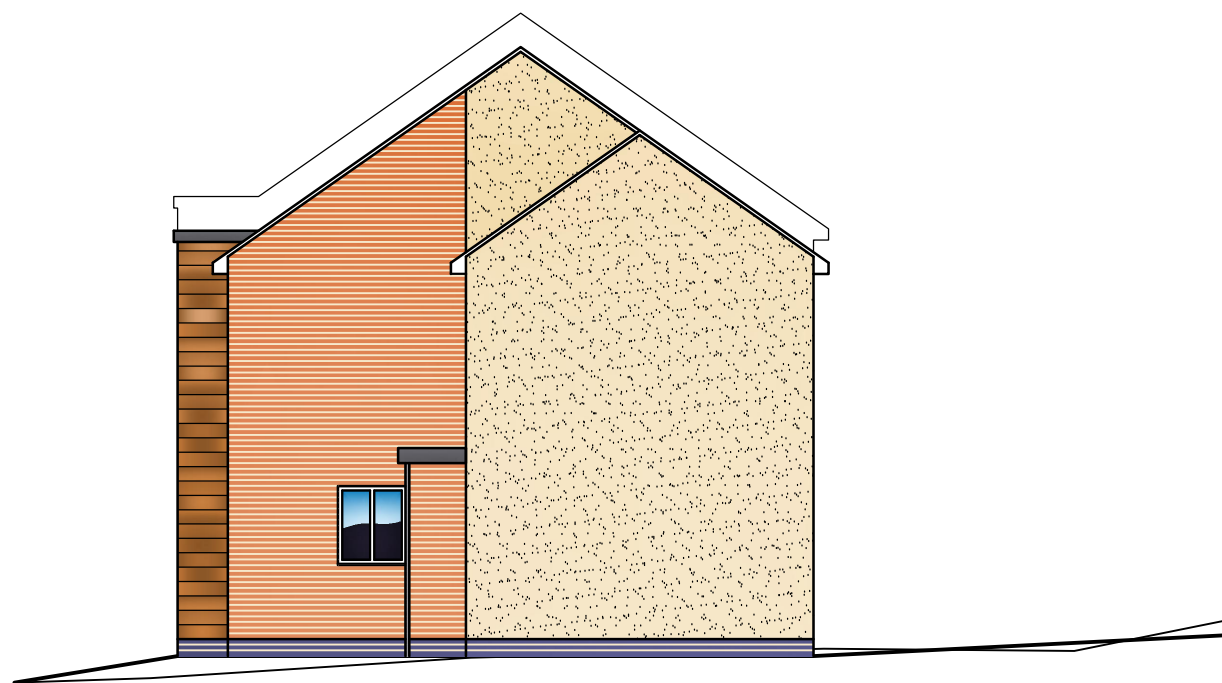
SITE PLAN



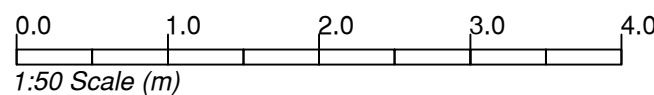
KENWORTHY ROAD



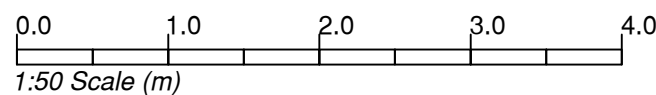
SITE SECTION A-A



SITE SECTION C-C



SITE SECTION B-B



NOTES:

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This drawing may not be reproduced in any form without prior written agreement.

Do not scale from the drawing, use written dimensions only.

- 1 Rainwater Harvesting tank
- 2 Garden Shed
- 3 Wheelie Bins
- 4 450 x 450mm Paving Flags
- 5 Rotary Clothes Dryer
- 6 Tarmac
- 7 Permeable block paved drives

First plot mirrored and street scene extended to show adjacent properties as per planner comments.

REVISD BY: LS DATE: 02/10/2013 CHECKED BY: LK DATE: 02/10/2013

SCALE BAR

PURPOSE OF ISSUE

FILE STATUS CODE

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A1

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Newtown, NPT 23PH, Tel: 01532 750001 Fax: 01532 750001
Other Office locations can be found on our website - www.nps.co.uk

Property Design and Management Services

CLIENT
Berneslai Homes

PROJECT
**HSG 4924 - Highstone Road & Kenworthy Road
Worsborough Common
Social Housing Development**

TITLE

**Kenworthy Road Site GA Plan
& Site Sections**

SCALES DATE DRAWN CHECKED
1:100 29/08/2013 LS

FILE / DRAWING NAME
PROJECT NR
13-7-1020

ZONE	LEVEL	TYPE	ROLE	UNIQUE NR	REV CODE
-	-	PL	A	011	A

Date Plotted: 11 March 2014 15:59:03

Appendix B

SYMAS and Coal Authority Reports

MINERAL REPORT



Date: 20th August, 2012

My Ref: PJ/M2321/6

CONFIDENTIAL

LAND AT HIGHSTONE ROAD/KENWORTHY ROAD, WORSBOROUGH COMMON

SITUATION

The land under consideration for housing development is shown edged orange on the attached drawing no M2321/6A.

GEOLOGICAL INFORMATION

Geological records indicate that the sites are underlain by middle coal measures mudstones, siltstones and sandstones. The strata generally dips to the east at a rate of around 1 in 12.

The Meltonfield Coal Seam (thickness 900 mm to 1400 mm) outcrops to the west. The coal seam will therefore be present at a shallow depth beneath the land.

There are no known geological faults affecting the sites.

MINING

Shallow Workings

Several mine entries are present in the surrounding area as shown on the attached drawing. A number of these shafts accessed the Meltonfield Coal Seam. Shallow mineworkings are recorded in the area of the shafts. Further shallow mine workings may be present beneath the land.

It is therefore recommended that a borehole site investigation be undertaken on the development plots to prove the position, condition and thickness of the Meltonfield coal seam. Where workings are proved within a critical depth of the surface, stabilisation works will be necessary.

Suitable gas monitoring should also be undertaken to check for the presence of fugitive mine gases.

Deep Mineworkings

The land has been affected by mineworkings several coal seams in the past. Any movement at the surface should be complete and as the site now lies remote from the presently active coalfield no future mining should occur.

FORMER LAND USES

The relevant Ordnance Survey Sheets have been checked and there are no indications of any previous land use which may give rise to contamination issues.

LANDFILL

The site does not lie within 250 m of a known landfill site, as indicated on the current Borough Landfill Site Map.

Tel: (01226)772689
Fax: (01226)772688
E-mail: symas@barnsley.gov.uk
Website: www.barnsley.gov.uk/symas



CONCLUSIONS

1. The site is stable from the deep mining subsidence aspect and should remain so in future years.
2. Shallow mine workings in the Meltonfield Seam have been proved in the general area and it is possible that further workings could be present at a critical depth beneath the plots. It is therefore recommended that a borehole site investigation is undertaken in each of the plots to determine the depth, condition and thickness of the Meltonfield Seam and the existence, or otherwise, of any shallow mine workings. Boreholes to a depth of 15 m would be recommended; the results of this exercise would determine whether further remedial measures may be required to ensure the future stability of any new development.

If any unrecorded shafts etc. are encountered during development works, these should be reported to the Coal Authority and will require appropriate treatment.

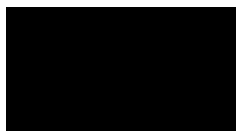
Consultation with the Coal Authority is required prior to any investigation or operations that involves entry into any coal or mines of coal, including coal mine shafts, adits and workings. The Documentation which supports the Coal Authority's Permissions procedures can be viewed at:
www.coal.gov.uk/services/permissions/index.cfm.

3. The presence of fugitive gases should be adequately investigated and it is recommended that monitoring in respect of fugitive gases should be undertaken during all site investigation and excavation works. Precautions against fugitive gases may need to be incorporated into future development.

THIS REPORT IS BASED ON AND LIMITED TO THE RECORDS IN THE POSSESSION OF SYMAS AT THE TIME THE ENQUIRY IS ANSWERED.

Copyright in this mineral stability report belongs to SYMAS. All rights are reserved and unauthorised use is prohibited. Copyright is not transferred to external parties by possession of this report, however, those for whom the report is compiled have the right to use it.

Report prepared by P. James 20th August, 2012.



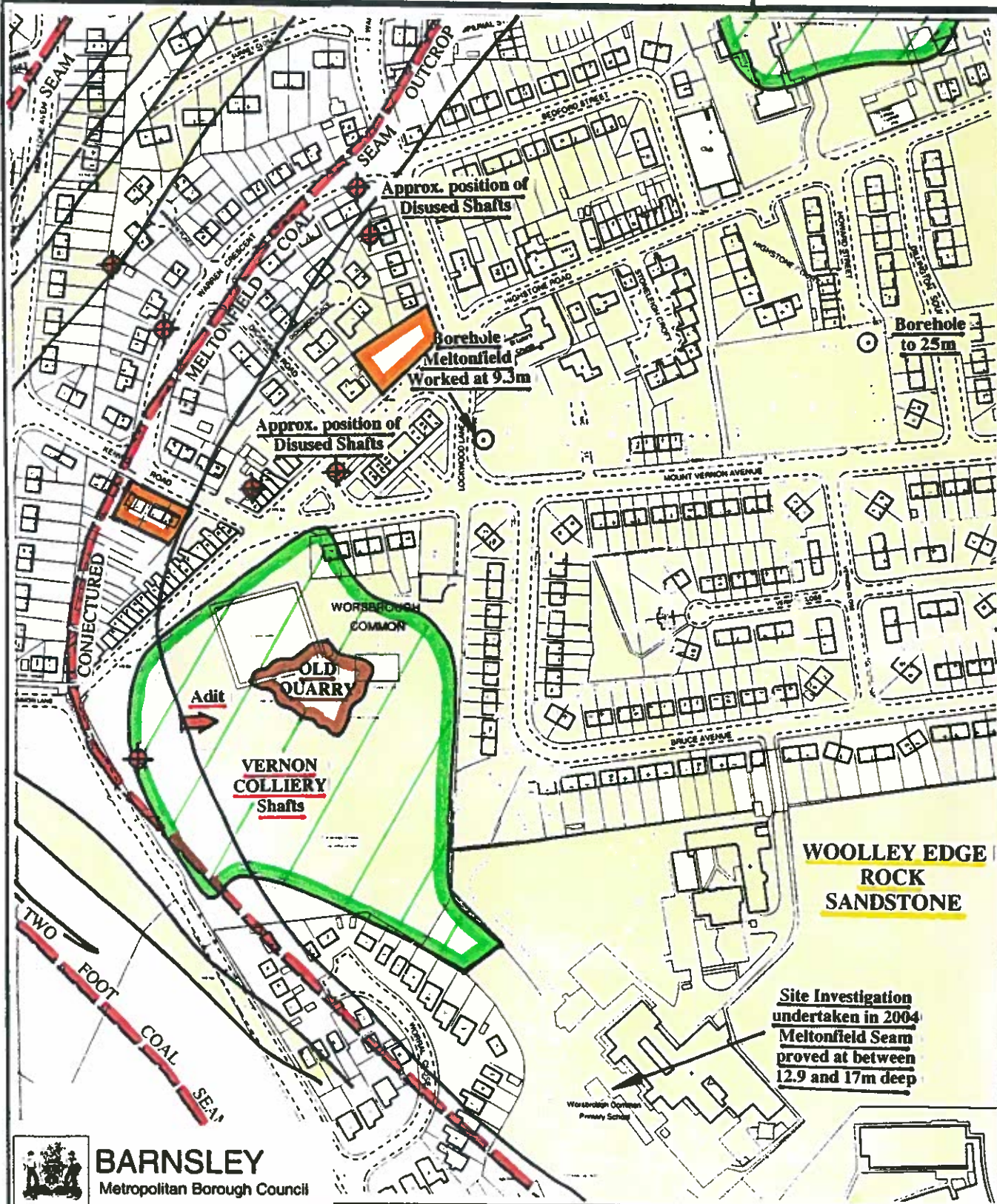
P. James,
Principal Mining Engineer.

DRAWING TITLE

DRAWING NO.

**LAND AT HIGHSTONE ROAD/KENWORTHY ROAD
WORSBOROUGH COMMON**

M2321/6A



BARNSLEY
Metropolitan Borough Council

SCALE
1:2500

DATE
20.8.12

**SOUTH YORKSHIRE MINING
ADVISORY SERVICE**

O.S REFERENCE
SE 3405

DRAWN BY
AS

CHECKED BY
RT

P. JAMES BSc (Hons)
PRINCIPAL MINING ENGINEER

**THE COAL AUTHORITY
200 LICHFIELD LANE
MANSFIELD
NOTTINGHAMSHIRE
NG18 4RG**

Our reference: **71000503744003**
Your reference: **9014**
Date of your enquiry: **13 March 2014**
Date we received your enquiry: **13 March 2014**
Date of issue: **13 March 2014**

This report is for the property described in the address below and the attached plan.

Non-Residential Coal Authority Mining Report

SITE AT, KENWORTHY ROAD, WORSBROUGH, BARNSELEY,

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 8 seams of coal at shallow to 490m depth, and last worked in 1975.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

Coal mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast coal mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal mining subsidence

There are 3 claim(s) within 50 metres of the property boundary that do not match the property address. These are shown on the attached plan.

The Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

If further subsidence damage claims information is required in addition to that provided in this report, the Authority need to manually search their records. For further advice on how to order this additional information visit www.groundstability.com or telephone 0845 7626 848.

Mine gas

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of support

The property is not in an area for which a notice of entitlement to withdraw support has been published.

The property is not in an area for which a notice has been given under section 41 of the Coal Industry Act 1994, revoking the entitlement to withdraw support.

Working facilities orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to owners of former copyhold land

The property is not in an area for which a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Comments on Coal Authority information

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006. The Coal Authority owns the copyright in this report. The information we have used to write this report is protected by our database right. All rights are reserved and unauthorised use is prohibited. If we provide a report for you, this does not mean that copyright and any other rights will pass to you. However, you can use the report for your own purposes.

Location map



Approximate position of property



Enquiry boundary

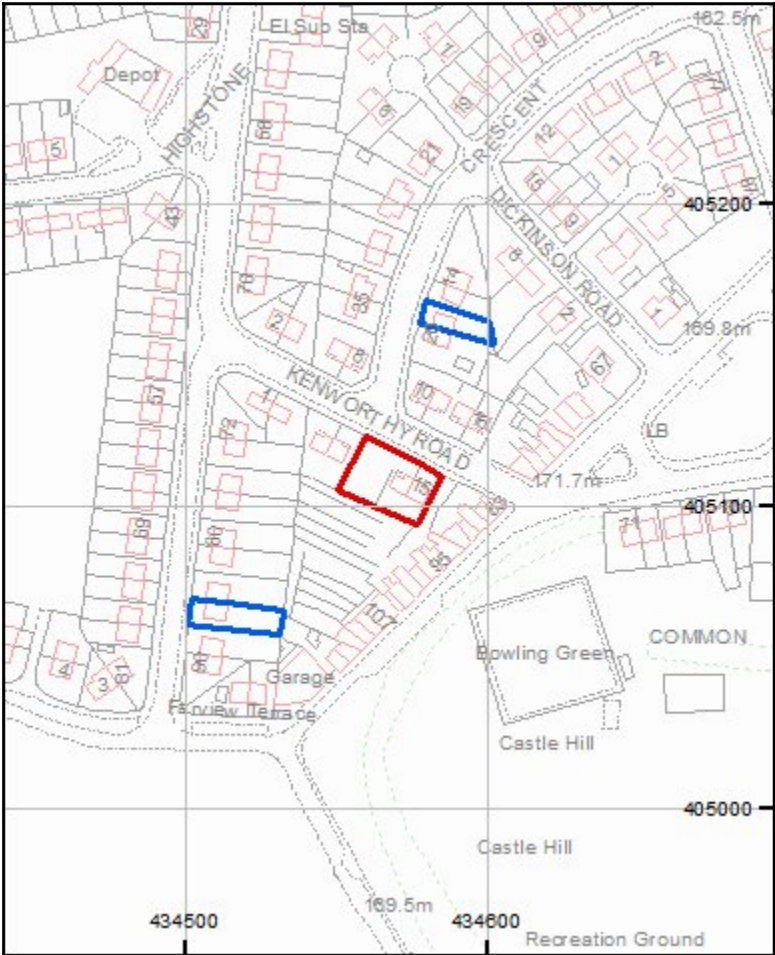
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Key

Approximate position of enquiry boundary shown



Coal Claims



Appendix C

Exploratory Hole Plan

Appendix D

Subsurface North East Report



Site : KENWORTHY ROAD, BARNSELEY, SOUTH YORKSHIRE Client : BARNSELEY MBC Engineer: NPS BARNSELEY LTD	Job Number NE3302
	Sheet 1 / 1

Produced by the GEOTECHNICAL DATABASE SYSTEM (GEODASY) (C) all rights reserved

Machine : BERETTA

Flush : WATER

Core Dia: mm

Method : ROTARY OPEN HOLE

Casing Diameter

95mm to 1.40m

Location

AS PLAN

Ground Level (mOD)

Dates
10/04/2014

Client

BARNESLEY MBC

Engineer

NPS BARNSELY LTD

**Job
Number**
NE3302

Sheet
1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00-0.20					B		(0.20)	MADE GROUND: brown sand and clay.			
0.20-0.50					B		(0.30)	Dark brown slightly gravelly sandy CLAY (possible made ground).			
0.60					B		(0.50)				
0.75					D		(0.70)	Very weak completely weathered brown silty CLAY and lithorelicts of siltstone.			
0.90					D		(0.95)	Very weak dark grey completely to highly weathered very silty COAL with silty bands.			
1.40-1.85					2.2/2.4, 19, 50 SPT N=75		(1.40)	Dark grey COAL.			
1.40-1.85					D		(1.00)	Stiff brown and grey CLAY and light brown MUDSTONE.			
							(2.40)	Moderately strong light brown MUDSTONE.			
4.00-4.00					50/ SPT(C) 50*/0		(6.00)				
					Seepage(1) at 7.50m.		8.40	Strong light grey MUDSTONE.			

Remarks

Remarks	Hand dug inspection pit from GL to 0.95m to check for services.
---------	---

Descriptions by foreman driller.

Descriptions by Lorenzian
Slight seepage at 7.50m

On completion backfilled with grout and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and gravel surround to 3.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.50m to GL.

Scale (approx)

1:50

**Logged
By**

DS/S.I

Figure No.
NE3302.R4



SUB SURFACE

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

Site
KENWORTHY ROAD, BARNLEY, SOUTH YORKSHIRE

Borehole
Number
R3

Machine : BERETTA

Flush : WATER

Core Dia: mm

Method : ROTARY OPEN
HOLE

Casing Diameter

120mm to 1.50m

Ground Level (mOD)

Location

AS PLAN

Dates
10/04/2014

Client
BARNLEY MBC

Engineer
NPS BARNLEY LTD

Job
Number
NE3302

Sheet
1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20-0.40 0.40-0.60					B B		(1.20)	MADE GROUND: dark brown silty clay and gravel sized fragments of stone and brick .			
0.60-0.80 0.80-1.00					B B		1.20	Weak/weathered yellow brown MUDSTONE.			
1.50-1.88					8,5/8,9,14,50 SPT 81/225		(0.60)				
							1.80	Moderately strong yellow brown MUDSTONE.			
4.00-4.00					40/ SPT(C) 40*/0		(7.60)				
							9.40	Strong light grey MUDSTONE.			

Remarks

Hand dug inspection pit from GL to 1.20m to check for services.
Descriptions by foreman driller.
On completion backfilled with grout and installed a 50mm dia hdpe gas monitoring standpipe with a gas valve and gravel surround to 4.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.50m to GL.

Scale
(approx)

1:50

Logged
By

DS/SJ

Figure No.

NE3302.R3



SUB SURFACE

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

Site

KENWORTHY ROAD, BARNLEY, SOUTH YORKSHIRE

Borehole Number

R3

Machine : BERETTA

Flush : WATER

Core Dia: mm

Method : ROTARY OPEN HOLE

Casing Diameter

120mm to 1.50m

Ground Level (mOD)

Location

AS PLAN

Dates

10/04/2014

Client

BARNLEY MBC

Engineer

NPS BARNLEY LTD

Job Number
NE3302

Sheet
2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
								Strong light grey MUDSTONE.			
							(2.80)				
							12.20	Strong grey MUDSTONE.			
							(2.80)				
							15.00	Complete at 15.00m			
					10/04/2014:						

Remarks

Scale (approx)

1:50

Logged By

DS/SJ

Figure No.

NE3302.R3



SUB SURFACE

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

Site

KENWORTHY ROAD, BARNSELY, SOUTH YORKSHIRE

Borehole Number

R4

Machine : BERETTA

Flush : WATER

Core Dia: mm

Method : ROTARY OPEN HOLE

Casing Diameter

95mm to 1.40m

Ground Level (mOD)

Dates

10/04/2014

Client

BARNSELY MBC

Engineer

NPS BARNSELY LTD

Job Number
NE3302

Sheet
2/2

Location

AS PLAN

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
							(5.00)	Strong light grey MUDSTONE.			
							13.40	Strong grey MUDSTONE.			
							(1.60)				
							15.00	Complete at 15.00m			

Remarks

Scale (approx)

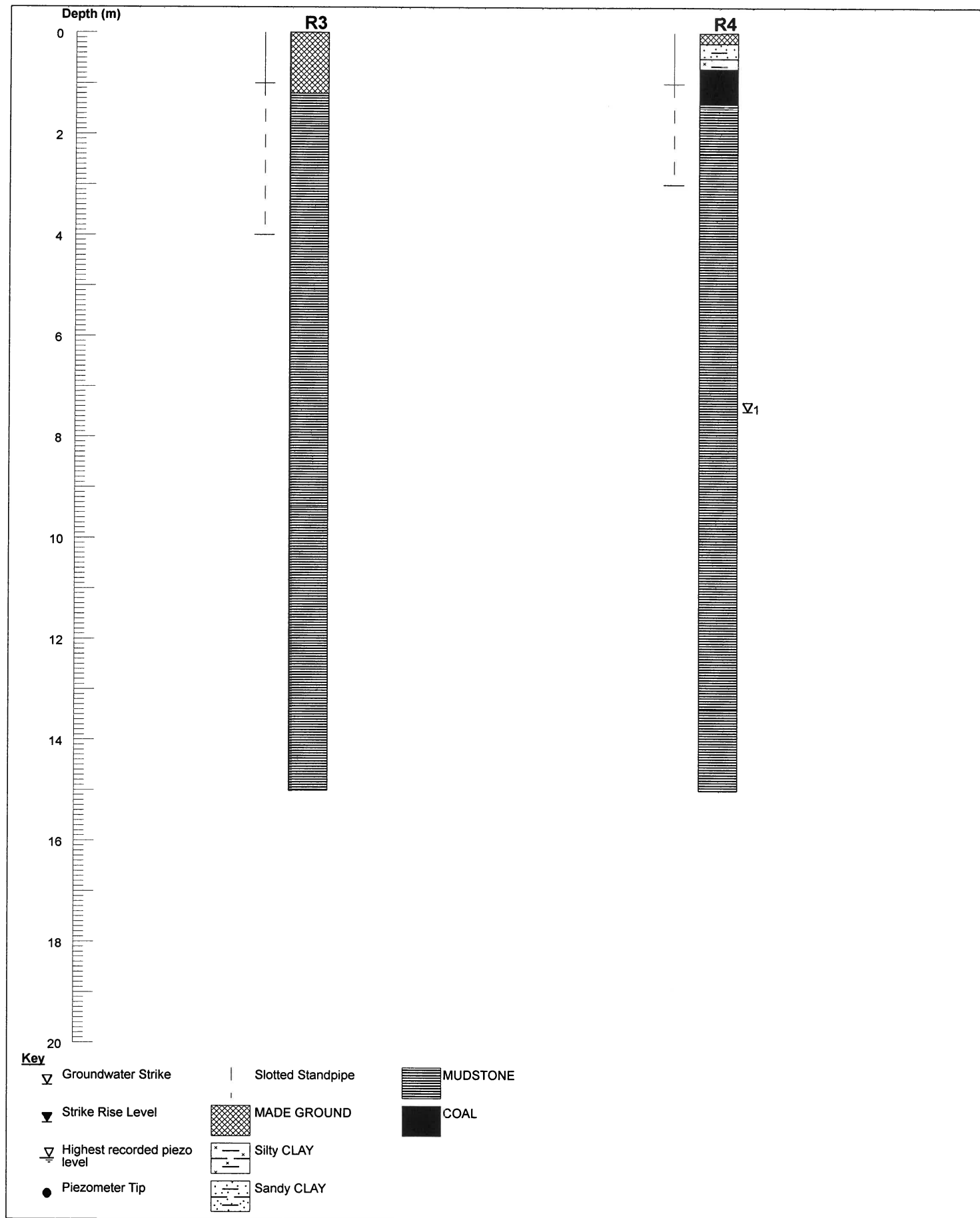
1:50

Logged By

DS/SJ

Figure No.

NE3302.R4



S SUB SURFACE SITE INVESTIGATION, GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	Nominal Section			
Site KENWORTHY ROAD, BARNSELY, SOUTH YORKSHIRE	Date Drawn 24/04/2014	Date Checked	Sheet 1/1	Job Number NE3302
Client BARNSELY MBC	Drawn By	Checked By	Scale 1:100[V]	Figure No. NE3302.1



SUB SURFACE

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

Insitu Test Results

Site: KENWORTHY ROAD, BARNSELY, SOUTH YORKSHIRE

Client: BARNSELY MBC

Engineer: NPS BARNSELY LTD

Job Number
NE3302

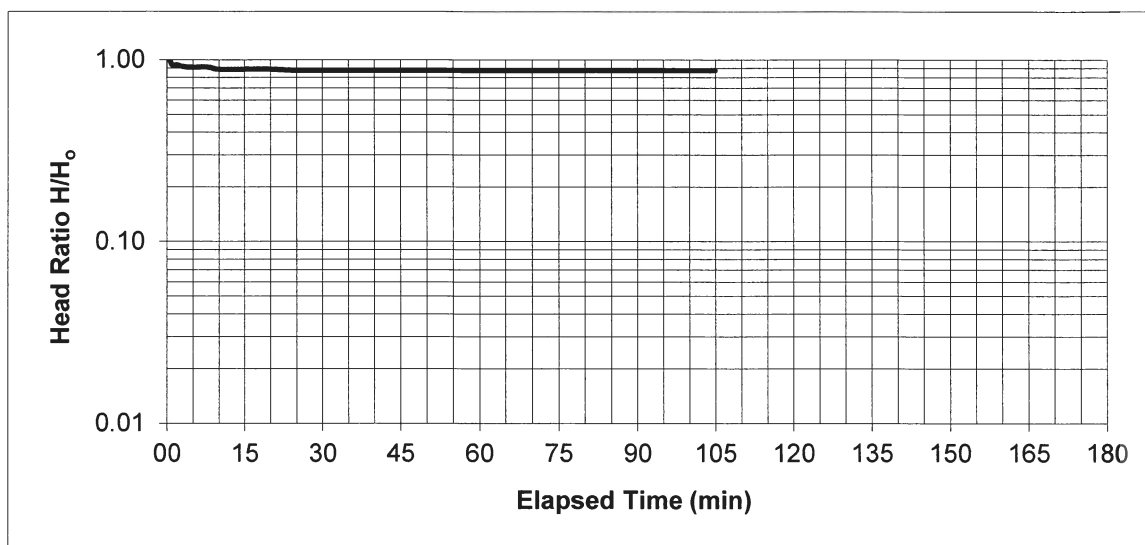
Sheet:
1 / 1

Falling Head Permeability Test

BH R3

TEST NO: 1

DATE: 10/04/2014



Time Elapsed		Depth of Water [d _i]	Water Column Ht. [h _i = d _s - d _i]	Head Ratio [h _i / h _o]
(min)	(sec)	(m)	(m)	
00	00	1.20	0.80	1.00
00	30	1.20	0.80	1.00
01	00	1.25	0.75	0.94
02	00	1.25	0.75	0.94
04	00	1.27	0.73	0.91
08	00	1.27	0.73	0.91
10	00	1.29	0.71	0.89
15	00	1.29	0.71	0.89
20	00	1.29	0.71	0.89
25	00	1.30	0.70	0.88
30	00	1.30	0.70	0.88
45	00	1.30	0.70	0.88
60	00	1.30	0.70	0.88
75	00	1.30	0.70	0.88
90	00	1.30	0.70	0.88
105	00	1.30	0.70	0.88

Top of test section: 1.20 m

Bottom of test section: 2.00 m

Response Zone [L]: 0.80 m

Diameter [D]: 0.12 m

Cross Sectional Area [A]: 0.01 m²

Standing Water Depth [d_s]: 2.00 m

Initial Water Column H_i [h_o]: 0.80 m

Basic Time Lag [T]: - s

Intake Factor [F]: 1.9364 m

where $F = \frac{2 \pi L}{\log_e [(L/D) + \{1 + (L/D)^2\}]}$

COEFFICIENT OF PERMEABILITY

$k = \frac{A}{F \times T}$

k = - m/s

Test Strata: Yellow brown MUDSTONE

Remarks: Unable to calculate due to impermeability of the strata

Sub Surface Laboratories
3 Peel Street
Preston
Lancashire
PR2 2QS

FAO Simon Gabbatt
28 April 2014

Dear Simon Gabbatt

Test Report Number **255983**
Your Project Reference **Kenworthy Road, Barnsley NE3302**

Please find enclosed the results of analysis for the samples received 16 April 2014.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely,



Phil Hemmer, Director



Notes to accompany report:

- The sign < means 'less than'
- Tests marked 'U' hold UKAS accreditation
- Tests marked 'M' hold MCertS (and UKAS) accreditation
- Tests marked 'N' do not currently hold UKAS accreditation
- Tests marked 'S' were subcontracted to an approved laboratory
- n/e means 'not evaluated'
- i/s means 'insufficient sample'
- u/s means 'unsuitable sample'
- Comments or interpretations are beyond the scope of UKAS accreditation
- The results relate only to the items tested
- 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
- Uncertainties of measurement for the determinands tested are available upon request
- None of the test results included in this report have been recovery corrected

LABORATORY TEST REPORT

Results of analysis of 3 samples
received 16 April 2014

Kenworthy Road, Barnsley NE3302

Report Date
28 April 2014

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

255983		AK09617		AK09618	
AK09616		RO3		RO4	
312		315		316	
10/4/2014		10/4/2014		10/4/2014	
0.80m		0.60m		0.75m	
SOIL		SOIL		SOIL	
SOP↓	Determinand↓	CAS No↓	Units↓	*	
2010	pH			M	
	pH 2.5 to 1	PH		8.1	
2175	Sulfur (total TRL report 447)		%	5.7	
2625	Organic matter		%	0.075	
2120	Sulfate (2:1 water soluble) as SO4	14808798	g l ⁻¹	0.13	
2490	Chromium (hexavalent)	18540299	mg kg ⁻¹	0.05	
2430	Sulfate (total BS1377 HCl extract)	14808798	%	0.14	
2450	Arsenic	7440382	mg kg ⁻¹	0.036	
	Cadmium	7440439	mg kg ⁻¹	13	
	Chromium	7440473	mg kg ⁻¹	0.66	
	Copper	7440508	mg kg ⁻¹	24	
	Mercury	7439976	mg kg ⁻¹	93	
	Nickel	7440020	mg kg ⁻¹	0.29	
	Lead	7439921	mg kg ⁻¹	62	
	Selenium	7782492	mg kg ⁻¹	120	
	Zinc	7440666	mg kg ⁻¹	1.3	
2675	TPH aliphatic >C5-C6		mg kg ⁻¹	110	
	TPH aliphatic >C6-C8		mg kg ⁻¹	< 0.1	
	TPH aliphatic >C8-C10		mg kg ⁻¹	< 0.1	
	TPH aliphatic >C10-C12		mg kg ⁻¹	< 0.1	
	TPH aliphatic >C12-C16		mg kg ⁻¹	< 1	
	TPH aliphatic >C16-C21		mg kg ⁻¹	< 1	
	TPH aliphatic >C21-C35		mg kg ⁻¹	< 1	
	TPH aliphatic >C35-C44		mg kg ⁻¹	< 1	

LABORATORY TEST REPORT

Results of analysis of 3 samples
received 16 April 2014

FAO Simon Gabbatt

Kenworthy Road, Barnsley NE3302

Report Date
28 April 2014

255983		AK09616		AK09617		AK09618	
		RO3	RO4	RO4	RO4	RO4	RO4
		312	315	315	316	316	316
		10/4/2014	10/4/2014	10/4/2014	10/4/2014	10/4/2014	10/4/2014
		0.80m	0.60m	0.60m	0.75m	0.75m	0.75m
		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2675	TPH aromatic >C5-C7		mg kg ⁻¹	N		< 0.1	
	TPH aromatic >C7-C8		mg kg ⁻¹	N		< 0.1	
	TPH aromatic >C8-C10		mg kg ⁻¹	N		< 0.1	
	TPH aromatic >C10-C12		mg kg ⁻¹	M		< 1	
	TPH aromatic >C12-C16		mg kg ⁻¹	M		< 1	
	TPH aromatic >C16-C21		mg kg ⁻¹	M		< 1	
	TPH aromatic >C21-C35		mg kg ⁻¹	M		< 1	
	TPH aromatic >C35-C44		mg kg ⁻¹	N		< 1	
	Total Petroleum Hydrocarbons		mg kg ⁻¹	N		< 10	
2700	Naphthalene	91203	mg kg ⁻¹	M		< 0.1	
	Acenaphthylene	208968	mg kg ⁻¹	M		< 0.1	
	Acenaphthene	83329	mg kg ⁻¹	M		< 0.1	
	Fluorene	86737	mg kg ⁻¹	M		< 0.1	
	Phenanthrene	85018	mg kg ⁻¹	M		0.71	
	Anthracene	120127	mg kg ⁻¹	M		< 0.1	
	Fluoranthene	206440	mg kg ⁻¹	M		0.73	
	Pyrene	129000	mg kg ⁻¹	M		0.51	
	Benzo[a]anthracene	56553	mg kg ⁻¹	M		< 0.1	
	Chrysene	218019	mg kg ⁻¹	M		< 0.1	
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	N		< 0.1	
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	N		< 0.1	
	Benzo[a]pyrene	50328	mg kg ⁻¹	M		< 0.1	
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	M		< 0.1	
	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M		< 0.1	
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M		< 0.1	

Sub Surface Laboratories
3 Peel Street
Preston
Lancashire
PR2 2QS

FAO Simon Gabbatt

LABORATORY TEST REPORT

Results of analysis of 3 samples
received 16 April 2014

Kenworthy Road, Barnsley NE3302



Report Date
28 April 2014

255983		AK09617		AK09618	
AK09616		RO3		RO4	
312		315		316	
10/4/2014		10/4/2014		10/4/2014	
0.80m		0.60m		0.75m	
SOIL		SOIL		SOIL	
2700 Total (of 16) PAHs	mg kg ⁻¹	M			< 2
2920 Phenols (total)	mg kg ⁻¹	M			<0.3

All tests undertaken between 17/04/2014 and 28/04/2014

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page.

Column page 1

Report page 3 of 3

LIMS sample ID range AK09616 to AK09618

Sub Surface Laboratories
3 Peel Street
Preston
Lancashire
PR2 2QS

FAO Simon Gabbatt
28 April 2014

Dear Simon Gabbatt

Test Report Number **255983**
Your Project Reference **Kenworthy Road, Barnsley NE3302**

Please find enclosed the results of analysis for the samples received 16 April 2014.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely



Phil Hellier, Director



Notes to accompany report:

- The in-house procedure is employed to identify materials and fibres in soils
- The sample is examined by stereo-binocular and polarised light microscopy
- Sample size is reduced by coning and quartering to obtain a representative sub-sample if necessary
- The bulk identification is in accordance with the requirements of the analyst guide (HSG 248)
- Samples associated with asbestos are retained for six months
- The results relate only to the items tested as supplied by the client
- Comments or interpretations are beyond the scope of UKAS accreditation

Sub Surface Laboratories
3 Peel Street
Preston
Lancashire
PR2 2QS
FAO Simon Gabbatt

LABORATORY TEST REPORT

Asbestos in Soils



Results of analysis of 1 sample
received 16 April 2014
Kenworthy Road, Barnsley NE3302

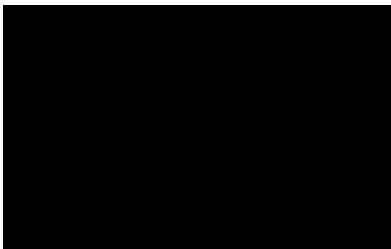
Report Date
28 April 2014

Login Batch No: 255983

Qualitative Results

Chemtest ID	Sample ID	Sample Desc	Depth (m)	SOP 2192	
				ACM Type	Asbestos Identification
AK09618	RO4	316	0.75	-	No Asbestos Detected

The detection limit for this method is 0.001%



Senior Environmental Surveyor



Laboratory Report



Contract Number: 22962

Client's Reference: **NE3302**

Report Date: **01-05-2014**

Client **Sub Surface**
3 Peel Street
Preston
PR2 2QS

Contract Title: **Kenworthy Road, Barnsley**
For the attention of: **Simon Gabbatt**

Date Received: **15-04-2014**
Date Commenced: **15-04-2014**
Date Completed: **01-05-2014**

Test Description	Qty
Moisture Content 1377 : 1990 Part 2 : 3.2 - UKAS *	2.0
PSD Wet Sieve method 1377 : 1990 Part 2 : 9.2 - UKAS *	2.0

Notes: Observations and Interpretations are outside the UKAS Accreditation
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Approved Signatories:

Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - D V Edwards (Managing Director)
Emma Williams (Office Manager) - Paul Evans (Quality/Technical Manager)

NE3302
Kenworthy Road, Barnsley
22962-150414

[illegible]

Note: Results on this table are in summary format and may not meet the requirements of the relevant standards, additional information is held by the laboratory



Date Approved: **1.5.14**

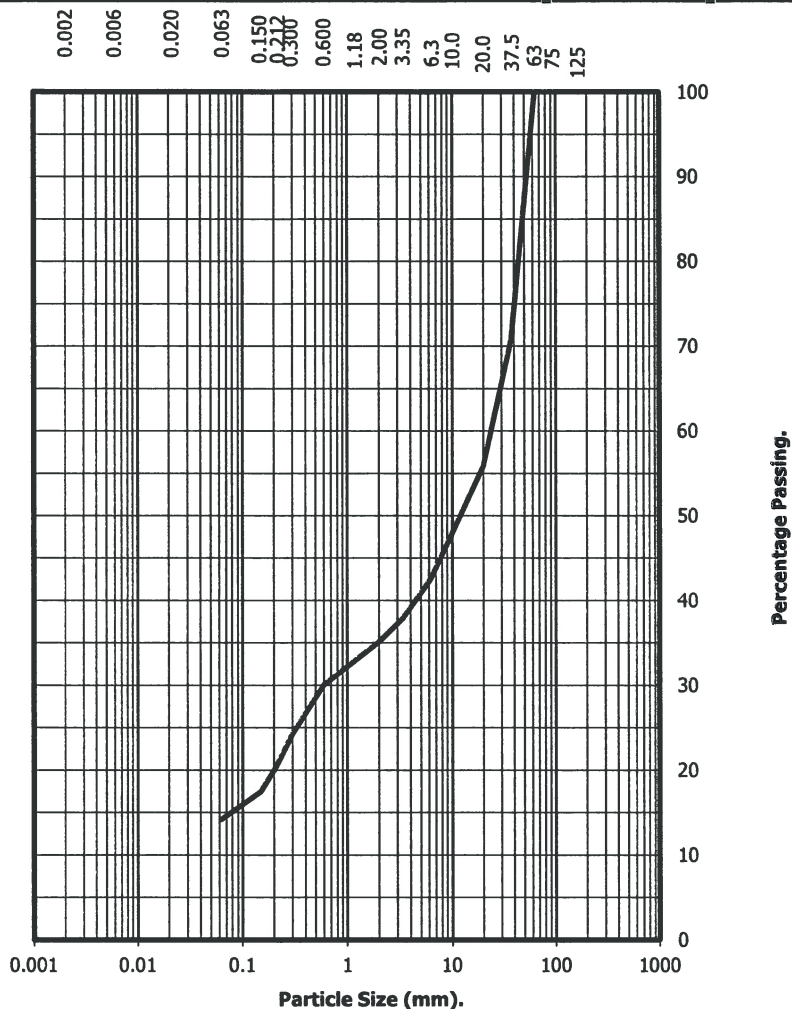
Client ref: NE3302
Location: Kenworthy Road, Barnsley
Contract Number: 22962-150414

Test Report: Particle Size Distribution Test
BS 1377 Part 2:1990.
Wet Sieve, Clause 9.2

Client ref: NE3302
Location: Kenworthy Road, Barnsley
Contract Number: 22962-150414
Hole Number: RO3
Sample Number: 312
Depth (m) : 0.80
Sample Type: B

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	71
20	56
10	48
6.3	43
3.35	38
2.00	35
1.18	33
0.60	30
0.300	24
0.212	20
0.150	17
0.063	14

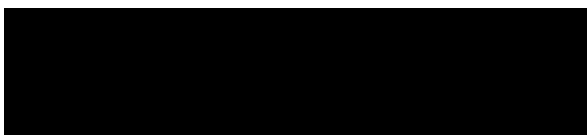
Particle Diameter	Percentage Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	14	21	65	0	Total Percentage

Remarks:

#- not determined



Date Approved: 1.5.14

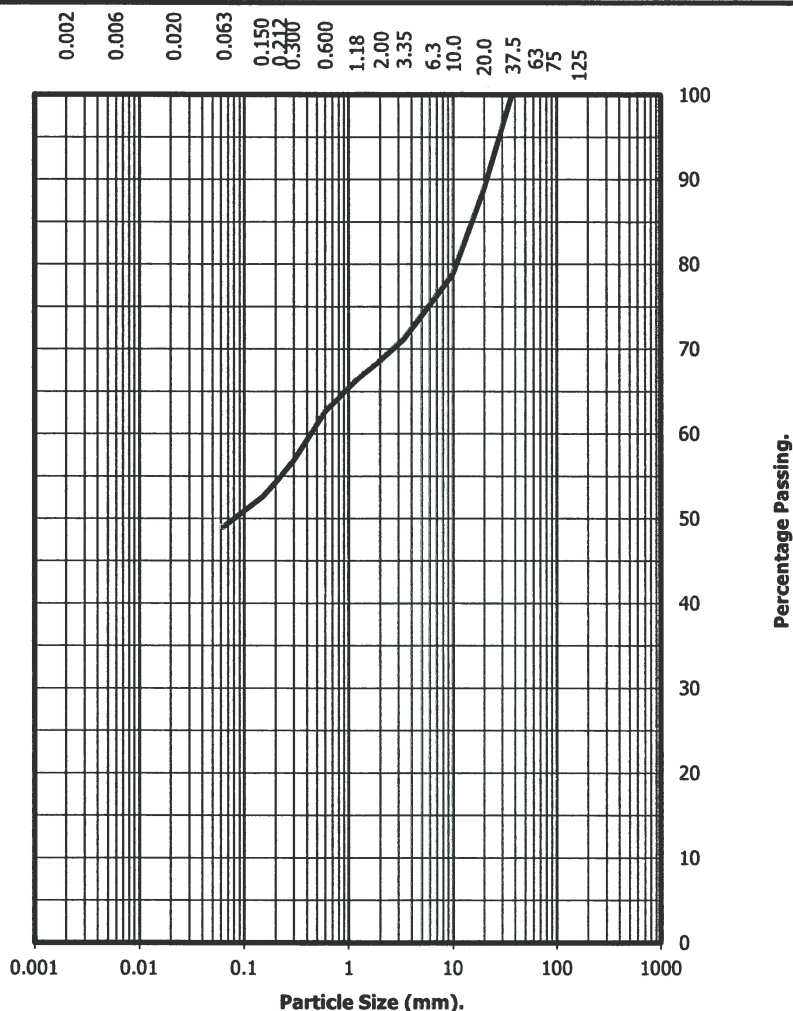


Test Report: Particle Size Distribution Test
BS 1377 Part 2:1990.
Wet Sieve, Clause 9.2

Client ref: NE3302
Location: Kenworthy Road, Barnsley
Contract Number: 22962-150414
Hole Number: RO4
Sample Number: 313
Depth (m) : 0.20
Sample Type: B

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	89
10	79
6.3	75
3.35	71
2.00	69
1.18	66
0.60	63
0.300	57
0.212	55
0.150	53
0.063	49

Particle Diameter	Percentage Passing
0.02	#
0.006	#
0.002	#



Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
49	20	31	0	Total Percentage

Remarks:

- not determined



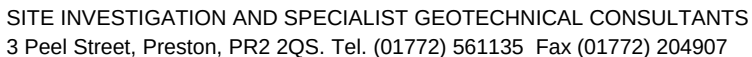
Checked By

Approved By:

Date Approved:

1.5.14





Site:	KENWORTHY ROAD, BARNSELEY	Job Number	NE3302
Client:	BARNSELEY MBC	Sheet:	1 of 1
Engineer:	NPS BARNSELEY LTD		

[illegible]

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



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