

SITE INVESTIGATION REPORT

LAND OFF BARNBURGH ROAD, GOLDTHORPE

FOR

GLEESON HOMES AND REGENERATION



34041-005

SEPTEMBER 2011

SITE INVESTIGATION REPORT

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FOR

GLEESON HOMES AND REGENERATION

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1.0 EXECUTIVE SUMMARY

1. The site is located to the south of Barnburgh Lane, Goldthorpe and comprises two adjacent fields which equate to an area of approximately 5.7 hectares. It is centred on National Grid Reference SK 467 038. There have been no buildings on site and the site is currently used as agricultural land and rough grazing land. The boundaries are marked by hawthorn hedges and occasional trees.
2. Generally the ground conditions comprise sandy clayey topsoil over stiff brown or mottled orange and grey clay with rare gravel and cobbles of sandstone. This is underlain by mudstone fragments or stiff brown clay. Made ground was not encountered on the site. Groundwater was encountered within the boreholes at approximately 8 m with perched groundwater observed in one trial pit (TP 1) at 2.35 m.
3. The shallowest possibly worked coal seam is Shafton Coal seam at a depth of between 11.7 m and 19 m below the site with a thickness of between 0.8 m and 1.8 m. Precautions due to coal mining are required over the southern part of the site.
4. One mineshaft, which has been infilled, is noted to be approximately 20 m from the development site. If development of the southern field is undertaken the mineshaft should be located, capped and no buildings located over the cap. Other unrecorded shafts may be present.
5. Due to an adjacent historic landfill and the possible shallow mining, gas monitoring points have been installed and gas monitoring is ongoing at the site. This will be reported on under a separate cover once completed. No radon protective measures are required in proposed properties at this site. At this stage Amber 1 precautions should be assumed.
6. The most suitable foundations are unreinforced strip footings founded a minimum depth of 1000 mm into the natural clay (of high volume change potential) using a safe bearing pressure of 150 kN/m². The foundations should be deepened due to trees in accordance with NHBC guidance and reinforced above the grouting works due to the mining conditions.
7. At this stage it should be assumed that a precast concrete floor incorporating a gas membrane will be required.
8. Chemical testing has been undertaken and indicates that all the contaminants were below their respective assessment values with the exception of arsenic within two samples of

topsoil. Early discussion with the regulatory authority or additional testing should be undertaken to confirm the bio-availability and risk to the end-users of the site.

9. It is possible that the topsoil may be suitable for re use subject to the additional chemical testing and the approval of the regulators. No capping is required at the site.
10. A design sulphate Class of DS-1 and ACEC Class of AC-1 has been assigned to the ground at the site.
11. The above conclusions must be agreed with the regulators before work begins on site.

2.0 INTRODUCTION

This report presents the findings of a phase 2, geotechnical and geo-environmental site investigation carried out by Eastwood & Partners (Consulting Engineers) Ltd for, and on the instructions of, Gleeson Homes and Regeneration. A desk study has been previously undertaken and a précis is included as part of this report.

The recommendations are based on the proposal that the site will be developed with residential properties with associated gardens and infrastructure. It is assumed that ground levels will remain similar to those at present.

All information, comments and opinions given in this report are based on the information gained from the desk study and exploratory holes. However, there may be conditions at the site, which have not been taken into account such as unpredictable soil strata and water conditions. It should be noted that groundwater levels vary due to seasonal or other affects.

This report was prepared for the sole and exclusive use of Gleeson Homes and Regeneration in response to particular instructions. Any other parties using the information contained in this report, unless given prior written approval to do so, do so at their own risk, and any duty of care to those parties is excluded.

3.0 PRECIS OF THE DESK STUDY INFORMATION

3.1 Site Description

The site comprises two fields located to the south of Barnburgh Lane, to the east of Goldthorpe. The site has an area of approximately 5.7 hectares, and is centred on National Grid Reference SK 467 038. The site dips to the south with a height difference of approximately 15 m from the northern to the southern boundary.

The site is bordered by Barnburgh Lane to the north, a track to the east and fields to the south and south west with residential properties to the north west. The eastern and western site boundaries are marked by hawthorn hedges with elder and sycamore trees to the south. The northern boundary has a low intermittent hedge and the southern boundary is marked by an intermittent line of hawthorn trees. At the time of our site visits several horses were grazing in the southern field.

Two manhole covers are present along the north western edge of the site. The sewer records provided confirm the location of the sewer and its path.

3.2 Site and Surrounding Area History

The earliest map reviewed, dated 1854, shows the site to comprise two fields. There are no changes to the present day except a footpath shown crossing the southern field from 1961 onwards.

The 1854 map shows the surrounding area to be agricultural with Barnbrough Lane and Engine Lane present. Engine House is shown beyond Engine Lane to the east of the site. The village of Goldthorpe is 500 m west of the site. There is a small pond shown beyond the boundary to the south east of the site and West Moor Dyke is shown 250 m east of the site.

The Engine House has been demolished by 1894. By 1903 a railway has been constructed 750 m west of the site and there is a railway in construction 100 m north of the site, running east to west.

Major residential development occurred around Goldthorpe and up to the north eastern site boundary by 1931. Allotment gardens are shown beyond the road to the north of the site and the railway 100 m north of the site is operational as Dearne Valley Railway. Two collieries have been constructed, Goldthorpe colliery 175 m north of the site and Barnburgh Main Colliery 1 km east of the site. By 1976 the land to the north and east of the Goldthorpe Colliery is shown as active workings and a two fields, 250 m south west of the site are shown as a tip.

The only changes to present day are the closure and demolition of the collieries and dismantling of the nearest railway by 2000.

3.3 Geology

The Geological Map sheet 275 SE (1:10,560 scale) shows the solid geology beneath the site to be mudstone of the Carboniferous Middle Coal Measures. There is a fault shown 100 m to the east of the site. The strata have been calculated to dip at approximately 3° to the north east. The shallowest significant coal seam underlying the site is the Shafton Coal, which is calculated to lie at approximately 15 m to 40 m below the site (southern and northern boundaries respectively).

3.4 Groundwater Vulnerability and Abstractions

The 1:10,000 Groundwater Vulnerability Map for the area, Sheet 12 'Vale of York', indicates the site to lie on a Secondary A Aquifer of high permeability.

The Envirocheck report indicates there are no water abstractions within 500 m of the site boundary.

3.5 Hydrology

The nearest surface water feature is a small drain which runs along the south western boundary for approximately 30 m. The drain enters into Far Moor Dyke approximately 400 m south of the site. Information provided by the Envirocheck report shows that the site is not within a flood plain.

The Envirocheck report lists one pollution incident within 500 m of the site. This related to a minor incident of mining water entering a freshwater stream 325 m east of the site in 1994.

The Envirocheck report identifies five discharge consents within 500 m of the site. The closest is operated by British Coal and relates to Trade Effluent entering a freshwater stream 305 m east of the site. The others relate to Yorkshire Water Services Ltd discharging storm overflow / process effluent or pumping station into freshwater stream at least 400 m south west of the site.

3.6 Mining

Reference to the geological map indicates the shallowest coal seam to be the Shafton Coal, which lies at approximately 15 m to 40 m below the site (southern and northern boundaries respectively). This outcrops approximately 700 m south west of the site and is recorded as 1.5 m in total thickness in Goldthorpe Colliery 175 m north of the site. The next major coal seam is at significant depth below the Shafton Coal. Goldthorpe Colliery mine shafts were sunk to the Shafton Coal Seam.

A Coal Authority Report obtained states that the site is within the likely zone of influence on the surface from workings in five seams of coal at shallow to 670 m last worked in 1982.

There is one recorded mine entry within the site. The mineshaft (ref: 446403-021) is on the site just south of the centre near the eastern boundary. It has been filled to an unknown specification and its position is shown on the Exploratory Hole Location Plan.

3.7 Ground Gas

Information contained within the Envirocheck Report indicates that there is a historic landfill site, Marsh Tip 9 m south west of the site. The license for this was held by South Yorkshire County Council. The tip inputted between 1970 and 1979 and deposited waste included inert, industrial, commercial, household waste and liquid sludge.

It is almost certain that the Shafton seam has been worked at shallow depth below the site. There is therefore the possibility of mine gas migrating to the surface from these.

Information provided within the Envirocheck Report states that no radon precautions will be required for residential development on this site.

4.0 OUTLINE CONCEPTUAL MODEL

The following table details the possible sources and associated contaminants of concern, pathways and receptors, which are potentially present on site.

Potential Pollutant Linkages

Source	Pathway	Target
Naturally elevated levels of metals and PAHs in the natural ground.	Ingestion, inhalation, direct contact	Site workers, future residents and visitors
	Migration through ground	Secondary A aquifer
Elevated levels of metals and PAHs in any made ground present on the site.	Ingestion, inhalation, direct contact	Site workers, future residents and visitors
	Migration through ground	Secondary A aquifer
Landfill and mine gas	Migration through ground	Future Residents

5.0 GROUND INVESTIGATION

5.1 Site Works

We visited site on 31 August 2011 and excavated fourteen trial pits (TP1 to TP14) across the northern field. These reached depths of between 1.0 m and 3.3 m below ground level and were positioned away from the existing pipes on site. The trial pits were located to provide full coverage of the site

We also visited site on the 5 September 2011 to supervise the start of the drilling of five boreholes and four monitoring boreholes. These were drilled in the south of the northern field where the coal seam would be shallowest and were to calculate the depth of the Shafton Coal Seam below the site.

Copies of the trial pit and borehole logs are presented in Appendix 2, and their locations are plotted on the Exploratory Hole Location Plan, Drawing number 34041/002 revision A in appendix 1.

5.2 Laboratory Testing

Six samples of topsoil and four of natural clay were despatched for chemical testing. Soil samples were taken in 1 kg plastic tubs and analysed at Chemtest Laboratories, Newmarket using MCERTs accredited methodologies where available.

Six samples of natural clay were despatched for geotechnical testing at Professional Soils Laboratory.

Laboratory testing results are presented in Appendix 3 and Appendix 4.

6.0 GROUND CONDITIONS

6.1 Surface Covering

The site has a covering of grass or cut crop over clayey topsoil approximately 0.2 m thick. No made ground is present on the site.

6.2 Natural Ground

The natural ground comprised stiff brown or mottled orange and grey clay overlying weak mudstone in nine trial pits and sandstone in four trial pits.

6.3 Obstructions

No obstructions were encountered in any of the exploratory holes.

6.4 Groundwater

Perched groundwater was encountered in one trial pit (TP1) at a depth of 2.35 m. Within the boreholes groundwater was encountered at approximately 8 m (BH1, BH2 and BH4).

6.5 Evidence of Contamination

Visual or olfactory evidence of possible contamination was not identified in any of the exploratory holes.

7.0 GEOTECHNICAL APPRAISAL

7.1 Mining

A coal seam was encountered to outcrop within several of the trial pits in the north of the site. It was encountered in TP2 (0.3m to 0.5m), TP 5 (1.1m to 1.9m), TP 7 (0.4m to 0.6m) and TP 14 (2.4m to 3.25m). Within the geological memoir and map this seam is not named, however is shown as a single outcrop on the eastern edge of the site. There is no indication that there are mine entries to this seam from the surface and therefore it is unlikely to have been worked below the north of the site. Within the Goldthorpe Colliery borehole log the corresponding seam is not named and is shown as coal being approximately 0.50 m thick.

The shallowest possibly worked coal seam below the site is the Shafton Coal and was encountered below the site in the boreholes at depths of between 11.7 m and 19 m dipping to the north. The thickness of the coal seam varies between 0.8 m in BH 4 and 1.8 m in BH 1. The coal seam was not encountered in BH 2 indicating that the seam has been worked although there was no loss of flush or broken ground which would be anticipated within workings.

The seam is likely to have been worked due to the variable thickness encountered within the boreholes as well as the proximity to the colliery and absence of any coal from BH 2 which was closest to the mineshaft. The seam thickness at Goldthorpe Colliery was recorded as just less than 1.6 m. The seam thickness found in the boreholes is variable up to 1.8 m. At this stage an extraction thickness of 1.6 m appears to be reasonable for grouting design.

Grouting of a shallow coal seam is normally recommended when the depth from the bottom of the foundations to the top of the coal seam is less than 10 times the extracted seam thickness. Using an extraction thickness of 1.6 m and assuming that the underside of the footings are, conservatively 2.0 m below ground level, the depth from ground level to the underside to the coal seam would have to be more than 19.6 m for grouting not to be necessary. Therefore just over half of the northern area of site will need to be grouted as shown on the attached plan.

One recorded mine shaft is present approximately 20 m south east of the development site. It is possible that other unrecorded shafts are present on site, care should be taken accordingly.

7.2 Foundations

The ground conditions comprise topsoil over clay with mudstone bedrock below. An allowable bearing pressure of 150 kN/m² should be used for foundation design within the clay. Generally the most suitable foundations will be strip or trench fill footings taken down onto the firm to stiff clay, at

1000 mm depth. The footings will need to be thickened and reinforced over most of the site to take account of the shallow mine workings. The foundations adjacent to the boundaries of the site will need to be deepened due to trees in accordance with the NHBC guidance.

Five samples of soil from depths between 0.6 m and 1.2 m were tested for plasticity index. The results varied between 37 and 43 % with an average of 40.6 %. Although a slight connection could be made for the percentage passing the 425 μ m sieve, it would be prudent to assume the typical plasticity index for the soil on site is over 40% and therefore of high shrinkability according to NHBC Standards.

7.3 Ground Slabs

Precast concrete ground floors will be required with incorporated gas membrane.

Where the final footing depth exceeds 1500 mm due to the effect of trees, the floor void should increase from 150 mm to 300 mm.

7.4 Superstructure Precautions

No additional precautions are anticipated to be required for the superstructure on site.

7.5 Road works

A CBR value of at least 2% may be appropriate for road design. The ground should be assumed to be frost susceptible. It is recommended that CBR tests are undertaken along any proposed roads prior to construction so that more accurate CBR values can be obtained.

7.6 Excavation Problems

Excavation is relatively easy within the clay and mudstone bedrock, however it is more difficult within the sandstone bedrock. The excavations should be relatively stable within the natural ground on site. Support will however be required in accordance with current Health & Safety Regulations wherever access is required to trenches deeper than 1.2 m or less where there is risk of collapse.

7.7 Obstructions

Significant obstructions are not expected on the site. There is however a sewer pipe along the north western boundary of the site which should be allowed for.

7.8 Surface Water Drainage

It is highly unlikely that the clay and underlying mudstone/sandstone will be suitable for soakaways.

7.9 Gas Precautions

Because of the proximity of the landfill site gas monitoring points have been installed within four shallow boreholes on the site. The gas monitoring is ongoing and will be reported once completed. At this stage it should be assumed that Amber 1 precautions will be required on the site. This includes a precast concrete ground floor with a ventilated void below and a gas membrane in the ground floor construction. This should be continuous across the cavity from external wall to external wall. The membrane should be sealed at joints and service entries to ensure that it is gas tight.

7.10 Sulphate Attack of Buried Concrete

No sulphate precautions are required on site.

8.0 REFINEMENT OF OUTLINE CONCEPTUAL MODEL

8.1 Source Characterisation

An outline conceptual model, detailing the possible sources and associated contaminants of concern, potential pathways and receptors is shown in Section 4.0.

This section of the report documents the works undertaken to obtain information to test and refine this model enabling a risk assessment to be produced and, where significant risks are expected, remediation recommendations.

8.2 Ground Conditions

The site was covered with topsoil approximately 0.2m thick. Natural ground of stiff brown or mottled grey and orange clay was encountered. There is no reason to suspect that the materials recorded on site, being predominantly natural, will contain any specific contaminants although may contain elevated concentrations of common contaminants such as arsenic, and sulphates due to the presence of pyrite. Polycyclic Aromatic Hydrocarbons (PAHs), such as benzo(a)pyrene, may also be elevated due to the atmospheric fallout of these derived from the combustion of fossil fuels.

8.3 Unexpected Contamination

No visual or olfactory observations of unexpected contamination were noted.

8.4 Chemical Testing

Six samples of topsoil and four of natural clay were sent for testing. Each of the samples was analysed for the suite of contaminants listed below.

Contaminant Type	Actual Contaminants
Metals/Metalloids	Arsenic, cadmium, chromium, lead, mercury, nickel, copper and zinc
pH	pH
PAHs	Speciated PAH

In addition to the above testing the samples of clay were analysed for water soluble sulphate, acid soluble sulphate and sulphur.

Testing was undertaken by Chemtest, using MCERTs accredited methodologies, where available.

8.5 Assessment Criteria

The proposed development of the site is to be residential properties with associated gardens. Therefore the assessment criteria relating to a residential end use with plant uptake has been used.

Tables detailing the relevant assessment concentrations used are included in appendix 4.

8.6 Chemical Test Results

Some preliminary risk assessment is undertaken in this section of the report where determinants can be readily discounted.

8.6.1 Metals

Arsenic was found to exceed its assessment value of 32 mg/kg in two samples of topsoil, TP1 at 58 mg/kg TP2 at 39 mg/kg.

No other metals were found to exceed their relevant assessment concentrations within the topsoil or natural ground on site.

8.6.2 Polycyclic Aromatic Hydrocarbons

The results indicate that the levels of PAHs were below their respective assessment concentrations in the topsoil and natural ground on site.

8.6.3 Sulphates

In accordance with BRE Special Digest 1, the site comes under the classification of 'Greenfield'. The four samples of natural ground were tested for total sulphate and sulphur and the results indicate the maximum proportion of oxidisable sulphates as 0.05%. The threshold above which it is considered that pyrite is probably present is 0.3% and thus pyrite is not expected to be present in the natural ground.

The concentrations of water soluble sulphate were 10 mg/l compared with the upper limit of Design Sulphate Class 1 of 500 mg/l. On the basis of both the potential sulphate and water soluble sulphate results the natural ground would be assigned a Design Sulphate Class of DS-1 and Aggressive Chemical Environment for Concrete (ACEC) class of AC-1.

8.7 Significant Pollutant Linkages

The only pollutant linkage remaining after the investigation is the elevated value of arsenic within two samples of topsoil which are above the assessment value for a residential with plant uptake end use.

8.8 Risk Assessment

The contaminants tested for were below their respective assessment values within the topsoil and clay at the site with the exception of arsenic within two samples of topsoil. Additional testing of bio-availability may indicate that the topsoil is suitable for reuse within a residential setting. No capping layer is required on the site.

9.0 RECOMMENDATIONS

1. Foundations should be designed on the basis of a safe bearing pressure of 150 kN/m² within the clay on site.
2. The depth to the base of the footings should be a minimum of 1000 mm from the original or finished ground level whichever is lower and should be deepened near trees in accordance with the guidance in the NHBC Chapter 4.2 Building Near Trees.
3. At this stage it should be assumed that a precast concrete floor slab will be suitable because of the possible amber 1 gas precautions.
4. Gas monitoring points have been installed and the monitoring is ongoing. It will be reported under a separate cover once completed.
5. Only arsenic was found to exceed its relevant assessment concentration within the topsoil. With additional bio-availability testing this should be resolved to not be at a level which will affect future residents and therefore the topsoil should be able to be re used within the development site if bio-availability testing is undertaken. All contaminants were found to be below their relevant assessment concentration within the natural clay and therefore no capping layer is required.
6. A Design Sulphate Class of DS-1 and ACEC class of AC-1 has been assigned to the ground at the site.
7. There should be no contamination risks to construction workers from the ground on the site but normal good hygiene precautions such as washing hands before eating should be adopted.
8. The conclusions made in this report in relation to contamination are subject to agreement by the approving bodies such as the NHBC.

Appendix 1

34041/002 Exploratory Hole Location Plan

Information within this drawing is not necessarily produced to scale.
Always use figured dimensions and co-ordinates – if in doubt, ask.



KEY

- Approximate trial pit location.
- Approximate borehole location.
- Approximate location of mineshaft.
(Ref: 446403-021).
- Approximately 20 m buffer from mineshaft location.

A	First Issue.			
REV	DESCRIPTION	SIG	CHK	DATE
GLEESON HOMES & REGENERATION				
BARNBURGH LANE, GOLDTHORPE				
EXPLORATORY HOLE LOCATION PLAN				
Eastwood & Partners CONSULTING ENGINEERS St. Andrew's House 23 Kingfield Road Sheffield S11 9AS Tel 0114 255 4554 Fax 0114 255 4330 mail@eastwoodandpartners.com www.eastwoodandpartners.com EOP				
SCALE WHEN PLOTTED AT A3 1:2500			DRAWING STATUS INFORMATION	
DRAWN TG	CHECKED JMW	DATE 06-09-11	DRAWING NUMBER 34041/002	REV A

Appendix 2

Exploratory Hole Logs

Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

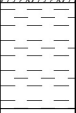
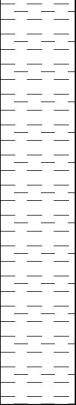
Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 2.50m

Logged By
 KLG

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.10	D					Dark brown or grey very clayey TOPSOIL.	
			0.20			Stiff brown CLAY.	
0.40	D						
			0.55			Stiff friable mottled orange and grey CLAY.	
0.80	IPP	450					1
			1.90			Weak laminated grey MUDSTONE.	2
			2.40			Becoming clayey relatively strong orange SANDSTONE bedrock.	
			2.50			Trialpit Complete at 2.50 m	
							3
							4

Remarks: Pit sides stable during excavation.

Groundwater: Groundwater observed at 2.35 m.



Date
31/08/2011

Scale
1:25

Logged By
KLG

Groundwater: No groundwater observed.



Date
31/08/2011

Scale
1:25

Logged By
KLG

Trialpit Complete at 2.00 m

Groundwater: No groundwater observed.



Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

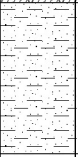
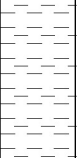
Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 2.50m

Logged By
 KLG

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.10	D		0.20			Clayey TOPSOIL.	
0.50	D					Very stiff orange slightly sandy CLAY.	
0.80	IPP	450	0.70			Very stiff grey CLAY recovered as gravel and cobbles.	
0.90	D						1
1.60	IPP	450	1.50			Very weak grey MUDSTONE recovered as fine to coarse gravel. Becoming cobbly with depth, with black patches of fossilised vegetation and occasional ironstone nodules.	2
			2.50				
Trialpit Complete at 2.50 m							3
							4

Remarks: Pit sides stable during excavation.

Groundwater: No groundwater observed.



Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

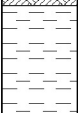
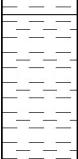
Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 2.20m

Logged By
 KLG

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description		
Depth (m)	Type	Results						
0.10	D	450	0.20			Dark brown or grey very clayey TOPSOIL.	1	
0.30	D					Very stiff brown mottled orange CLAY		
0.80	D		0.60			Very stiff grey CLAY.		
			1.10					
1.30	IPP		1.25			Black bright COAL, recovered as fine to coarse gravel sized fragments.		
			1.40			Stiff grey CLAY.		
					Black bright COAL, recovered as fine to coarse gravel to cobble sized fragments.			
			1.90			Relatively strong SANDSTONE bedrock recovered as fine to coarse gravel to cobble sized fragments.	2	
			2.20			Trialpit Complete at 2.20 m		3
							4	

Remarks: Pit sides stable during excavation.

Groundwater: No groundwater observed.



Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

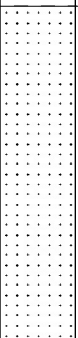
Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 2.00m

Logged By
 KLG

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.10	D		0.25			Dark brown or grey very clayey TOPSOIL.	
0.40	D					Very stiff orange slightly sandy CLAY.	
			0.90			Relatively strong orange clayey SANDSTONE, recovered as fine to coarse gravel to cobble sized fragments.	1
			2.00				2
Trialpit Complete at 2.00 m							
							3
							4

Remarks: Pit sides stable during excavation.

Groundwater: No groundwater observed.



Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

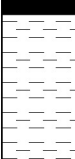
Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 2.20m

Logged By
 KLG

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description		
Depth (m)	Type	Results						
0.90	D		0.20			Dark brown or grey very clayey TOPSOIL.	1	
			0.40			Stiff brown CLAY.		
			0.60			Dark brown black vegetation and COAL fragments. [Lens at the north of the pit].		
			1.10			Very stiff brown and grey CLAY.		
1.30	D		1.40			Very stiff mottled orange and grey CLAY.	2	
			2.20			Becoming clayey relatively strong MUDSTONE bedrock.		
			Trialpit Complete at 2.20 m			3		
								4

Remarks: Pit sides stable during excavation.

Groundwater: No groundwater observed.



Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

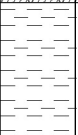
Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 2.80m

Logged By
 KLG

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.10	D		0.20			Dark brown or grey very clayey TOPSOIL.	
0.40	D					Stiff orange and brown slightly sandy CLAY.	
0.70	IPP	450	0.90			Very stiff mottled orange and grey CLAY with occasional gravel sized fragments of weak mudstone.	1
1.20	D		2.00			Becoming clayey relatively strong MUDSTONE bedrock.	2
			2.80			Trialpit Complete at 2.80 m	3
							4

Remarks: Pit sides stable during excavation.

Groundwater: No groundwater observed.



Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

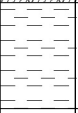
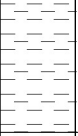
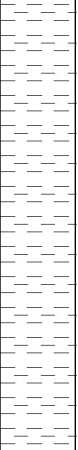
Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 3.00m

Logged By
 KLG

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.10	D	450	0.20			Dark brown or grey very clayey TOPSOIL.	
			0.55			Stiff orange and brown CLAY.	
0.80	IPP		1.00			Very stiff orange CLAY. Infilled land drain, encountered trending north to south.	
1.00	D		2.50			Very stiff mottled orange and grey CLAY.	1
			3.00			Becoming clayey relatively strong MUDSTONE bedrock.	2
						Trialpit Complete at 3.00 m	3
							4

Remarks: Pit sides stable during excavation.

Groundwater: No groundwater observed.



Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 1.80m

Logged By
 KLG

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
1.00	D		0.20			Dark brown or grey very clayey TOPSOIL.	
						Stiff dark brown grey slightly sandy CLAY.	
						0.6 m 100 mm diameter land drain encountered trending north to south.	
			0.90			Stiff grey CLAY.	
			1.80			Trialpit Complete at 1.80 m	

Remarks: Pit sides stable during excavation.

Groundwater: No groundwater observed.



Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

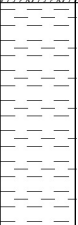
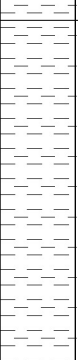
Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 2.80m

Logged By
 KLG

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
			0.20			Dark brown or grey very clayey TOPSOIL.	
						Stiff brown CLAY.	
			1.00			Stiff friable mottled orange and grey CLAY.	1
			2.20			Becoming clayey relatively strong MUDSTONE bedrock.	2
			2.80			Trialpit Complete at 2.80 m	3
							4

Remarks: Pit sides stable during excavation.

Groundwater: No groundwater observed.



Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 2.00m

Logged By
 KLG

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.10	D					Dark brown or grey very clayey TOPSOIL.	
			0.20			Stiff brown CLAY.	
						0.4 m Encountered land drain 100 mm diameter trending north to south.	
			0.80			Stiff friable mottled orange and grey CLAY.	1
			1.60			Becoming clayey relatively strong MUDSTONE bedrock.	
			2.00				2
						Trialpit Complete at 2.00 m	
							3
							4

Remarks: Pit sides stable during excavation.

Groundwater: No groundwater observed.



Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

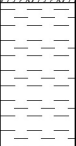
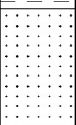
Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 1.10m

Logged By
 KLG

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
			0.20			Dark brown or grey very clayey TOPSOIL.	
						Stiff friable mottled orange and grey CLAY.	
			0.70			Becoming clayey relatively strong SANDSTONE bedrock.	
			1.10			Trialpit Complete at 1.10 m	1
							2
							3
							4

Remarks: Pit sides stable during excavation.

Groundwater: No groundwater observed.



Project Name
 Land off Barnburgh Lane

Project No.
 34041

Co-ords: -
 Level: -

Date
 31/08/2011

Location: Goldthorpe

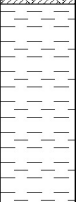
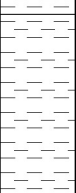
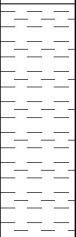
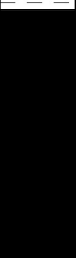
Dimensions: -

Scale
 1:25

Client: Gleeson Homes and Regeneration

Depth
 3.30m

Logged By
 KLG

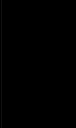
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
1.00	D		0.30			Dark brown or grey very clayey TOPSOIL.	
						Stiff brown CLAY	
			1.00			Stiff mottled orange and grey CLAY	1
			1.60			Very stiff grey CLAY.	2
2.80	D		2.40			Bright black COAL, recovered as fine to coarse gravel sized fragments.	3
			3.25			Very stiff grey CLAY	
			3.30			Trialpit Complete at 3.30 m	4

Remarks: Pit sides stable during excavation.

Groundwater: No groundwater observed.



Project Name Land off Barnburgh Lane		Project No. 34041	Co-ords: -	Hole Type Rotary
Location: Goldthorpe			Level: -	Scale 1:100
Client: Gleeson Homes and Regeneration			Dates: 31/08/2011	Logged By KLG

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			Brown clayey TOPSOIL.	
								Dark grey MUDSTONE with occasional thin sandstone and siltsotne bands.	1
									2
									3
									4
									5
									6
									7
									8
									9
									10
									11
					11.70			Bright black COAL.	12
									13
					13.50			Dark grey MUDSTONE with occasional sandstone bands.	14
									15
									16
									17
									18
									19
			Type	Results					

Project Name Land off Barnburgh Lane		Project No. 34041	Co-ords: -	Hole Type Rotary
Location: Goldthorpe			Level: -	Scale 1:100
Client: Gleeson Homes and Regeneration			Dates: 31/08/2011	Logged By KLG

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					26.00			Dark grey MUDSTONE with occasional sandstone bands.	21
									22
									23
									24
									25
									26
								End of Borehole at 26.00 m	27
									28
									29
									30
									31
									32
									33
									34
									35
									36
									37
									38
									39
			Type	Results					

Project Name Land off Barnburgh Lane		Project No. 34041	Co-ords: -	Hole Type Rotary
Location: Goldthorpe			Level: -	Scale 1:100
Client: Gleeson Homes and Regeneration			Dates: 31/08/2011	Logged By KLG

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					26.00			Dark grey MUDSTONE with occasional sandstone bands.	21
									22
									23
									24
									25
									26
								End of Borehole at 26.00 m	27
									28
									29
									30
									31
									32
									33
									34
									35
									36
									37
									38
									39
			Type	Results					

Project Name Land off Barnburgh Lane		Project No. 34041	Co-ords: -	Hole Type Rotary
Location: Goldthorpe			Level: -	Scale 1:100
Client: Gleeson Homes and Regeneration			Dates: 31/08/2011	Logged By KLG

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					20.00			Dark grey MUDSTONE with occasional sandstone bands.	
					21.00			End of Borehole at 21.00 m	21
									22
									23
									24
									25
									26
									27
									28
									29
									30
									31
									32
									33
									34
									35
									36
									37
									38
									39

Remarks:	
----------	---

Project Name	Project No.	Co-ords: -	Hole Type
Land off Barnburgh Lane	34041		Rotary
Location: Goldthorpe		Level: -	Scale
			1:100
Client: Gleeson Homes and Regeneration	Dates: 31/08/2011	Logged By	
		KLG	

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			Dark brown clayey TOPSOIL.	
								Dark grey MUDSTONE with occasional sandstone bands.	1
									2
									3
									4
									5
									6
									7
									8
									9
									10
									11
									12
					12.50			Bright black COAL.	13
					13.50			Dark grey MUDSTONE with occasional sandstone bands.	14
					14.50			End of Borehole at 14.50 m	15
									16
									17
									18
									19

Appendix 3

Chemical test results

Assessment Values

Eastwood & Partners
St. Andrews House
23 Kingfield Road
Sheffield
S11 9AS

FAO Karen Green
08 September 2011

Dear Karen Green

Test Report Number 119537

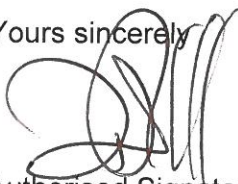
Your Project Reference Barnburgh Lane, Goldthorpe - JMW/KLG/34041/001

Please find enclosed the results of analysis for the samples received 6 September 2011.

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



Authorised Signatory

☒ Darrell Hall	Director
☐ Phil Hellier	Director
☐ Keith Jones	Technical Manager
☐ John Crawford	Quality Manager
☐ Malcolm Avis	Director



2183



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 outside of the scope of UKAS accreditation
- The results relate only to the items tested
- Stones represent the quantity of material removed prior to analysis
- 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
- Soil descriptions, including colour and texture, are beyond the scope of MCertS accreditation
- None of the test results included in this report have been recovery corrected

Test Report 119537 Cover Sheet

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 6 September 2011

Report Date
08 September 2011

FAO Karen Green

Barnburgh Lane, Goldthorpe - JMW/KLG/34041/001

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP↓ Determinand↓

CAS No↓

Units↓

*

					119537					
					AG43110	AG43111	AG43112	AG43113	AG43114	AG43115
					TP1	TP2	TP6	TP8	TP9	TP12
					05/09/2011	05/09/2011	05/09/2011	05/09/2011	05/09/2011	05/09/2011
					0.1m	0.2m	0.1m	0.1m	0.1m	0.1m
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2175	Sulfur (total TRL report 447)		%	M						
2120	Sulfate (2:1 water soluble) as SO ₄	14808798	g l ⁻¹	M						
2490	Chromium (hexavalent)	18540299	mg kg ⁻¹	N	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2430	Sulfate (total BS1377 HCl extract)	14808798	%							
2450	Arsenic	7440382	mg kg ⁻¹	M	58	39	15	10	17	15
	Cadmium	7440439	mg kg ⁻¹	M	0.44	0.52	0.22	0.20	0.24	0.25
	Chromium	7440473	mg kg ⁻¹	M	45	36	16	15	15	17
	Copper	7440508	mg kg ⁻¹	M	120	49	17	16	18	19
	Mercury	7439976	mg kg ⁻¹	M	0.53	0.36	0.14	0.12	0.14	0.12
	Nickel	7440020	mg kg ⁻¹	M	47	53	23	20	21	25
	Lead	7439921	mg kg ⁻¹	M	85	47	21	20	24	23
	Selenium	7782492	mg kg ⁻¹	M	1.1	1.4	<0.20	0.22	0.46	0.35
	Zinc	7440666	mg kg ⁻¹	M	170	130	72	68	69	76
2800	Naphthalene	91203	mg kg ⁻¹	M	0.6	0.3	0.1	<0.1	0.1	<0.1
	Acenaphthylene	208968	mg kg ⁻¹	N	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Acenaphthene	83329	mg kg ⁻¹	M	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Fluorene	86737	mg kg ⁻¹	M	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Phenanthrene	85018	mg kg ⁻¹	M	1.1	0.2	0.3	0.2	<0.1	<0.1
	Anthracene	120127	mg kg ⁻¹	M	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Fluoranthene	206440	mg kg ⁻¹	M	2.3	0.3	0.6	0.2	<0.1	<0.1
	Pyrene	129000	mg kg ⁻¹	M	2.1	0.3	0.5	0.1	<0.1	<0.1
	Benzo[a]anthracene	56553	mg kg ⁻¹	M	1	<0.1	0.2	<0.1	<0.1	<0.1
	Chrysene	218019	mg kg ⁻¹	M	1	<0.1	0.2	<0.1	<0.1	<0.1
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	M	1.5	0.1	0.3	<0.1	<0.1	<0.1
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	N	0.3	<0.1	<0.1	<0.1	<0.1	<0.1
	Benzo[a]pyrene	50328	mg kg ⁻¹	M	0.9	<0.1	<0.1	<0.1	<0.1	<0.1
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	N	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

All tests undertaken between 07/09/2011 and 08/09/2011

* Accreditation status

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

Column page 1

Report page 1 of 2

LIMS sample ID range AG43110 to AG43119

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 6 September 2011

Report Date
08 September 2011

FAO Karen Green

Barnburgh Lane, Goldthorpe - JMW/KLG/34041/001

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP↓ Determinand↓

CAS No↓

Units↓

119537

AG43116

AG43117

AG43118

AG43119

TP1

TP3

TP7

TP9

05/09/2011

05/09/2011

05/09/2011

05/09/2011

0.4m

0.4m

0.9m

1m

SOIL

SOIL

SOIL

SOIL

2175	Sulfur (total TRL report 447)		%	M	0.020	0.010	0.010	0.020
2120	Sulfate (2:1 water soluble) as SO ₄	14808798	g l ⁻¹	M	0.01	<0.01	<0.01	<0.01
2490	Chromium (hexavalent)	18540299	mg kg ⁻¹	N	<0.5	<0.5	<0.5	<0.5
2430	Sulfate (total BS1377 HCl extract)	14808798	%		0.01	0.02	0.01	0.03
2450	Arsenic	7440382	mg kg ⁻¹	M	17	13	13	18
	Cadmium	7440439	mg kg ⁻¹	M	<0.10	0.21	0.13	0.20
	Chromium	7440473	mg kg ⁻¹	M	25	19	35	14
	Copper	7440508	mg kg ⁻¹	M	27	18	39	16
	Mercury	7439976	mg kg ⁻¹	M	0.11	0.12	0.16	<0.10
	Nickel	7440020	mg kg ⁻¹	M	61	38	52	23
	Lead	7439921	mg kg ⁻¹	M	15	18	31	19
	Selenium	7782492	mg kg ⁻¹	M	0.33	0.32	0.91	0.49
	Zinc	7440666	mg kg ⁻¹	M	130	82	130	63
2800	Naphthalene	91203	mg kg ⁻¹	M	0.2	<0.1	<0.1	<0.1
	Acenaphthylene	208968	mg kg ⁻¹	N	<0.1	<0.1	<0.1	<0.1
	Acenaphthene	83329	mg kg ⁻¹	M	<0.1	<0.1	<0.1	<0.1
	Fluorene	86737	mg kg ⁻¹	M	<0.1	<0.1	<0.1	<0.1
	Phenanthrene	85018	mg kg ⁻¹	M	0.2	<0.1	<0.1	<0.1
	Anthracene	120127	mg kg ⁻¹	M	<0.1	<0.1	<0.1	<0.1
	Fluoranthene	206440	mg kg ⁻¹	M	0.5	<0.1	<0.1	<0.1
	Pyrene	129000	mg kg ⁻¹	M	0.4	<0.1	<0.1	<0.1
	Benzo[a]anthracene	56553	mg kg ⁻¹	M	<0.1	<0.1	<0.1	<0.1
	Chrysene	218019	mg kg ⁻¹	M	<0.1	<0.1	<0.1	<0.1
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	M	0.2	<0.1	<0.1	<0.1
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	N	<0.1	<0.1	<0.1	<0.1
	Benzo[a]pyrene	50328	mg kg ⁻¹	M	<0.1	<0.1	<0.1	<0.1
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	N	<0.1	<0.1	<0.1	<0.1

Eastwood & Partners
St. Andrews House
23 Kingfield Road
Sheffield
S11 9AS

FAO Karen Green

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 6 September 2011

Barnburgh Lane, Goldthorpe - JMW/KLG/34041/001



Report Date
08 September 2011

					119537					
					AG43110	AG43111	AG43112	AG43113	AG43114	AG43115
					TP1	TP2	TP6	TP8	TP9	TP12
					05/09/2011	05/09/2011	05/09/2011	05/09/2011	05/09/2011	05/09/2011
					0.1m	0.2m	0.1m	0.1m	0.1m	0.1m
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2800	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M	0.3	<0.1	<0.1	<0.1	<0.1	<0.1
	Total (of 16) PAHs		mg kg ⁻¹	N	12	<2	2.1	<2	<2	<2
2010	pH			M	7.2	7.5	7.4	7.5	7.5	7.5
2030	Moisture		%	n/a	18.5	16.7	15	12.5	11.6	16.7
	Stones content (>50mm)		%	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2040	Soil colour			n/a	brown	brown	brown	brown	brown	brown
	Soil texture			n/a	sand	sand	sand	sand	sand	sand
	Other material			n/a	roots	roots	roots	roots	roots	roots

All tests undertaken between 07/09/2011 and 08/09/2011

* Accreditation status

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

Column page 1

Report page 2 of 2

LIMS sample ID range AG43110 to AG43119

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23 Kingfield Road
Sheffield
S11 9AS

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 6 September 2011



Report Date
08 September 2011

FAO Karen Green

Barnburgh Lane, Goldthorpe - JMW/KLG/34041/001

					119537			
					AG43116	AG43117	AG43118	AG43119
					TP1	TP3	TP7	TP9
					05/09/2011	05/09/2011	05/09/2011	05/09/2011
					0.4m	0.4m	0.9m	1m
					SOIL	SOIL	SOIL	SOIL
2800	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M	<0.1	<0.1	<0.1	<0.1
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M	<0.1	<0.1	<0.1	<0.1
	Total (of 16) PAHs		mg kg ⁻¹	N	<2	<2	<2	<2
2010	pH			M	8.0	8.0	5.9	7.4
2030	Moisture		%	n/a	13.5	10.6	10.7	9.11
	Stones content (>50mm)		%	n/a	<0.02	<0.02	<0.02	<0.02
2040	Soil colour			n/a	brown	brown	brown	brown
	Soil texture			n/a	sand	sand	sand	sand
	Other material			n/a	roots	none	none	none

Inorganics	Intended Land Use
	Residential (mg/kg)
Arsenic	32
Cadmium	10
Chromium	130
Chromium (VI)	4.3
Lead	450
Mercury	1
Nickel	130
Selenium	350
Copper	80 ^{*1} (200 above pH7)
Zinc	200 ^{*1} (300 above pH7)

Notes:

*¹ - These are pH dependent; the most conservative value is given in this case.

The assessment values for the first seven metals or metalloids (arsenic to selenium) are the Soil Guideline Values (SGVs) derived by DEFRA and Environment Agency using the '*Contaminated Land Exposure Assessment*' model. The assessment concentrations for arsenic, cadmium, nickel, mercury and selenium are outlined in the Environment Agency's Science Report series SC050021. These are based on a sandy loam soil and 6% soil organic matter. The assessment concentrations for the remaining metals/metalloids are described in the Contaminated Land Report Series (CLR), which have now been withdrawn.

The SGV threshold value is not intended to be applied to individual sample results where materials are similar, as the levels of contaminants will have a natural variability across the site. The modified mean value should instead be compared with the SGV.

The assessment values for the metals copper and zinc are levels at which plant growth is thought to be affected. The assessment values for copper and zinc are taken from the maximum permissible and advisable concentrations in soil after application of soil sludge given in the '*The Code of Good Agricultural Practice for the Protection of Soil*', MAFF, 1998.

The assessment of sulphate, water soluble sulphate, elemental sulphur and sulphide is to determine the aggressive nature of the ground with respect to concrete and consequently the results are compared with BRE Special Digest 1:2005 '*Concrete in Aggressive Ground*'.

Prepared	AS	Checked	KLG	Date	09.09.11	Job No	34041
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 Eastwood & Partners CONSULTING ENGINEERS St Andrew's House 23 Kingfield Road Sheffield S11 9AS Tel: (0114) 255 4554 Fax: (0114) 255 4330	GLEESON HOMES & REGENERATION LAND OFF BARNBURGH LANE, GOLDTHORPE GENERIC ASSESSMENT CRITERIA - RESIDENTIAL
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Organic Compounds	Intended Land Use Residential (mg/kg)		
	1% SOM	2.5% SOM	6% SOM
Naphthalene	1.5	3.7	8.7
Acenaphthene	210	480	1000
Acenaphthylene	170	400	850
Fluorene	160	380	780
Phenanthrene	92	200	380
Anthracene	2,300	4,900	9,200
Fluoranthene	260	460	670
Pyrene	560	1,000	1,600
Benzo(a)anthracene	3.1	4.7	5.9
Chrysene	6.0	8.0	9.3
Benzo(b)fluoranthene	5.6	6.5	7.0
Benzo(k)fluoranthene	8.5	9.6	10
Benzo(a)pyrene	0.83	0.94	1.0
Dibenz(a,h)anthracene	0.76	0.86	0.90
Indeno(1,2,3-cd)pyrene	3.2	3.9	4.2
Benzo(g,h,i)perylene	44	46	47
Phenol	210	390	420

The assessment criteria for chromium (VI) and the sixteen polycyclic aromatic hydrocarbon (PAH) species covered under the USEPA test have been taken from Nathanail, C. P., McCaffrey, C., Ashmore, M. H., Cheng, Y. Y., Gillett, A., Ogden, R. & Scott, D., 2009 '*The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment 2nd Edition*', Land Quality Press, Nottingham. This is also the case for phenol at 1% and 2.5% SOM. These are also all based on a sandy loam soil.

The threshold value is not intended to be applied to individual sample results where materials are similar, as the levels of contaminants will have a natural variability across the site. The modified mean value should instead be compared with the threshold value.

Prepared	AS	Checked	KLG	Date	09.09.11	Job No	34041
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Appendix 4

Geotechnical test results



LABORATORY REPORT



4043

Contract Number: PSL11/2168

Client's Reference:

Report Date: 05 September 2011

Client Name: Eastwood & Partners
St Andrew's House
23 Kingfield Road
Sheffield

S11 9AS

For the attention of: JM Wood

Contract Title: Barnburgh Lane, Goldthorpe.

Date Received: 01-September-11

Date Commenced: 01-September-11

Date Completed: 05-September-11

Notes: Observations and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. 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.

Checked and Approved Signatories:

R Gunson
(Director)

A Watkins
(Director)

M Beastall
(Laboratory Manager)

5 – 7 Hexthorpe Road, Hexthorpe,

Doncaster DN4 0AR

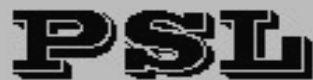
tel: +44 (0)844 815 6641

fax: +44 (0)844 815 6642

e-mail: rgunson@prosoils.co.uk

awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	05/09/11		05/09/11		05/09/11
BARNBURGH LANE, GOLDTHORPE.				Contract No: PSL11/2168	
				Client Ref: 34041/003/JMW/KLG	

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

[illegible]

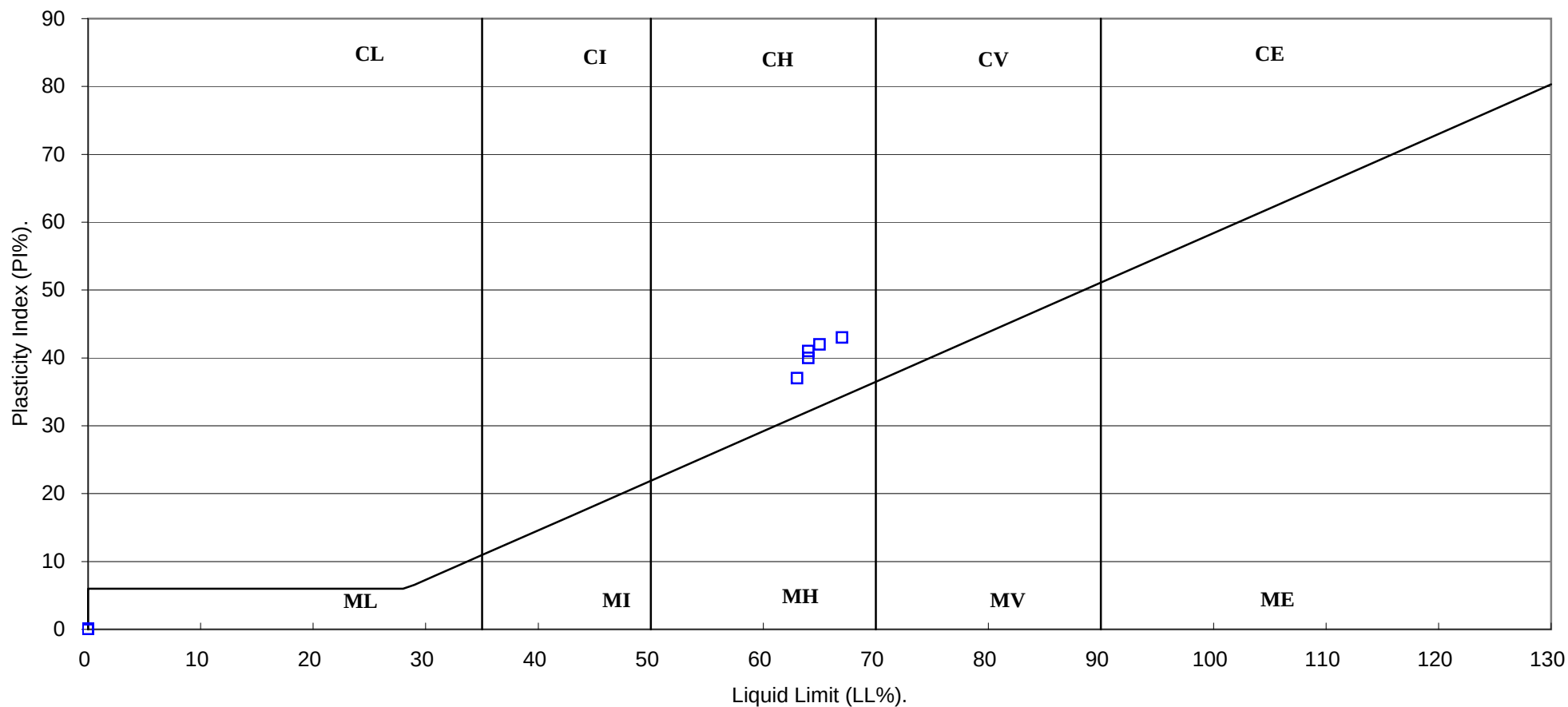
SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**

 Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		05/09/11		05/09/11		05/09/11
	BARNBURGH LANE, GOLDTHORPE.				Contract No: PSL11/2168 Client Ref: 34041/003/JMW/KLG	

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



 Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date	
		05/09/11		05/09/11		05/09/11	
	BARNBURGH LANE, GOLDTHORPE.					Contract No:	PSL11/2168
						Client Ref:	34041/003/JMW/KLG