Consolidated Geo-Environmental Report

Linglongs Lane, Whaley Bridge

For

Gladman Developments Ltd

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APPENDICES

3.0 DESK STUDY

3.1 Sources of Information

3.1.1 Lees Roxburgh have undertaken a full desk study which is enclosed within this report as Appendix 1. A summary of the salient issues are summarised in the following sections.

3.2 Site History

3.2.1 The history of the site is recorded over selected periods by the maps inspected, copies of which are supplied within the Phase I report in Appendix 1. The account presented in this report is restricted by specific time periods represented by these map only.

3.2.2 Available historical Ordnance Survey maps, from 1884 to 2013, of the site and surrounding area were inspected. A detailed site history is presented in the Lees Roxburgh Report enclosed, however a summary is shown below;

Period	On Site	Off Site
1881	The site is shown to overlie several tree lined field boundaries.	The west boundary is formed by an unnamed road. Approximately 50m south east of the site at its closest point, the River Goyt flows north. Toddbrook Reservoir is recorded ~250m north with Whaley Bridge beyond to the north east. Botney Bleach Works shown 100m east of the site. Shallcross Colliery and Ferntles Colliery 1000m and 1400m respectively to the south east. There are numerous references to Well, Quarry, Shaft, Air Shaft and Coal Pit within the surrounding area.
1885-1913	No significant changes Footpath (FP) recorded cutting south to north through the site.	A watercourse system is identified close to the east boundary of the site. A gasometer is identified close to the bleach works. Collieries to the south east no longer recorded. An air shaft and shaft are shown approximately 90m south-east of the site. Two quarries are shown within 250m (south and south west) of the site. A further 15 quarries are shown between 250m and 1000m of the site. Colliery recorded within Whaley Bridge to the north east. Terraced properties appear fronting onto Macclesfield Road shown. A tank is shown approximately 200m east as part of the bleach works.
1921-1924	No significant changes.	Gasometer beside bleach works no longer shown.
1938	No significant changes.	Residential development continues to the north.

Period	On Site	Off Site
1954-1955	No significant changes.	Botney Bleach Works has been extended to the site side of the River Goyt.
1968-1977	A Spring, Path, Track and two references to Issues are identified on site, no development is recorded.	The bleach works is recorded having been further extended with the nearest building to the east boundary of the site at some 80m. Road forming the west boundary now described as Linglongs Road with development to the west.
1985-1994	No significant changes.	The works to the east have been further extended to some 40m from the site and are now merely described as Works. Various references to Tank and Tanks noted.
2006 - Present	No significant changes.	The former Bleach Works is identified as Rotary Bans Park.

3.3 Geology, Hydrogeology and Hydrology

3.3.1 According to the inspected published geological information, the site is shown to be underlain by Devensian Till (diamicton) superficial deposits.

3.3.2 The solid geology beneath the site is shown to be mudstone, siltstone and sandstone of the Pennine Lower Coal Measures Formation.

3.3.3 The Yard coal seam is recorded as outcropping approximately 50m north west of the site and dips to the south east beneath the site.

3.3.4 According to the Environment Agency (EA), the Devensian Till is designated as unproductive strata. The bedrock of the Pennine Lower Coal Measures below the site is designated as a Secondary A Aquifer. These are described as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

3.3.5 The site is not located within a groundwater Source Protection Zone (SPZ).

3.3.6 Soils are classified as being of High Leaching Potential (H3).

3.3.7 The nearest main watercourse is the River Goyt 50m to the south east that flows in a general northerly direction.

3.3.8 Reference to the Environment Agency's flood mapping identifies the site as being located within a Zone 1 area of flood risk although Zones 2 and 3 extend towards the site across the lower lying land within the business park and the wood approximately 50m to the east.

3.4 Mineral Extraction

3.4.1 Whaley Bridge is listed within the Law Society's Guidance Notes and Directory for Coal Mining Searches as requiring a Coal Mining Report. A copy of this report is included within the Lees Roxburgh Report, enclosed as Appendix 1. The findings of this report are summarised below.

3.4.2 Reference to the Coal Authority identifies that the site is not within the zone of likely physical influence on the surface from past underground workings. However, the property is in an area where the Coal Authority believe there is coal at or close to the surface which may have been subject to (unrecorded) workings in the past.

3.4.3 The Yard coal seam is recorded as outcropping to the west of the site and dips to the south east beneath the site. This seam is a known worked scheme and indicated to be up to 1.5m thick. The cover to the seam below the site is unknown but is not expected to be significant given that the dip of the seam follows the general topography.

3.4.4 The property is not within the zone of influence of any present or planned future underground coal workings although reserves of coal do exist in the local area which could be worked at some time in the future.

3.4.5 There are three BGS recorded mineral sites registered within 250m of the site, the licences for which have now ceased. The nearest recorded mineral site was Horwich End which extracted sand and gravel by opencast.

3.5 Environmental Considerations

3.5.1 Specific details relating to the environmental setting of the site are presented within the Lees Roxburgh Report included as Appendix 'A'. The salient issues which relate to the site are summarised as follows:

- There are no contaminated land entries within 1000m of the site;
- There is one waste transfer site within 500m of the site, this was at 416m to the northwest, the licence for which lapsed in 1993;
- There are no recorded BGS, historical, Local Authority or registered landfills within 500m of the site boundary;
- There are no Licensed Waste Management Facilities located within 1000m Of the site;
- There are eight Pollution Incidents to Controlled Waters registered within 250m of the site (one of which is recorded within the site boundary), all of which are classified as Category 3 Minor Incidents. The most recent of which occurred in 1998 and was associated with an accidental oil spillage to the River Goyt.
- There are no Local Authority Pollution Prevention Controls registered within 250m of the site;

- There are no discharge consents registered within 500m of the site;
- There are one water abstraction point within 500m of the site boundary, the nearest of which is located 117m to the east and was utilised for manufacturing at Botany Bleach Works. The status of the licence for this abstraction is revoked/lapsed or cancelled;
- The Peak District National Park is located 112m south of the site and Toddbrook Reservoir located 213m north-west of the site is designated as a Site of Special Scientific Interest (SSSI).
- There are eleven Contemporary Trade Directory entries recorded within 250m of the site described as either active or inactive. None were deemed by Lees Roxburgh as requiring consideration in respect to the development of the site; and
- There is one fuel station entry within 260m of the site, this is located to the north west off Buxton Road.

3.5.2 There are no other pertinent features contained within the Envirocheck Report which may affect the redevelopment of the site.

3.6 Radon

3.6.1 The Building Research Establishment have produced their revised document BRE211 ("Radon guidance on protective measures for new buildings" 2007 Edition). This provides a staged framework to determine whether radon protective measures should be afforded to new dwellings.

3.6.2 This site requires basic radon protective measures.

3.7 Asbestos

3.7.1 Lees Roxburgh did not identify any issues associated with asbestos within the Phase I report.

3.8 Local Authority Environmental Searches

3.8.1 Lees Roxburgh undertook an environmental information request with High Peak Borough Council, the response is enclosed within the Phase 1 Report in Appendix 1.

3.8.2 High Peak Borough Council hold no entries relating to the site or surrounding land.

4.0 PRELIMINARY CONCEPTUAL SITE MODEL

4.1 Potential Sources of Contamination

4.1.1 From desk based information the following potential **on site** sources of ground contamination have been identified:

- Pesticides due to historical agricultural use; and
- Ground gases from historic shallow coal workings if present beneath the site.

4.1.2 From Desk Based Information the following potential **off site** sources of ground contamination have been identified:

- Ground gases from historic shallow coal workings in the vicinity of the site;
- Ground gases from historic backfilled quarries in the vicinity of the site; and
- Chemicals from nearby bleach works (considered unlikely due to site topography).

4.2 Receptors of Contamination and Migration Pathways

4.2.1 Receptors are defined as human or non-human organisms that have the potential to experience adverse effects from direct or indirect exposure to contaminated material.

4.2.2 Migration pathways are defined as the courses chemicals take from a source to an exposed organism or receptor. The exposure pathway can be direct (i.e. stays within the same exposure media) or indirect transport from one medium to another takes place.

4.2.3 The following potential human health and environmental receptors have been identified:

- Future site occupants;
- Site construction and maintenance workers;
- Neighbouring occupants;
- Future building materials;
- Vegetation, proposed/existing landscaping; and
- Surface water drains on and off site;
- River Goyt and stream located within eastern boundary of the site; and
- Underlying Secondary A aquifer of the Pennine Lower Coal Measures.

4.2.4 The following potential migration pathways have been identified:

- Inhalation
  Breathing dust and vapours from contaminated soil in outdoor air. Vapours can also migrate into buildings resulting in inhalation by the occupants.

- Ingestion
  Eating and swallowing of contaminated soil and/or groundwater either by deliberate consumption, indirectly by eating or smoking with dirty hands or by ingestion of fugitive dust.

- Dermal Contact
  Direct contact with contaminated soil and groundwater, causing skin conditions such as dermatitis etc. Certain contaminants can be absorbed into the body through the skin or enter directly through open cuts or abrasions.

- Migration of Contaminated Water
  Contaminated groundwater can migrate laterally or vertically dependent on permeability, preferential pathways, man-made voids etc.

- Leaching
  Infiltration of water through soil can leach out soluble contaminants resulting in groundwater pollution.

- Migration of Ground Gases
  Generated ground gases can migrate laterally or vertically dependent on permeability, preferential pathways, man-made voids etc.

- Aggressive Attack
  Building materials can be damaged by direct contact with aggressive ground conditions, for example sulphate attack on concrete and hydrocarbon attack on plastics.

- Uptake By Plants And Vegetables
  Some contaminants may be toxic to plants but not necessarily to human health at the same concentrations. In addition, plants may uptake contaminants through their roots, which, in the case of home-grown vegetables may later be consumed by humans. Contaminated soil adhered to vegetables can also be potentially ingested if not properly washed before consumption. Plant growth can also be adversely affected by landfill gas.

4.3 Source-Pathway-Receptors Relationships

4.3.1 The following potential **Source-Pathway-Receptor** relationships have been identified for the site bearing in mind the development proposals;

Source	Pathway	Receptor
Contaminated soil	Ingestion (excluding home-grown produce) Dermal contact Inhalation (outdoor air)	Construction workers Future occupants
Contaminated soil	Inhalation (indoor air)	Future occupants
Contaminated soil	Ingestion (inc. home-grown produce)	Future occupants
Contaminated soil	Leaching and migration	Controlled waters (surface waters and aquifers)
Contaminated soil and groundwater	Aggressive attack	Building materials
Contaminated soil and	Root uptake	Vegetation

Source	Pathway	Receptor
groundwater		
Contaminated groundwater	Dermal contact Inhalation of vapours (outdoor air)	Construction workers Future occupants
Contaminated groundwater	Lateral and vertical migration	Controlled waters (surface waters and aquifers)
Ground Gases	Migration of ground gases	Future occupants and building materials

4.3.2 A schematic representation of the above is included as drawing DO_J-D1747.00_403 R0.

5.0 INVESTIGATION METHODOLOGY

5.1 Objectives

5.2.1 The objectives of the investigation were to:

- Determine ground conditions for the purpose of constructing residential dwellings;
- Determine foundation solutions for proposed residential dwellings;
- Determine presence of shallow coal or workings in underlying strata; and
- Carry out an environmental assessment of the ground in relation to any likely contamination affecting the end use of dwellings with residential gardens.

5.3 Clearance of Underground Services

5.3.1 Prior to any intrusive works being undertaken, the positions of exploratory holes were agreed with the client and scanned for the presence of underground utilities using a cable avoidance tool (CAT).

5.4 Site Works

5.4.1 The site investigation was undertaken between 27th to 31st October 2014 and comprised:

- Thirteen window sample boreholes (WS1 – WS13) to a maximum depth of 8.0 metres below existing ground level (m begl) undertaken by RP Drilling using a percussive windowless sampling rig (Competitor Dart);
- Four rotary boreholes (RO1 – RO4) to a maximum depth of 27.0m begl undertaken by Dynamic Sampling utilising a Comacchio GEO205 tracked rotary rig;
- Ten trial pits (TP1 – TP10) to a maximum depth of 2.6m begl using a backhoe excavator (JCB 3CX type);
- Five in situ CBR tests were undertaken in trial pits CBR1 – CBR5.

5.4.2 All works were undertaken under the supervision of an Opus field engineer.

5.4.3 Disturbed samples were taken at selected intervals from the encountered geology within the window sample boreholes and trial pits based upon the observations of the Opus field engineer. Samples were placed in laboratory supplied bottleware for submission for analytical testing.

5.4.4 In-situ standard penetration tests (SPTs) were undertaken at selected depths within WS1 to WS13.

5.4.5 In addition to the above investigation, soakaway testing was undertaken in three trial pits, SA1, SA2a and SA3, between 3rd and 6th November 2014. The results of this investigation were reported under separate cover, the letter report is enclosed as Appendix 6.

5.4.6 The results of the CBR testing are enclosed as Appendix 4.

5.4.7 Four boreholes (WS2, WS10, WS11 and RO1) were installed with 51mm inner diameter HDPE monitoring wells to allow for groundwater and gas monitoring to be undertaken. The remaining exploratory holes were backfilled to ground level with soil arisings. Monitoring well construction details are provided in the borehole logs in Appendix 2.

5.4.8 The approximate locations of the exploratory holes are shown on the appended Drawing No. DO J-D1747.00_402_R1 and the exploratory hole logs are presented in Appendix 2.

5.5 Chemical Laboratory Testing

5.5.1 As part of the assessment for potential contamination at the site, twenty-four soil samples were scheduled for selected chemical analysis. This analysis was by Scientific Analysis Laboratories Ltd (SAL), a UKAS and MCERTS accredited laboratory.

5.5.2 The following analyses were undertaken:

- General Screening suite (including metals and PAHs) 15 samples
- OCP/OPP Pesticides 6 samples
- Concrete Classification 5 samples
- Asbestos ID 5 samples
- Total Petroleum Hydrocarbons (TPH) 3 samples

5.5.3 The results of the chemical testing are presented in Appendix 3.

5.6 Geotechnical Laboratory Testing

5.6.1 Five representative samples of natural clay and sand soils were submitted to Professional Soils Laboratory, a UKAS accredited testing laboratory, for determination of the modified plasticity index, in accordance with NHBC Standards, as shown in the table below. The geotechnical test results are enclosed as Appendix 3.

Location	Sample No	Depth (m bgl)	Description	Analysis
TP4	D118	0.50	Sand	Atterberg Limits & Natural Moisture Content
TP7	D130	1.00	Clay	Atterberg Limits & Natural Moisture Content
TP9	D137	0.50	Clay	Atterberg Limits & Natural Moisture Content
TP3	D116	2.00	Clay	Atterberg Limits & Natural Moisture Content
TP2	D114	0.80	Clay	Atterberg Limits & Natural Moisture Content

5.7 Gas Monitoring

5.7.1 Potential sources of ground gas generation were identified as part of the desk study relating to potential on-site shallow coal workings and backfilled opencast mineral sites within 250m of the site.

5.7.2 Neither shallow coal nor coal workings were encountered during the ground investigation, therefore installations were generally constructed in the window sample holes within the shallow strata, however, one rotary borehole was also installed with a monitoring well.

5.7.3 Four gas monitoring installations were constructed within rotary boreholes RO1 and window sample holes WS2, WS10 and WS11.

5.7.4 In accordance with CIRIA C665 Table 5.5a and 5.5b the source of ground gas is deemed to be very low given no coal workings were identified during the investigation. Considering this, a monitoring period of six visits over three months is currently being undertaken.

5.7.5 The gas monitoring programme is currently underway with one visit completed to date, recommendations for ground gas risk protection, if required, shall be reported under separate cover.

5.8 Soakaway Testing

5.8.1 Soakaway testing was undertaken in three pits (SA1, SA2a and SA3) between 3rd November and 6th November 2014. The full letter report J-D1747.00_L2_JO is enclosed as Appendix 6 in this report, and summarised in Section 6.6 of this report.

6.0 RESULTS OF THE INVESTIGATION

6.1 Geology

6.1.1 A summary of the geology encountered within the exploratory holes is provided below. Further details can be found in the exploratory hole logs presented in Appendix 2.

6.1.2 Firm consistency brown clay topsoil was encountered in all thirty six exploratory holes to depths ranging between 0.20m and 0.35m below existing ground level (begl).

6.1.3 Superficial deposits of Devensian Till were encountered to depths ranging between 1.4m and 11.5 m begl. However, the base of these deposits was only encountered in the rotary boreholes RO1 – RO4 with proven thicknesses ranging between 4.5m and 17.0m.

6.1.4 These deposits were generally recovered as soft consistency sandy gravelly clay (with cobbles and boulders). However, clayey and/or gravelly sand horizons were also encountered within the Devensian Till unit. No discernible lateral or vertical distribution trends were observed with respect to the sand horizons across the site.

6.1.5 Mudstone bedrock (with occasional interbedded sandstone) of the Pennine Lower Coal Measures was encountered underlying the Devensian Till within the four rotary boreholes RO1 – RO4 from a depth of between 4.5m begl (RO2) and 17.0m begl (RO3). The base of Pennine Lower Coal Measures was not proven during this investigation.

6.1.6 Given the potential for shallow coal beneath the site, rotary boreholes were sunk to a depth considered suitable. No significant coal was encountered as part of these works, therefore shallow coal is not considered to affect the site.

6.2 Groundwater

6.2.1 Groundwater seepages were encountered in fourteen of the exploratory holes between depths of 0.30m and 4.50m begl.

6.2.2 Resting groundwater depths ranged between 0.44m and 15.10m begl (WS2 and RO1 respectively) during the first gas monitoring round undertaken on 5th October 2014.

6.3 Field Observations

6.3.1 No visual or olfactory evidence of potential contamination was observed during the course of the intrusive investigation.

6.4 Chemical Testing

6.4.1 The results of the chemical testing on soil samples have been reviewed in accordance with the legislative framework and criteria set out in Appendix 3.

6.4.2 From the ground investigation the following geological horizons were identified:

- Topsoil; and
- Devensian Till.

6.4.3 Where possible the results of the analysis have been assessed using statistical analysis as outlined in CLAIRE 'Guidance on Comparing Soil Contamination Data with a Critical Concentration' Dated May 2008. Appropriate UCL (Upper Confidence Limit) values have

been calculated for those identified strata types with sufficient analysis (i.e. three or more test results).

6.4.4 The results of the chemical testing are enclosed as Appendix 3, however, where concentrations of the detected determinands have exceeded their respective human health generic assessment criteria (HH GAC) they are tabulated below. The selected HH GAC are based upon a future residential with gardens land-use scenario.

6.4.5 Topsoil

The mean total organic carbon (TOC) content of samples recovered from the topsoil horizon is 3.6%, equivalent to 6.1% soil organic matter (SOM). Therefore, HH GAC based upon an SOM of 6% have been adopted. The TOC result of 16.0% from WS9 0.2m have been disregarded as being spurious and not included within the above calculation.

Six samples from this horizon were submitted for a general suite of analysis including heavy metals and polycyclic-aromatic hydrocarbons (PAHs). No exceedances of HH GAC were detected with the exception of following analyses all within the WS5 0.2m sample:

Location	Depth (m)	Determinand	Detected Concentration mg/kg	HH GAC mg/kg
WS5	0.20	Benzo(a)anthracene	17	8.5
WS5	0.20	Benzo(a)pyrene	21	5.0
WS5	0.20	Benzo(b)fluoranthene	22	9.9
WS5	0.20	Dibenzo(ah)anthracene	1.6	1.0

Whilst four minor exceedances of HH GAC were detected for these compounds, they are considered unlikely to be representative of a potential risk to human health. Elevated PAH concentrations are typically associated with ashy material, which commonly also have coincidental high heavy metals concentrations. However, given the absence of elevated heavy metals concentrations within this sample above the background levels detected in other topsoil samples and the lack of any ashy material observed within the borehole log, ash is considered unlikely to be the source of the elevated PAHs in this sample.

Instead, it is considered more likely that an inclusion, such as a coal fragment or organic mudstone (considering the local Coal Measures bedrock geology), was incorporated within the sample analysed by the laboratory. Due to the high organic content of such materials, artificially elevated PAH concentrations can result that are not actually representative of the wider soil matrix. This is considered to be a more likely source of the PAHs given the absence of any observations of ashy material within the soil or the co-occurrence of elevated heavy metals.

One sample of topsoil was submitted for total petroleum hydrocarbons criteria working group (TPH-CWG) analysis. No exceedances of HH GAC were detected.

Two samples from this horizon were also analysed for organochlorine and organophosphate pesticides (OCP/OPP). No exceedances of HH GAC were detected.

Three samples were analysed for the potential presence of asbestos fibres. No asbestos was detected within the samples.

6.4.6 Devensian Till

The mean total organic carbon (TOC) content of samples recovered from the Devensian Till horizon is 0.9%, equivalent to 1.6% soil organic matter (SOM). Therefore, HH GAC based upon an SOM of 1% have been adopted.

Nine samples from this horizon were submitted for a general suite of analysis including heavy metals and PAHs. No exceedances of HH GAC were detected.

Two samples of topsoil were submitted for TPH-CWG analysis. No exceedances of HH GAC were detected.

Four samples from this horizon were also analysed for OCP/OPP. No exceedances of HH GAC were detected.

Two samples were analysed for the potential presence of asbestos fibres. No asbestos was detected within the samples.

6.4.7 It should be noted that the classification of soil for waste disposal purposes and any resulting waste acceptance criteria (WAC testing) required under the Landfill Regulations introduced in July 2005 is beyond the scope of this report.

6.5 Geotechnical Testing

6.5.1 Five representative samples of natural superficial deposits (clay and silty sand) were submitted to Professional Soils Laboratory (PSL), a UKAS accredited laboratory and the following tests undertaken to determine soil properties as related to foundation design and construction:

- Natural Moisture Content — BS1377; Part 2; 1990
- Plasticity Index Analysis — BS1377; Part 2; 1990

6.5.2 Results of the geotechnical testing are presented in full within Appendix 4, and summarised within the table below.

Location	Sample Number	Depth (m)	Plasticity Index (p)	Modified Plasticity Index (p')	Volume Change Potential	Material Type
TP2	D114	0.80	23	23	Medium	Clay
TP3	D116	2.00	11	10	Low	Clay
TP4	D118	0.50	15	14	Low	Clayey Sand
TP7	D130	1.00	20	20	Medium	Clay
TP9	D137	0.50	20	19	Low	Clay

6.5.3 In accordance with NHBC Chapter 4.2 and for the purpose of calculating the effect of trees, the natural clays should be detailed as having a medium volume change potential.

6.6 Ground Gases

6.6.1 The site requires basic radon protective measures.

6.6.2 Potential sources of ground gas generation were identified as part of the Phase I Desk Study. As such, four monitoring wells (WS2, WS10, W11 and RO1) were installed in and are currently undergoing monitoring. A full gas risk assessment shall be undertaken and reported under separate cover.

6.6.3 The preliminary results to date are included as Appendix 5 and result in an interim classification of Green in accordance with the NHBC Traffic Light Classification. This is a preliminary result and is subject to change upon the concentrations recorded on subsequent monitoring visits. As such, no design specification decisions should be made until the final gas risk classification is determined following completion of the gas monitoring programme.

6.7 Soakaway Testing

6.2.1 Soakaway testing was undertaken in three pits (SA1, SA2a and SA3) between 3rd November and 6th November 2014. The full letter report J-D1747.00_L2_JO is enclosed as Appendix E in this report, however, a summary of the results is details below.

Test location	Infiltration Rate ($m^3/m^2/sec \times 10^{-5}$)	
	Test 1	**Design Rate**
SA1	N/A	N/A
SA2A	N/A	N/A
SA3	N/A	N/A

6.2.2 All tests failed to achieve 50% empty within 24 hours and, therefore, are deemed to have failed, in accordance with BRE Digest 365.

6.2.3 Considering the cohesive strata as logged across the majority of the site and shallow ground water table the soakaway results are considered to be representative. Therefore, it is considered that soakaways are not a feasible form of surface water drainage for this site, and alternative methods should be sought.

ASSESSMENT & RECOMMENDATIONS

7.0 INTRODUCTION

7.1 This report has been prepared on the understanding that the site is to be developed with residential properties with gardens. Should the proposed site usage change significantly from the above, the contents of this report will require review and amendment as appropriate.

7.2 The ground conditions are typified by the presence of topsoil underlain clay with sand lenses (Devensian Till) and subsequently by mudstone (with interbedded sandstone) bedrock from depths of between 4.5m and 17.0m begl.

8.0 ENVIRONMENTAL ASSESSMENT

8.1 Soil Contamination Summary

8.1.1 The results of the laboratory testing undertaken have been assessed in accordance with the philosophy and Tier 1 screening values presented in Appendix 3. It is considered that as a conservative Tier 1 assessment, it is appropriate to adopt screening values for residential with home grown produce.

8.1.2 The soils encountered on site are divided into three main types:

- Topsoil;
- Devensian Till.

8.1.3 The results of the chemical testing are enclosed as Appendix 3 and are discussed below.

8.1.4 Topsoil

As discussed within Section 6.4 above, the four minor PAH exceedances detected within sample WS5 0.2m are not considered to be representative of the wider soil matrix concentrations at this location. As such, they have been discounted from further assessment.

Since no further exceedances of HH GAC were detected within the remainder of this horizon, it is considered that removal of the hotspot would leave the remaining topsoil chemically suitable for reuse at surface within garden areas.

8.1.5 Devensian Till

Since no exceedances of HH GAC were detected within this horizon, this soil is considered chemically suitable for reuse at surface within garden areas.

8.2 Risk Assessments

8.2.1 Whilst the site is located on a Secondary A Aquifer, given the non-detect or low concentrations of potential contaminants and the predominant low permeability of the Devensian Till deposits, it is considered that the potential risks to controlled waters receptors are unlikely.

8.2.2 Given the above, it is considered that there is a negligible risk to receptors. Whilst the slightly elevated PAH concentrations at WS5 0.2m are considered unlikely to be representative of the wider soil matrix at this location, limited further sampling of the topsoil around this area may be prudent in order to confirm this.

8.3 Revised Conceptual Site Model

8.3.1 In light of the results of this investigations, there are no viable and potentially significant Source-Pathway-Receptor linkages are considered to exist at the site. The topsoil and Devensian Till deposits are considered suitable for reuse and retention on site. However, it is considered prudent to undertake limited topsoil sampling in the vicinity of WS5 to confirm the materials encountered in this area are suitable for reuse.

8.3.2 Assessment of potential risks from ground gases will be evaluated under separate cover.

8.3.3 The site has been identified as requiring basic radon protective measures, at this stage the risk to the site as a result of ground gas generation is undergoing monitoring and subsequent assessment.

8.4 Recommended Remedial Strategy

8.4.1 Based on the results of the investigation, no remediation of the site is considered necessary. However, it is considered prudent to undertake limited topsoil sampling in the vicinity of WS5 to determine the legitimacy of the observed concentrations.

8.4.2 In addition to the above basic radon protective measures are required across the site and gas protection measures may be required subject to the results of the ongoing monitoring.

8.5 Health & Safety

8.5.1 Even considering the very low level of contamination on site, during the reclamation and construction phases of the site development it will be prudent to protect the health and safety of site personnel. General guidance on these matters is given in the Health and Safety Executive (HSE) document "Protection of Workers and the General Public during the Redevelopment of Contaminated Land". The guidance is useful whether contamination is present or not.

8.5.2 In summary, the following measures are suggested to provide a minimum level of protection:

- All ground workers should be issued with the relevant protective clothing, footwear and gloves. These protective items should not be removed from the site and personnel should be instructed as to why and how they are to be used.
- Hand-washing and boot-washing facilities should be provided.
- Good practices relating to personal hygiene should be adopted on the site.
- The contractor shall satisfy the Health and Safety Executive with regard to any other matters concerning the health, safety and welfare of persons on the site.

8.6 Waste Disposal

8.6.1 Due to the implementation of the Landfill Directive the details of any soils which may require removal from the site should be supplied to the proposed disposal point for clarification on whether a suitable license is held to receive materials with the contamination levels recorded.

8.7 Service Pipes

8.7.1 No special precautions to protect water supply mains from soil contaminants are considered necessary, however this should be confirmed with the relevant service providers.

9.0 GEOTECHNICAL ASSESSMENT

9.1 Foundation Design

9.1.1 The following recommendations are made assuming that site levels will remain similar to those at present. If this is not the case then the following will require review and possible amendment.

9.1.2 The site is generally underlain by clay with sandstone gravel and boulders and occasional sand lenses. Mudstone was encountered underlying the clay deposits from depths between 4.5m and 17.0m begl.

9.1.3 Considering this, the most economic foundation solution is considered to be unreinforced strip footings, founding within the natural ground at a minimum depth 900mm in medium volume change cohesive ground. This should be below existing or finished ground level, whichever is appropriate in accordance with NHBC Guidance. Additional deepening due to trees may be required locally in accordance with NHBC Chapter 4.2.

9.1.4 Variable horizons of sand were encountered during the investigation. Where granular soils are encountered, it is recommended that a minimum footing depth of 600mm is utilised. Should footings span differing geology types the foundations should be deepened to found wholly within the same material. Alternatively, it may be prudent to allow for light reinforcement although this will require approval by the relevant authorities at the appropriate time.

9.1.5 It should be noted that highly variable ground conditions were encountered across the site during the investigation. It is therefore recommended that following confirmation of the final site layout, a plot specific investigation is undertaken to determine the localised ground conditions prior to any foundation design.

9.1.6 Though considered unlikely due to the depth of rockhead encountered, if competent mudstone is encountered additional deepening may cease where a whole footing is founded entirely on mudstone and keyed in an additional 150mm.

9.1.7 Based on an allowable settlement of 25mm on a 600mm wide strip footing at a minimum depth of 900mm, foundations should be designed based on an allowable bearing capacity of 100KN/m^2.

9.1.8 Should footings encounter granular material, based on an allowable settlement of 25mm on a 600mm wide strip footing at a minimum depth 600mm, a foundations should be designed based on an allowable bearing capacity of 50KN/m^2.

9.1.9 The results of pH and water soluble sulphate testing for the soils present on site indicate that the site should be classified as having a concrete design sulphate class as summarised below.

9.1.10 Where footings are in areas of natural material (clay/mudstone) or topsoil a concrete design sulphate class of DS-1 and ACEC class AC-1, as defined in BRE Special Digest 1 (2005).

9.1.11 In addition to the above, known services, including a water pipe and gas main, are known to cross the site. These areas were not disturbed during investigation works but the location of the services and the deep made ground associated with the features should be considered during layout planning. Where deep made ground is encountered all footings

require deepening through the made ground and keyed in a minimum of 150mm into the underlying natural soils.

9.2 Floor Slab Design

9.2.1 Suitable floor slabs for medium volume change potential clays in accordance with NHBC Standards Chapter 4.2 will be required.

9.2.2 Basic radon gas protection measures are required.

9.2.3 Ground gas monitoring programme is currently being undertaken, recommendations for ground gas risk protection, if required, shall be reported under separate cover.

9.2.4 The results to date are included as Appendix 5 and result in a current classification of Green due to a maximum recorded concentration of 0.3% for carbon dioxide and non-detected methane.

9.2.5 The Green classification has the requirement for no ground gas protection measures however this is for guidance only and is subject to confirmation once monitoring is complete. A carbon dioxide concentration of 5% or greater would result in ground gas protective measures being required, it would therefore be prudent to allow for the provision of ground gas protective measures until confirmation is received. However, it should be noted that no design specification decisions should be taken until completion of the gas monitoring programme and the final level of gas risk is evaluated.

9.3 Building Near Trees

9.3.1 In accordance with industry best practice, NHBC Standards Chapter 4.2, the near surface natural clay soils have been classed as medium volume change potential and, therefore, deepening due to existing or proposed trees shall require consideration where foundations are founded within clay.

9.3.2 Weathered mudstone was encountered at varying depths across the site, where foundations have been deepened due to the presence of trees, deepening may cease in rockhead provided a key in of 150mm into competent rock is achieved. However, this is considered unlikely as the shallowest rockhead encountered was at 4.5m (begl).

9.3.3 The extent of deepening due to existing trees shall be present across the majority of the site due to the existing surrounding hedges and mature trees and sporadic mature trees in some of the fields.

9.4 Pavement Design

9.4.1 In situ CBR testing was undertaken in five locations across the site as summarised below;

CBR Location Reference	CBR Value (%)	Depth of Test (m)
CBR1	1.2	0.20
CBR2	1.5	0.30
CBR3	1.8	0.30
CBR4	3.3	0.30
CBR5	3.4	0.30

9.4.2 The tests were undertaken within natural clay at an average depth of 0.45m (begl), for the purpose of road design a CBR design value of 1.2% should be adopted within the natural clay.

9.5 Construction

9.5.1 Groundwater seepages were encountered in fourteen of the exploratory holes between 0.30m and 4.50m begl.

9.5.2 Groundwater depths ranged between 0.44m and 15.10m begl (WS2 and RO1 respectively) during the first gas monitoring round undertaken on 5th October 2014. Whilst unlikely due to the general low permeability nature of the superficial deposits, some dewatering measures may be required in areas of high permeability ground.

9.5.3 Where exploratory holes encountered clay soils no side stability issues were noted, however, exploratory holes which encountered sand were noted to experience some collapse and/or side stability issues, due to running sands.

9.6 Soakaways/Drainage

9.6.1 Following testing undertaken on site, it is considered that soakaways are not a feasible form of surface water drainage for this site and alternative methods should be sought.

10.0 FURTHER WORKS

10.0.1 The following further works have been recommended prior to the development of the site:

a) Limited delineation sampling and assessment localised elevated PAH concentrations at window sample WS5;

b) Following finalisation of site layout, further investigation is undertaken to determine the localised ground conditions for foundation design;

c) Full foundation schedule in accordance with NHBC Standards Chapter 4.2

d) Full tree survey (If not already undertaken); and

e) Completion of full gas monitoring programme and gas risk assessment.

APPENDIX 1
Lees Roxburgh Ltd - 5644/R1 –
Phase 1 Desk Study Report - February 2014

LEES
ROXBURGH
Consulting Engineers

LEES ROXBURGH LIMITED
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Telephone: 01925 812898 Fax: 01925 838864
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Web Site: www.leesroxburgh.co.uk

Report No: 5644/R1

LINGLONGS ROAD, WHALEY BRIDGE, DERBYSHIRE

PHASE 1 GEOENVIRONMENTAL ASSESSMENT (DESK STUDY)

FEBRUARY 2014

Prepared By: **John E Lees B.Sc., C.Eng., M.I.C.E., M.C.I.W.E.M.**

Client: **Gladman Developments Ltd**
Gladman House
Alexandria Way
Congleton
Cheshire
CW12 1LB

Further evidence of groundwater flows into the site was noted centrally to the northern boundary alongside the track.

2.5.4 These systems link beyond the eastern site boundary and flow into an 800mm wide by 500mm deep stone lined channel which then appears to be culverted through the business park. It reappears downstream of the main building in a well formed, well maintained stone channel which then becomes culverted prior to connection to the River Goyt.

2.5.5 The public surface water sewer system from the housing development to the west discharges into the site close to the Linglongs Road boundary. However, there is no evidence of a ditch system here which, under current regulatory requirements, would be deemed as an acceptable outfall.

2.5.6 It is also noted that a minor ditch system to the south west at the junction of Lanehead Road with Linglongs Road has been connected into the combined sewer system which continues downstream through the area of the school, through the site and into Whaley Bridge.

2.5.7 More generally, there are numerous watercourse and ditch systems in the area identified on OS mapping.

2.5.8 Reference should be made to the Flood Risk Assessment for more detailed consideration of drainage matters.

3.0 GEOLOGICAL, HISTORICAL AND ENVIRONMENTAL SETTING

3.1 Sources of Information

3.1.1 Reference has been made to the Landmark Envirocheck report dated 24th June 2013 (**Appendix 2A**).

3.1.2 Reference has also been made to the Coal Authority **(Appendix 2B)** and to High Peak Borough Council. **(Appendix 2C).**

3.2 Historical Maps

3.2.1 The Envirocheck report provides mapping dating back to 1881.

3.2.2 **1881** mapping identifies the site located within an area of open fields and areas of extensive woodland with only sporadic development.

The site is clear of development with only internal tree lined boundaries recorded.

The west boundary is formed by an unnamed road.

To the east the *River Goyt* winds north 50m from the south east corner of the site at the closest.

Taxal Wood, an extensive area of woodland, is situated some 150m west of the site extending to the south.

Lodge Cottages and *Lodge Wood* are recorded immediately to the south of the site.

Toddbrook Reservoir is recorded to the north with *Whaleybridge* beyond to the north east.

A *Rifle Range* is recorded within Lodge Wood.

Botney Bleach Works is identified immediately to the north east apparently to the west of the river.

Shallcross Colliery and *Ferntles Colliery* 1km and 1.4km respectively to the south east.

There are numerous references to *Well, Quarry, Shaft, Air Shaft* and *Coal Pit* within the surrounding area.

3.2.3 **1885 to 1913** mapping continues to record the site as open fields providing more details with respect to field boundaries.

The number of internal field boundaries reduces by 1898.

A watercourse system is identified close to the east boundary of the site.

Reference to a *Trough* within the southern area of the site.

Footpath *(FP)* recorded cutting south to north through the site.

Roads to the north and forming the west boundary identified but not annotated.

Lodge Wood more clearly identified as is the Rifle Range.

Taxel Lodge appears to the south within the wood.

Air Shaft some 200m to the south west.

Botney Bleach Works remains recorded and shown to the far side of the River Goyt.

Gasometer identified close to the bleach works.

Collieries to the south east no longer recorded.

Numerous references to *Air Shaft, Old Air Shaft, Old Shaft, Old Pit, Quarry, Old Quarry, Old Coal Pit* and *W* (well) within the surrounding area but particularly concentrated to the east.

Well also recorded near the south west corner of the site near *Lodge Cottages.*

Colliery recorded within Whaley Bridge to the north east.

Terraced properties appear fronting onto *Macclesfield Road* which by 1909 is annotated.

Taxal annotated to the south.

3.2.4 **1921 to 1924** mapping records the site as remaining unchanged**.**

Some workings are recorded to the opposite side of the River Goyt to the south east.

The Bleach Works remains recorded but reference to the gasometer has disappeared.

3.2.5 **1938** mapping records the site as remaining substantially unchanged with the exception of appearance of internal field boundaries to the west area of the site.

Frontage development has extended to Macclesfield Road over the full length of the northern boundary of the site.

Road forming the west boundary now annotated as *Taxal Edge Road.*

3.2.6 **1954 to 1955** mapping the site side remains clear of development.

Botney Bleach Works has been extended to the site side of the River Goyt.

3.2.7 **1968 to 1977** mapping shows more detailed information to the site area and identifies a *Spring, Path, Track* and two references to *Issues.* No development is recorded.

Arrows identify a ditch/watercourse system leaving the east boundary of the site and flowing towards the bleach works.

The bleach works is recorded having been further extended with the nearest building to the east boundary of the site at some 80m.

Taxal Lodge School with *Tennis Courts* now recorded to the south.

Road forming the west boundary now described as *Linglongs Road* with development to the west.

General extension of development off Macclesfield Road to the north noted.

3.2.8 **1985 to 1994** mapping identifies no change within the site area.

The works to the east have been further extended to some 40m from the site and are now merely described as *Works*. Various references to *Tank* and *Tanks* noted.

3.2.9 **2006 to date** mapping provides more detail with respect to watercourses and water features.

It continues to show the site as remaining clear of development but with references to *Track, Path*, *Spr* (Spring) and *Issues* with a watercourse system leaving the east boundary of the site into the works.

Current mapping identifies the former Bleach Works as *Rotary Bans Park*.

The buildings to the south are merely described as *School.*

3.3 Site Geology and Hydrogeology

3.3.1 Reference to geological mapping identifies the site as being free of Superficial Deposits to the south west and otherwise underlain by the Devensian Till (boulder clay).

Close to surface (to the south west) or otherwise below the clay the site is underlain by mudstone, siltstone and sandstone of the Pennine Lower Coal Measures Formation.

The Yard coal seam is recorded as outcropping just to the west of the site and dips to the south east beneath the site.

3.3.2 Soils are classified as a combination of High Leaching Potential (H3) and Low Leaching Potential.

3.3.3 Superficial Aquifer designation is given as both Unproductive Strata and Secondary Aquifer A.

Bedrock Aquifer designation is given as Secondary Aquifer A.

3.3.4 The site is not located within a Source Protection Zone.

3.4 Estimated Soil Chemistry

3.4.1 Estimated background concentrations for the following metals have been provided;

- Arsenic <15mg/kg
- Cadmium < 1.8mg/kg
- Chromium 60-90mg/kg
- Lead < 150mg/kg
- Nickel <15 and 15-30mg/kg

3.4.2 Whilst levels of Chromium, and to a less extent, Nickel are marginally elevated, these are not considered as presenting a risk.

3.5 Hydrology and Flooding

3.5.1 The nearest main watercourse system is the River Goyt just to the east.

3.5.2 Reference to the Environment Agency's flood mapping identifies the site as being located within a Zone 1 area of flood risk although Zones 2 and 3 extend towards the site across the lower lying land within the business park and the wood.

3.6 Pollution Incidents to Controlled Waters

3.6.1 8 No. pollution incidents are recorded either within the site or within the vicinity of the site.

These are all described as Category 3 – Minor Incident with the most recent dated 4th June 1998.

3.7 Mining and Extraction

3.7.1 Reference to the Coal Authority identifies that the property is not within the zone of likely physical influence on the surface from past underground workings.

However, the property is in an area where the Coal Authority believe there is coal at or close to the surface which may have been subject to (unrecorded) workings in the past.

The Yard coal seam is recorded as outcropping to the west of the site and dips to the south east beneath the site. This seam is a known worked scheme and indicated to be up to 1.5m thick.

The cover to the seam below the site is unknown but is not expected to be significant given that the dip of the seam follows the topography.

3.7.2 The property is not within the zone of influence of any present or planned future underground coal workings although reserves of coal do exist in the local area which could be worked at some time in the future.

3.8 Waste and Landfill Sites

3.8.1 A Waste Transfer Site, for which the license lapsed in 1993, registered to British Gas is identified 416m to the north west.

Otherwise there are no records of waste or landfill activities within 1km of the site.

3.9 Contaminated Land Entries

3.9.1 High Peak Borough Council hold no entries relating to the site or surrounding land**.**

3.10 Contemporary Trade Directory and Fuel Station Entries

3.10.1 There are 11 No. recorded Contemporary Trade Directory Entries recorded within 250m of the site.

These are variously described as Active and Inactive.

None of these is deemed as requiring consideration in respect of development of this site.

3.10.2 There is 1 No. Fuel Station Entry located to 260m to the north west on Buxton Road.

Again, this is not deemed as presenting a risk to the development.

3.11 Hazardous Ground Gas

3.11.1 No specific landfill activities which would give rise to a gas risk to the development have been identified externally to the site.

However, ground conditions associated with historic development to the east need to be considered.

3.11.2 Reference to *BRE Radon – Guidance on Protective Measures for New Buildings* identifies that the site lies in an area which is at risk from radon and basic protection measures should be allowed for.

3.11.3 On this basis, the risks to the development relating to landfill gas and radon need to be addressed.

3.12 Previous Investigation Data

3.12.1 No available investigation data for the site has been identified.

4.0 PRELIMINARY RISK ASSESSMENT

4.1 Potential Sources of Contamination

4.1.1 From a review of the Desk Study stage of the work and site inspection, no potential sources of contamination onsite have been identified.

Sections 4.1, 4.2 and 4.3 set out the general potential issues which can impact on a site of this nature. Section 4.4 addresses this specific site.

4.1.2 Any potential contaminants are likely to be entrained within the made ground and could potentially relate to the following determinands;

Radon	Construction workers	Emissions from the ground	**Active** -Low to Medium Risk	The site is within a radon risk area.
	Site end users	As above; Penetrating buildings		
Hazardous Ground Gasses; originating from organic degradable soils or volatile hydrocarbons	Construction workers	Emission From the ground	**Potentially Active** - Low Risk	No sources identified at this stage.
	Site end users	As above; penetrating unprotected buildings	**Potentially Active** - Low Risk	

In summary, it is considered from review of the source material and the existing setting of the site that any risk of contamination can be considered to be low and the property would not be considered to be designated as "contaminated land" under Part IIA of the Environmental Protection Act 1990. However, physical site investigation works are recommended and covered under Section 5.0.

5.0 COMMENT AND RECOMMENDATIONS

5.1 Site Investigation

5.1.1 A Phase 2 Geoenvironmental Assessment (Site Investigation) will be required at the appropriate stage.

5.1.2 A trial pit investigation is recommended as providing the best means of identifying trench stability for construction purposes and is less susceptible to conclusions on the nature of the underlying ground conditions being distorted by local variations. The requirement for further investigation by borehole might be identified by the initial Trial Pits dependent upon conditions encountered and scheme proposals.

5.1.3 The risk of the site having been affected by unrecorded shallow coal workings has been identified.

On this basis, the site investigation strategy should include for rotary core boreholes to investigate the underlying strata for the presence of shallow workings and to determine any requirements for ground stabilisation.

5.1.4 In view of the historic activities to the east of the site it is also considered prudent to allow for some gas monitoring along the east boundary of the site.

This would require cable percussive boreholes, a separate investigation from the rotary holes described above, to be drilled and monitored.

5.1.5 In view of the topography of the site, it may well be that some further investigation may also be required in specific areas to address proposed retention and slopes.

5.2 Soakaways

5.2.1 On the basis of this desk study, it is considered that ground conditions will be unsuitable for soakaways as a drainage solution.

5.3 Potential Foundation Requirements and Contamination Issues

5.3.1 Based on this desk study, traditional strip foundations may well be appropriate.

However, detailed foundation requirements can only be confirmed once physical site investigation works have been undertaken and soil conditions identified and assessed.

Foundation requirements will also be dependent upon proposed development levels and the potential requirement to raise levels to create an appropriate development platform.

Foundations will also need to be deepened in clay where located within the zone of influence of trees.

Proposals will also need to give due consideration to the outcome of the coal mining investigation although it is normally considered that, provided any workings have been stabilised, no additional precautions over and above those required to address the near surface conditions should be required.

5.3.2 As noted, it is considered that the risk of contamination issues impacting on the development proposals is low.

However, this preliminary assessment can only be confirmed, or otherwise, once physical site investigation works have been undertaken and ground conditions sampled and assessed, supplemented by testing as necessary.

5.3.3 Attention is also drawn to the knotweed at the southern boundary. A full inspection of the site will need to be undertaken by a specialist to check for invasive plant species generally.

APPENDIX 2A

Envirocheck Report

Geology 1:50,000 Maps Legends

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	ALV	Alluvium	Clay, Silt, Sand and Gravel	Flandrian - Flandrian
	TILLD	Till, Devensian	Diamicton	Devensian - Devensian
	GFDUD	Glaciofluvial Deposits, Devensian	Sand and Gravel	Devensian - Devensian
	RTDU	River Terrace Deposits (Undifferentiated)	Sand and Gravel	Quaternary - Quaternary
	HEAD	Head	Clay, Silt, Sand and Gravel	Quaternary - Quaternary

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	PLCM	Pennine Lower Coal Measures Formation	Sandstone	Langsettian (Westphalian A) - Langsettian (Westphalian A)
	PLCM	Pennine Lower Coal Measures Formation	Mudstone, Siltstone and Sandstone	Langsettian (Westphalian A) - Langsettian (Westphalian A)
	WH	Woodhead Hill Rock	Sandstone	Langsettian (Westphalian A) - Langsettian (Westphalian A)
	MLRS	Milnrow Sandstone	Sandstone	Langsettian (Westphalian A) - Langsettian (Westphalian A)
	RR	Rough Rock	Sandstone	Yeadonian - Yeadonian
	CHG	Chatsworth Grit	Sandstone	Marsdenian - Marsdenian
	ROG	Roaches Grit	Sandstone	Marsdenian - Marsdenian
	COG	Corbar Grit	Sandstone	Marsdenian - Marsdenian
	MGCZ	Unnamed Sandstone of Marsdenian Age (In Millstone Grit Group)	Sandstone	Marsdenian - Marsdenian
	KG	Kinderscout Grit	Sandstone	Kinderscoutian - Kinderscoutian
	MG	Millstone Grit Group [See also Migr]	Mudstone, Siltstone and Sandstone	Namurian - Namurian
	MG	Millstone Grit Group [See also Migr]	Sandstone	Namurian - Namurian
	BSG	Bowland Shale Formation	Mudstone, Siltstone and Sandstone	Yeadonian - Asbian
		Faults		
		Rock Segments		

Envirocheck® Geology

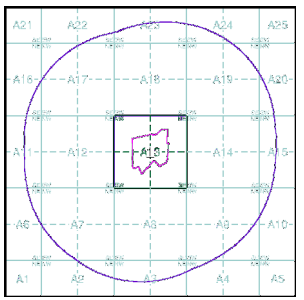
Geology 1:50,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps.
The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:50,000 Maps Coverage

Map ID: 1
Map Sheet No: 099
Map Name: Chapel en le Frit
Map Date: 1975
Bedrock Geology: Available
Superficial Geology: Available
Artificial Geology: Not Available
Faults: Available
Landslip: Available
Rock Segments: Available

Geology 1:50,000 Maps - Slice A



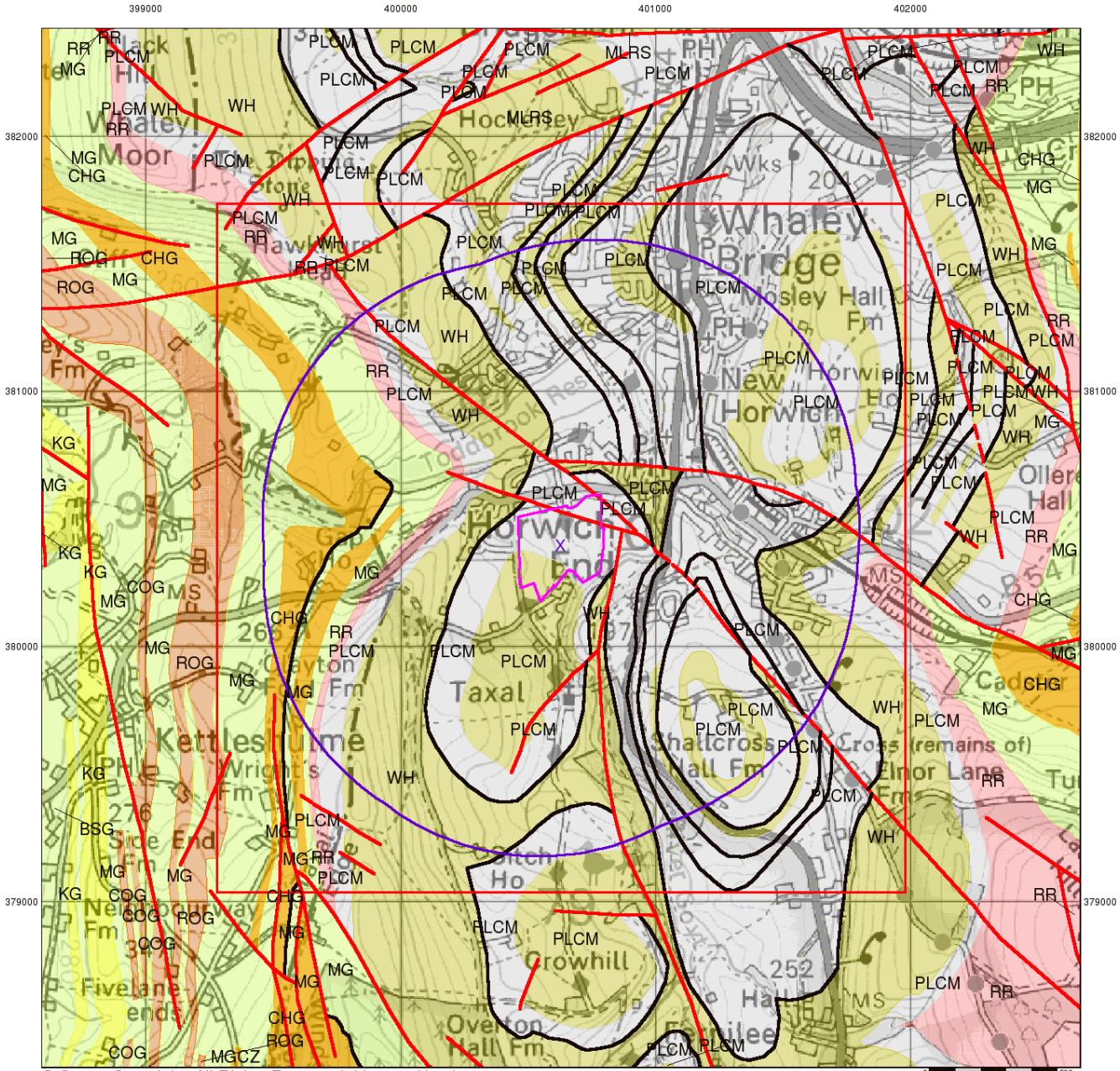
Order Details:

Order Number: 47074923_1_1
Customer Reference: 5644
National Grid Reference: 400630, 380400
Slice: A
Site Area (Ha): 9.68
Search Buffer (m): 1000

Site Details:

Linglongs Road, Whaley Bridge, HIGH PEAK, Derbyshire, SK23 7DS

Landmark® Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck® Geology

Bedrock and Faults

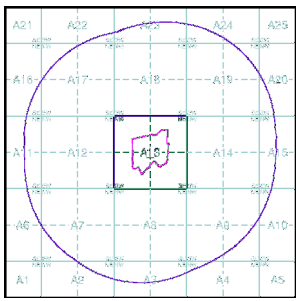
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seam, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but cut across the strata and post date its deposition.

Bedrock and Faults Map - Slice A



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Customer Reference:	5644
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Slice:	A
Site Area (Ha):	9.68
Search Buffer (m):	1000

Site Details:

Linglongs Road, Whaley Bridge, HIGH PEAK, Derbyshire, SK23 7DS

Landmark® Information Group
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Fax: 0844 844 9951
Web: www.envirocheck.co.uk

APPENDIX 2B

Coal Authority

Issued by:
The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0845 762 6848 DX 716176 MANSFIELD 5

LANDMARK INFORMATION GROUP LIMITED
SOWTON INDUSTRIAL ESTATE
ABBEY COURT
UNIT 5/7 EAGLE WAY
EXETER
DEVON
EX2 7HY

Our reference:	**51000323086001**
Your reference:	**47074923**
Date of your enquiry:	**24 June 2013**
Date we received your enquiry:	**24 June 2013**
Date of issue:	**24 June 2013**

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

Non-Residential Coal Authority Mining Report

SITE AT LINGLONGS ROAD, WHALEY BRIDGE, HIGH PEAK, DERBYSHIRE,

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

According to the records in our possession, the property is not within the zone of likely physical influence on the surface from past underground workings.

However the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past.

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

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31st October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

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.

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

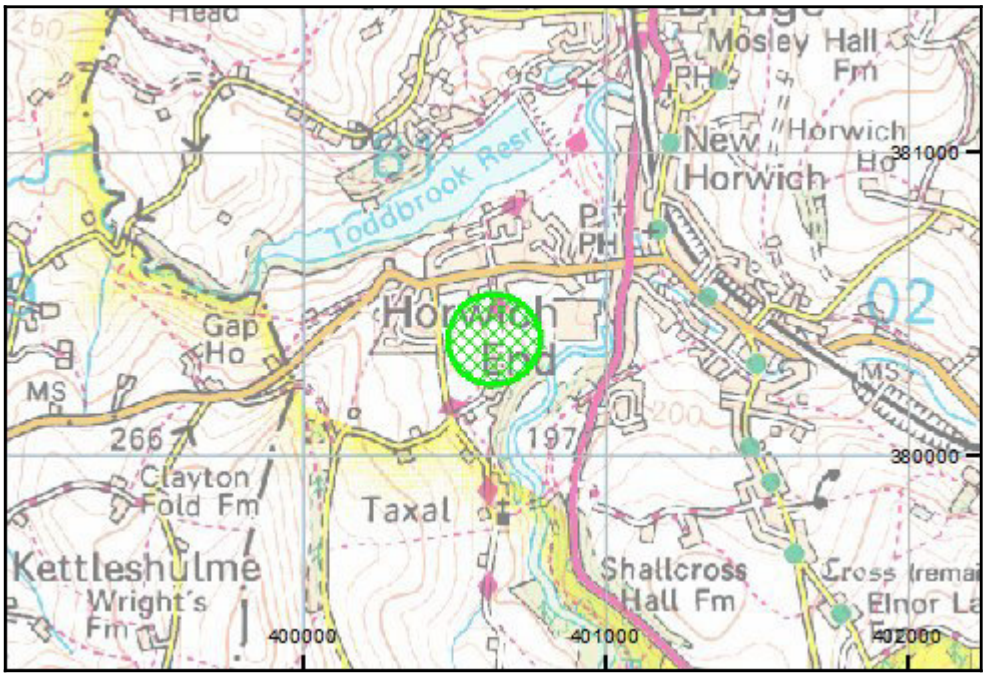
The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

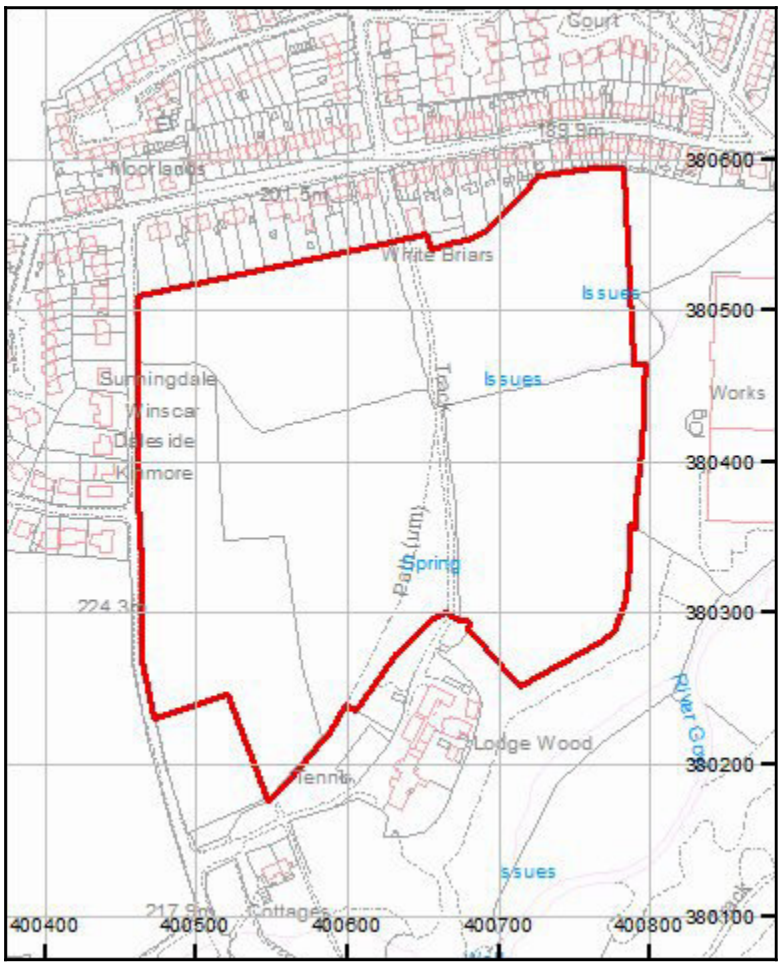
This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006.

Location map

Approximate position of property



Enquiry boundary



Key

Approximate position of enquiry boundary shown