Our Ref: AM/JK/DSN0185
Your Ref:

28th November 2016

Southern Testing
Environmental & Geotechnical

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For the attention of Howard Dowell

Dear Sir,

Re: Desk Study Review for Upper New Street, Barnsley
National Grid Reference: SE 345 059
Geology: Pennine Middle Coal Measures (Coal outcropping on site)

1 Scope

This assessment gives only a brief account of ground conditions, possible problems which may be encountered, the likely foundation type, and a preliminary conceptual model for the site, based on desk based research and a walkover survey only. It is not a fully comprehensive site investigation report and it is anticipated that further work including geotechnical and chemical laboratory testing will be carried out. It is not an engineering design document and should any information be used it should be noted that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the final design.

It is impossible to categorically define the extent of contamination on site at this preliminary stage.

The work and the assessment report are prepared specifically for Glanville Southern Testing Laboratories Limited owes no duty of care and skill to other parties. The recommendations may not be appropriate to alternative development schemes.

The findings and opinions conveyed via this assessment are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Limited believes are reliable. Nevertheless, Southern Testing Laboratories Limited cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

2 Site Description and Proposed construction

The site in Barnsley, South Yorkshire, which extends for approximately 0.5ha, currently comprises a former bingo hall with blacktop car park to the front. The site lies within the land bound by Upper New Street, Thomas Street, Burleigh Street and John Street.

It is proposed to develop the site with a new McDonalds Restaurant as per the AEW feasibility site layout option 3, dated 20/06/16.

3 Geology

The site is shown on the 1:50,000 British Geological Survey map of the area (No.87 Barnsley) to be underlain by the Pennine Middle Coal Measures (PMCM) although, specifically, the Woolley Edge Rock, with two coal seams shown to be outcropping on site, namely the Meltonfield (Woodmoor, Wathwood) Coal centrally, and the Two-Foot (Royston, Half Yard) Coal, reflecting the westerly local slope. Deeper coal seams include the Abdy (Winter) Coal, Top Beamshaw (Kilnhurst) Coal, Low Beamshaw Coal.

Coal Seam	Thickness	Types of workings
Meltonfield	0.0-1.4m	Worked (opencast)
Two-Foot	0.1-2.1m	Minor Workings (mine, opencast)
Adby	0.0-1.9m	Worked (crop, mine, opencast)
Top Beamshaw	0.0-2.9m	Worked (mine)
Low Beamshaw	0.0-1.2	Worked (mine)

Geology of the Barnsley District – a brief explanation of the geological map sheet 87 Barnsley, 2007.

3.1 BGS Archive Information

BGS Archives have records of a site investigation comprising 4 No. boreholes, to depth of between 15.5-22m bgl. The boreholes are dated 1989, and therefore appear to be associated with the development of the existing building, from the former garage usage.

Two boreholes logs describe the top 4m in detail, indicating 2.6-3.6m of made ground comprising clay with brick, sandstone, metal, coal and mudstone fragments. This is underlain by natural mudstones. The other boreholes suggest 3.3-4.8m of clayey overburden, which is potentially also made ground material. BH3 indicates the possible presence of workings at the base of the fill which could be the legacy of the Meltonfield Coal, mapped to outcrop on site.

Intact coal was reported in BH1 from 4.1-4.3m bgl; BH2, BH3 and BH4 all recorded 1.15-1.2m of intact coal from 8.0-10.4m, between 1.15-1.2m thick. The two deeper boreholes, BH1 and BH3 reported loose damp mudstone and coal from 20.2-21.4 in BH1 and 19.2-20.3m in BH3, suspected as being old mine workings (1.1-1.2m thick).

It is likely that the first seam is the Meltonfield Coal and the deeper underlying seam is the Two-Foot Coal, believed to have been worked locally – see section 8 below.

4 Hydrology and Hydrogeology

- The site is underlain by a Secondary A Aquifer (PMCM),
- The site does not lie within a Source Protection Zone (SPZ) for public drinking water.
- The site is not located within an area liable to flooding from Rivers.
- There are no groundwater abstractions recorded within 800m of the site.
- There are no watercourses within 250m of the site.
- There are no discharge consents recorded within 225m of the site.

5 Historical Map search

Historical Ordnance Survey Maps were obtained dating back to 1852, a summary of these is provided below.

Date	On site	Off Site
1852	The site is occupied largely by numerous square buildings, possibly housing, although potentially light industrial, and a public house. Wilson Street (now gone) runs through the centre of the site on a roughly north-south line. John Street forms the northern boundary, Burleigh Street the east, Thomas Street the south and New Street the west. Several pumps/ wells and a possible chimney are shown. Pub in the southwest.	Several 'old sandstone quarries' are shown to the east, the closest within 100m of the site boundary. A brickfield is also shown around 200m to the south, adjacent to a further sandstone quarry. Tyne Brick Yard was present approximately 200m to the north and a small reservoir approximately 200m to the northwest. Residential housing largely surrounds the site.
1889	Further similarly sized and shaped buildings were now present and are annotated as 'Courts', albeit off-site, suggesting a largely residential use.	The former brick yard had been redeveloped with housing as had the majority of the sandstone quarries to the east. The brickfield to the south appeared abandoned, but the Agnes Colliery (including shaft) is shown (disused).
1906	No significant change.	The former sandstone quarries have been developed with housing. The colliery is gone, but the old shaft is still shown.
1931	No significant change.	The small reservoir appears to have gone, potentially backfilled. Some housing clearance has taken place a short distance to the west, southwest and east of the site.
1938	The eastern half of the site is shown to be cleared of buildings	The adjoining land to the north, east and south of the site has also been cleared of buildings.
1948	Some redevelopment of the site appears to have taken place, although it remained partially cleared.	Some of the land previously cleared had been redeveloped.
1956	A single large building occupies the centre of the site, some small (possibly former) building are also present on the western boundary of the site.	No significant change.
1961	It appears the previous building has been removed and replaced with another slightly larger building, annotated as a garage. Two small buildings remain in the northwest corner.	Much of the land around the site is annotated as car parking, including land to the west and north. The land to the east and south largely remain clear and a small earth working is shown just to the south of the site. A public house was present just to the north next to the Glebe Cinema.
1970	The small buildings had been removed.	A warehouse was now present within the land immediately to the southwest of the site. The car park to the north had been developed and a

		printing works was now present just to the east, together with a public house. To the south/southeast were a clothing factory and several warehouses.
1977	A smaller ancillary building had been constructed in the west of the site.	No significant change.
1986	Some terracing is shown on site, with the eastern half of the site raised up above the garage.	No significant change.
1993	The site had been redeveloped once more. The garage had gone and a large 'warehouse' is shown occupying the eastern half of the site (as today). A gas governor is shown on the western boundary.	No significant change.
2016	No significant change.	The clothes factory to the southeast has gone and the supermarket to the west had been constructed.

6 Environmental Databases

The salient features of the environmental database search are summarised below.

Contemporary Trade Entries: WM Morrisons Petrol Station, 26m NW – Petrol filling station (active).
Andrew page Ltd, 39m W – Car component manufactures (inactive).

Points of Interest: Morrisons car Wash, 26m NW (commercial).
Factory, 31m S – unspecified (Manufacturing & Production).

Landfills: 201m SW: Mr A J Shaw – no further details (historic landfills).

Potentially infilled Land: 199m SW – Unknown filled ground 1993 (pit, quarry etc).
141m NW – unknown filled ground, 1855 (pond, march, river, stream, dock etc)
146m NW – unknown filled ground, 1907 (pond, march, river, stream, dock etc)
186m W – unknown filled ground, 1894 (pond, march, river, stream, dock etc).

7 Geological Hazards and Mining Activities

Data from various sources relating to potential geological hazards at the site are summarized below. The Hazard Potentials listed for the BGS data are as presented in the Envirocheck report, derived from various generic BGS sources, which are not considered as site-specific. It is important that this information is considered in context of the actual site topography, ground conditions encountered during future investigation, and development proposals.

Data Source	Hazard	Hazard Potential to Site	Remarks
BGS	Potential for Collapsible Ground Stability Hazard	Yes	Very Low
	Potential for Compressible Ground Stability Hazard	No	

Data Source	Hazard	Hazard Potential to Site	Remarks
	Potential for Ground Dissolution Stability Hazard	No	
	Potential for Landslide Ground Stability Hazard	Yes	Very Low
	Potential for Running Sand Ground Stability Hazard	No	
	Potential for Swelling or Shrinking Clay Ground Stability Hazard	Yes	Very Low
	BGS Recorded Mineral Site	Yes	171m SE: Union St, opencast quarrying for carboniferous sandstone – ceased.
			288m E: Taylor Row, opencast quarrying for carboniferous sandstone – ceased.
	Coal Mining Affected Areas	Yes	See Coal Authority Report
	Radon	No	No radon protective measures are necessary in the construction of new dwelling or extensions.

8 Information from the Local Planning Authority

South Yorkshire Mining Advisory Service have confirmed that the site is located in a Coal Authority coal mine referral area, due to the probable presence of shallow coal (likely to be the Two-Foot Coal Seam), and the possibility of the site being affected by coal mining legacy issues.

9 Coal Authority Report

A non-residential Mining Report was undertaken as part of the desk study, (Report ref: 51001298605001), 15th November 2016. For convenience, a summary is given below.

The property is in a surface area that could be affected by underground mining in 1 seam of coal at 140-150m depth, last worked in 1853. In addition, the property is in an area where the coal authority believe there is coal at or close to the surface, that may have been worked at sometime in the past.

There are no known coal mine entries within, or within 20m of, the boundary of the property. There may, however, be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

10 UXO Preliminary Risk Assessment

Barnsley was bombed during both the first and second world wars. As such, on the advice of MACC International, a preliminary UXB Risk Assessment for the site was undertaken.

The preliminary risk assessment concludes that there is no credible likelihood of encountering UXO on the plot. Consequently, the UXO risk is considered to be LOW within the plot boundary.

11 Intrusive Investigation Recommendations

At this stage, we would recommend that a Phase II intrusive investigation be undertaken for both geotechnical and contamination assessments of the site. At this stage due to the presence of the existing structure access is limited, restricting what is possible in the way of a robust investigation. As such further Phase III works, post demolition may also be required. The recommendations detailed below are subject to the approval of the regulatory authorities, particularly the local environmental health officer, but also the Environment Agency and Building Control.

12 Preliminary Environmental Recommendations

12.1 Risk of Soil Contamination

Given the site history, a moderate, level of contamination risk should be assumed at this preliminary stage. The site has a long developed history most recently used as a garage for used car sale and motor repairs. The site plan from the previous investigation does not indicate fuel dispensing took place, and the business included for sales and repairs. Although given the proposals the risk to the end users is low, certainly in terms of the proposed construction and use of the site, soil contamination may affect construction workers and impact on waste disposal costs. It might be prudent to do a Petroleum Officers search to see if they have any records of underground fuel tanks.

12.2 Risk of Groundwater Contamination

The risk to groundwater is considered to be low to moderate, due to the sensitivity of the underlying soils (Secondary A Aquifer), which are not anticipated to hold significant amounts of water. However, this may need to be reassessed after the findings of the Phase II investigation.

12.3 Risk from Ground Gases

This desk study review has highlighted a potential gas risk from both deep made ground on site, but also potentially infilled quarries locally. The underlying coal measures are also a potential natural source of land gases. As such, the potential gas risk will require assessment by way of a monitoring program after which recommendations can be made for any appropriate remedial measures.

13 Preliminary Geotechnical Recommendations

The site known to overly several coal seams, notably the Meltonfield Coal which is mapped to outcrop on site and the Two-Foot Coal, both of which are known to have been worked locally. The Meltonfield Coal is noted as being generally extracted using opencast methods, whilst the Two-Foot Seam was known to have been mined. Mining in this area is likely to have exploited coal using Pillar and Stall mining techniques, which left unworked pillars to support the overburden, and after the initial extraction, more coal was taken from Pillar and Stall workings by partially or totally 'robbing' the pillars. With Pillar and Stall mining there is little initial subsidence, but it eventually occurs if the pillars settle in the mine floor, through collapse or if deliberately removed. Surface subsidence is likely to be erratic and independent of time.

Historical boreholes undertaken by others for the previous redevelopment of the site, indicate two coal seams within 25m of the surface. The first was recorded at 8.4-10.4m bgl, 1.15-1.2m thick, noted as not worked (possibly intact), with the second at depths of between 19.2-21.4m bgl, 1.1-1.2m thick and believed to have been worked.

Based upon this information a detailed investigation will be required, comprising three rotary boreholes. Ideally these would be undertaken post demolition, so that they can cover more of the site area, rather than being restricted to the western car park section. However, time constraints may be such that this is not possible. Depending upon the findings of the Phase II works, grouting of former workings may to be required.

Foundation recommendations will be made upon completion of the Phase II works. However, given the depth of the fill and potential workings, vibro-ground improvement of near surface fill, together with a reinforced high level, spread foundation option is likely to be required. The reduced level of the proposed structure may be such

that a deepened beam foundation is viable through remnant made ground, onto the natural mudstones, and without the need for vibro treatment. Depending upon the results of the rotary boreholes, with regard to the mine workings, a grouting exercise may also be required. Suspended slabs or sub raft venting, with land gas design precautions, are also a likely consideration given the on-site workings and potential off site land gas risk – subject to a gas risk assessment.

Defunct infrastructure (cellars, foundations and drains etc) will potentially affect groundworks, and nominal allowances should be made for associated overbreak and delays etc. 'Pumps and wells' were indicated on old maps and likewise any such features encountered will need to be considered by the structural engineer, and decommissioned in line with Environment Agency guidelines – structural cover slab, inert backfill etc.

A substantial **retaining** structure is likely to be necessary around the eastern perimeter of the site, retaining the footpath and highway for John, Burleigh & Thomas Streets. Local Authority Highways engineers are likely to require consultation on this aspect. Cantilever flight auger or sheet pile retaining walls may not be viable given the possibility of relatively shallow rockhead once site levels have been reduced. Reinforced mass concrete retaining structures might be considered, as above, but similarly may also be subject to pre-drill & grout of coal workings. Crib-lock and gabion types, which anticipate limited movement, may not be suited to retention of the highway. Consultation with proprietary scheme providers will be necessary.

We trust we have understood your requirements and would be pleased to discuss the above further, if required.

Yours faithfully,

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For and on behalf of
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