



REEMA Estate, Thurnscoe

**Supplementary Ground Investigation and
Phase II Report Review**

for

Keepmoat Homes

Preamble

This report presents the results of a supplementary ground investigation carried out by Sirius Geotechnical and Environmental (SGE) on behalf of Keepmoat Homes. It was based on an Investigation undertaken by Abatech International Ltd (AIL) (for Barratt Homes Sheffield) on both this parcel of land and a nearby parcel of land, referred to as 'Brunswick Street', Thurnscoe. A pdf copy of the AIL report, covering both sites, is enclosed as a CD ROM in the Appendices (Ref. S7_032, dated October 2007).

The work undertaken by SGE follows recommendations for further work presented in the AIL report and agreed with Keepmoat Homes.

The scope of work undertaken by SGE was as follows:-

1. Installation of additional gas monitoring wells
2. Additional trial pitting
3. Additional soakaway testing
4. Further sampling and chemical analysis of 'topsoils'

The assessment and recommendations made in this report are based on the information provided (AIL report), together with available in-house information and the investigation carried out by SGE.

Sirius Geotechnical & Environmental Ltd. cannot accept responsibility for the reliability and authenticity of published information or reports prepared by third parties.

The recommendations made in this report are based on the assumption that the site will undergo residential development of conventional construction. It is also assumed that ground levels will remain similar to those at present. If this is not the case recommendations may need to be revised to accommodate changes. Where/if assessments of the site areas affected in particular ways are given, these are approximate.



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Site Description

Grid Ref	NGR 445810mE, 406130mN
Area	Approximately 20ha (approximately 49.5 Acres).
Location	North of Thurnscoe, which is located approximately 18km to the north-west of Doncaster, South Yorkshire
Description	The <u>Reema Estate</u> site can be divided into two distinct parcels of land, the first comprising the remnants of a council estate situated in the south-western corner and the second being agricultural land to the east and north. The estate area is bounded to the north and east by open land, whilst residential housing lies to the south and west. Most of the council houses have been demolished, with only a few remaining and occupied. Agricultural land lies immediately to the north of the site, whilst a now disused/infilled railway cutting runs parallel with the site's eastern boundary.

Geology

	The BGS map sheet 87, Barnsley (1:50,000 scale) and sheet memoir shows the site to be underlain by mudstone of the Middle Coal Measures (Upper Carboniferous). There may also be localised sandstones present within the vicinity of the site. There are no drift deposits shown to be present. There are no faults or other lines of weakness within the immediate vicinity of the site, although the general area may be affected by a south-west/north-east trending fault, which lies to the west of the Reema Estate. The fault downthrows strata to the south-east.
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History

History of site and environs	Historical OS plans dating back to 1851 indicate the <u>Reema Estate</u> site to have been used primarily for agricultural purposes, although a small wooded area (Whin Wood) to the north was present at the site until around 1955. With the exception of the construction of residential housing to the south-west around the mid 1930s and localised redevelopment within the general locale of the site, no significant changes to the layout of the site, or surrounding area, are recorded. A railway was constructed along the site's eastern boundary in the late 1890s. The line remains in use to date, although a second line which spurred-off towards the north-east became disused and was part infilled
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Mining

	Information given in the Coal Authority mining report indicates that the Reema Estate site lies within the likely zone of influence from workings in eight seams of coal (130m to 800m depth). The last date of working in both instances is 1981. All ground movement associated with the working of these seams should, by now, have ceased. There are no records of shallow mining in the area, which may affect the site, and there are no recorded mine entries within, or within 20m of the site.
Other mining (non-coal)	None is likely on the basis of the available information.
Quarrying	None is likely on the basis of the available information.

Ground Conditions

The supplementary investigation took place in February 2010 and comprised ten trial pits (with one trial trench), together with eight window sample holes (for gas monitoring installations). Soakaway tests were carried out in selected trial pits. See Appendices, for logs and plan.

No supplementary investigation works could be undertaken on the agricultural parcel.



Soil samples ('topsoil') were collected for chemical testing to assess its suitability for re-use on site.

Summary	Made ground was encountered in all pits/sample holes, with the deepest area present in the west, with (up to approximately 3.0m, likely to be associated with a former drainage gully (now culverted?). The made ground over the remaining area comprised 'topsoil'/remnant demolition waste. Natural strata were as anticipated, based upon the previous investigation and generally comprised a 'stiff' gravelly clay, overlying sandstone/mudstone. Groundwater: No significant groundwater seepages were encountered during the supplementary ground investigation.
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Volume Change Potential is assessed in accordance with NHBC Standards chapter 4.2 "Building near Trees" – the cohesive soils may be assumed to be of medium shrinkability.

Precautions Near Trees

Precautions near trees will be required following guidance given in NHBC Standards Chapter 4.2 "Building near Trees".

Foundations

On the basis of the supplementary and previous ground investigations, it is considered that strip/trench fill foundations will be generally suitable. These will need to be taken through any made ground soils into the underlying granular/cohesive soils or sandstone/mudstone strata, where present at founding depth. The minimum founding depth on granular soils should be 600mm, and 900mm on cohesive soils. It is understood that the area of deep made ground will lie in public open space. It is possible that deeper made ground might encroach onto plots. In this case local deepening may be required, with the use of trench fill foundations. Piling may need to be considered. However, it is likely that reduced dig, sectional trench fill and reinforced cover strip would be more economic in this case.

On the basis of the *in situ* testing, an allowable bearing pressure of between 100-125kN/m² may be assumed on the natural undisturbed soils. It should be noted however that localised areas of softer ground have been encountered. Further assessment of foundation options/localised deepening may therefore be required.

Where foundations are found to straddle sand/clay/rock they will need to be thickened and reinforced. A plot specific foundation schedule should be prepared.



Road Construction

Estimated CBR	It is recommended that a CBR value not exceeding 3% should be assumed in natural soils.
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The road construction proposals must be approved by the Local Authority before finalising design.

Surface Water Drainage

Suitability of soakaways	Additional soakaway tests were carried out and the results are enclosed in the Appendices. The results show poor infiltration and it is considered that traditional shallow soakaways will not be a suitable overall solution. An engineered 'network' solution combining traditional soakaways with deep borehole-type soakaways penetrating the sandstone might be feasible, subject to further assessment and liaison with the Environment Agency.
Risk of flooding	Low.

If soakaways will not be suitable, surface water will need to be taken into an appropriate drainage system.

Problems Because of Past Development

Previous buildings/structures	Part of the site was occupied by residential housing.
Comments	The site will be subject to enabling/demolition works.

It is possible that any previous buildings may have basements or that other localised foundation problems could be caused by old foundations or sewer trenches.

Excavation Problems

Side stability	All excavations must be suitably supported to ensure safe working conditions.
Groundwater difficulties	Perched water may be encountered locally, especially in the west. Local dewatering may be required during the winter months or during periods of prolonged rainfall.

Contamination

Soils and groundwater	No significant contamination was encountered in soils (including made ground). [No shallow
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	groundwater is present.] On the basis of the supplementary testing, surface soils (remnant topsoil/made ground) should be suitable for re-use on site. However, it is recommended that the soils should not be considered for use in gardens without further testing, following the site strip. Aside from chemical quality issues the soils may need to be screened to remove anthropogenic material, e.g. glass, metal and plastic.
Ground gas	Further monitoring is underway and two sets of results have been obtained to date (out of six proposed – over a three month period). The data obtained to date do not indicate a significant gas risk, with respect to methane or carbon dioxide, from a made ground or historic deep mine source. At this stage Amber 1 precautions should be assumed.
Radon	No radon precautions are required.

Remedial Strategy

	Extensive remedial works are not required. An appropriate specification for demolition and enabling should be prepared. If not already undertaken, an appropriate asbestos assessment and ecological assessment (including Japanese Knotweed survey) should be carried out by appropriate specialists. A suitable 'capping' methodology and scope will need to be agreed with the EHO/NHBC. Imported soils will need to be tested to ensure their suitability. Validation will also be required to confirm that they are placed appropriately.
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Further Work

1. A foundation schedule will be required, subject to confirmation of planning layout and proposed levels. (A tree survey will be required to confirm type and location).
2. Confirmation of the need for ground gas precautions, following completion of the monitoring. (Two out of six monitoring rounds have been completed.)



3. A clean capping validation scope and method will need to be confirmed and agreed with the appropriate regulatory/approving bodies.
4. Further investigation, both physical and chemical (including pesticide analysis) should be carried out on the open parcel of agricultural land, subject to access.

Appendices

A – Drawing – site plan

B – Investigation logs

C – Gas monitoring results (two rounds to date)

D – Chemical tests results (note: certificate is for both REEMA and Brunswick Street sites)

E – Soakaway test results

F - CR ROM with previous Phase II Geoenvironmental Report undertaken by Abatech International Ltd.