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PROPOSED ENERGY CENTRE, NORTH MANCHESTER GENERAL HOSPITAL

PHASE I SITE APPRAISAL (DESK STUDY) FOR BREATHE ENERGY

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P8653/DS.1

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Prepared for:
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This report has been prepared in accordance with GRM's Accredited Quality Procedures.

If you have any queries regarding this report please contact the project manager in the first instance.

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Issue	Description of Revision	Signature

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1 INTRODUCTION

1.1 PREAMBLE

GRM Development Solutions Limited (GRM) has been appointed by Alan Johnston Partnership LLP (Client's Agent), on behalf of Breathe Energy (Client), to undertake a Phase I Site Appraisal (desk study) as part of a planning application. The desk study and site inspection form Phase I of the assessment and allow the geotechnical and geo-environmental setting of the site to be determined and the identification of areas of particular concern that require targeted investigation.

This site appraisal is intended to provide information that will assist decision making by identifying potential ground engineering and contamination issues.

GRM Standard Limitations of Reporting are provided in Appendix A of this report.

The proposed development is thought to comprise a single two storey structure (Energy Centre) with associated service yard and significant below ground ducts and trenches. The current development proposal layout provided by the Client's Agent is presented in Appendix B.

1.2 OBJECTIVES OF THE SITE APPRAISAL

The principal aims of the Phase I Site Appraisal (desk study) are as follows:

a) Obtain information, from easily accessible sources, about the soil and groundwater conditions within the area of the site.

b) Determine the possible ground related geotechnical and contamination hazards within the site boundaries that may affect the proposed development.

c) Provide preliminary development recommendations.

d) Provide advice on further works required for the cost-effective reduction of risks to the development and procedures likely to satisfy regulators.

Whilst every effort has been made to pre-empt the likely requirements of the Local Authority and the Environment Agency, they are likely to have specific requirements that will need to be discussed and addressed at a later date.

2 PHASE I DESK STUDY AND SITE OBSERVATIONS

2.1 INFORMATION SOURCES

In addition to the general sources of information listed in Appendix A (i) the Client has supplied the following information that has been used in the assessment of the site:

- Site plan and proposed layout drawing
- Underground service plans.

2.2 SITE DESCRIPTION

2.2.1 Geographical Setting

The site area covers approximately 0.09 hectares and is located approximately 3.3km north of Manchester city centre. The National Grid Reference (NGR) for the approximate centre of the site is SD384402. A Site Location and Boundary Plan is presented in Appendix C.

The site is presently a car park with the ground surface comprising hardstanding (tarmac in the south and concrete in the north). A brick retaining wall runs through the centre of the site and marks a sudden drop in ground level of approximately 1m from north to south. The wall was observed to be 4m high in the west and 1.2m in the east with a metal railing on top of it. The northern site boundary is marked by approximately 3m brick retaining wall separating the site from Central Drive. The wall also extends down the western site boundary adjacent to the entrance to the car park. The eastern site boundary is marked by the sections of the northern and central retaining walls. Beyond the eastern site boundary is a boiler room associated with the Hospital. The southern site boundary also comprises a brick retaining wall and separates the site from a larger car park associated with North Manchester General Hospital.

The topography of the site is generally flat with a sudden change of 1m in the centre of the site. Central Drive appears to be gently sloping down from east to west, however the retaining structures on-site have allowed for the ground surface to be flat across the site.

2.2.2 Site Inspection Observations

Some general site photographs are presented in Appendix D and these illustrate the salient observations made during a site walkover undertaken on the 4th October 2018.

At the time of the site walkover, parked cars were observed across the majority of the site. Hydrocarbon spills were not identified during the walkover. An area of set concrete was identified in northwest region of the site with small amounts of litter (metal cans, paper and plastic cups) also present. The northern retaining wall appeared to be in poor condition, with multiple cracks and weathered bricks. A wooden fence was observed to run parallel with the retaining wall along the northern boundary and part of the eastern boundary. A locked gate was observed within the fence in the northeastern area of the site. Behind the fence were a number of lagged pipes. Litter was also observed on the floor around the pipes in the form of plastic bottles, metal cans and plastic bags. A corrugated metal roof was also present above the pipes in-between the fence and the northern retaining wall.

There was no evidence for any mature trees on site, however an immature Buddleia approximately 5m high was found to be growing from out of the western part of the central retaining wall. A tree stump was also observed approximately 10m northwest of the site boundary of around 1m diameter.

Service plans have been provided by the client and have been assessed prior to the site inspection. All manholes identified were marked with spray paint suggesting a recent survey had been undertaken. As described previously, steam and condensate pipes run above ground along the northern boundary. In the northeast of the site, the pipes go below ground and into the boiler house. In the northwest, the pipes go below ground and run west towards a plant room. A manhole was also located in the centre of the northern car park, adjacent to an infilled trench. It is assumed that this service has been removed as it was not marked out and does not appear on any service records. A manhole was also located in the south eastern corner of the site recorded as a surface water drain on the service plans. Manholes were also identified in the centre of the site and in the southwest corner, markings suggested these to be electric cables, however there are no records of these on the service plans.

Significant Features identified during site walkover:
Live services within site area (both above and below ground) – danger to site personnel. **Retaining structures** – ground stability issue. **Hydrocarbon spills associated with car park –** potential source of contamination.

2.3 HISTORICAL DEVELOPMENT OF THE SITE

A review of the available historical Ordnance Survey (OS) maps gives an insight into the development of the site and can highlight potential hazards. Extracts of the maps reviewed are provided in Appendix E.

The summary below identifies the significant features identified on the historical mapping data considered likely to have the potential to affect the site.

Date from and to	Identified On-site Hazard	Identified Off-site Hazard
1848	A building is recorded in the centre of the site. The rest of the site appears unoccupied and is open fields.	Open fields surround the site with a building approximately 10m to the west of the site.
1891-1894	The previous building is no longer present. The northern end of a long building to the south of the site encroaches into the southern half of the site.	The areas immediately to the north and south of the site have been developed into multiple buildings labelled as 'Manchester Workhouse'. 'Prestwich Union Workhouse' is also located approximately 180m north of the site. A hospital is also recorded approximately 160m northeast of the site boundary.
1893	No changes.	The buildings surrounding the site have been further developed and a mortuary is

		recorded approximately 95m to the east of the site. The hospital to the northeast of the site has also been extended and is labelled as a hospital for 'infectious disease'.
1906-1907	No changes.	Extensive developments in all areas surrounding the site including schools and churches.
1915	No changes.	Extension of the surrounding property, now named 'Crescent Road Institution'. Further development of residential properties to the west of the site.
1932	Additional buildings / extensions are shown along the north eastern site boundary.	The surrounding buildings have been extended and are labelled 'Crumpsall Institution'.
1950-1951	All buildings within the northern part of the site have been demolished and only the southern buildings remain.	The surrounding buildings are now labelled as 'Springfield Hospital'.
1973	Two 'tanks' are recorded in the northern part of the site. The southern part of the site remains occupied with buildings associated with Springfield Hospital.	An electricity substation has appeared approximately 55m to the east. A chimney is also recorded approximately 35m southeast of the site.
1981-1986	No changes. The on-site and surrounding buildings are now labelled as part of North Manchester General Hospital.	No changes.
1989-1992	No significant on-site changes are recorded on this map.	North Manchester General Hospital has been extended to the northwest. The hospital has also been extended to the west with associated roads and infrastructure.
1992-1993	No significant on-site changes are recorded on this map.	No changes.
2002	This map suggests no record of any buildings on-site and the 'tanks' identified in the north have also been removed.	Sections of the hospital have been demolished south and west of the site. No significant changes are recorded on maps after 2002.

Significant Features identified on OS Maps:
Previous buildings (on-site) – source of made ground and contamination including asbestos containing materials and risk of buried substructures/basements. **Unspecified tanks (on-site)** - potential source of contamination.

2.4 ANTICIPATED GEOLOGY

The BGS Geological Sheet for this area shows:

- Superficial deposits of Glaciofluvial sheet deposits. These are likely to comprise sand and gravel.

- Solid Geology of Chester Formation comprising sandstone. This formation is likely to have weathered to sand at shallow depth.

The BGS holds records close to the site; copies of which are presented in Appendix F. None of the boreholes assessed close to the site present evidence relating to depth to rockhead; all record superficial deposits to the base of the borehole ranging from 7.5m to 10m.

BGS mapping records the solid strata to be dipping to the south west with the nearest dip angle recorded as 15°. A normal fault trending northwest-southeast is located approximately 41m southwest of the site. The exact extent of the throw is unknown.

There is potential for some made ground to be present within the site due to demolition of previous buildings and general development of the site area.

Significant Features identified from geological data:
Made ground – potential for deepened foundations; potential source of contamination and ground gases. **Variable strata** – potential for deepened foundations. **Bedrock** – not expected to be present at shallow depths.

2.5 HYDROGEOLOGICAL INFORMATION

No detailed information regarding the depths to groundwater is available; however, the groundwater level is likely to be subject to seasonal variations.

The Environment Agency has classified the superficial deposits (Glaciofluvial Sheet Deposits) as a Secondary A Aquifer, whilst the underlying Chester Formation is classified as a Principal Aquifer.

There are no recorded groundwater / potable water abstraction licenses within 500m of the site and the site is not recorded to be within a Groundwater Source Protection Zone.

Significant Features identified from hydrogeological data:
Secondary A Aquifer (Glaciofluvial Sheet Deposits) – potential receptor. **Principal Aquifer (Chester Formation)** – potential receptor.

2.6 HYDROLOGICAL INFORMATION

Local surface water features include:

- The River Irk is located approximately 425m to the east flowing to the south. However, it is not considered to be a risk due to its distance from the site boundaries.

There are no recorded surface water abstraction licenses within 500m of the site.

No significant pollution incidents have occurred which may affect the site.

Significant Features identified from hydrological data:
None.

2.7 FLOOD RISK

The BGS suggests the site is within an area of potential groundwater flooding related to Clearwater Flooding (unconfined aquifer) and that the confidence level is low. Based on the anticipated ground conditions, it is considered unlikely that groundwater flooding will be a potential issue. However, a Phase II ground investigation would provide information on the local groundwater regime so that the risk can be assessed by the projects infrastructure engineer. Any risk associated with the groundwater regime should be catered for within the development infrastructure design.

The site and immediate surrounding area is not at risk from river flooding.

Significant Flood Risk Features identified:
Groundwater flooding – potential risk needs further consideration during ground investigation.

2.8 MINING

Coal
The site is not within an area recorded to require a Coal Authority mining report and no shallow coal seams are present. Therefore the risk from coal mining is considered to be negligible.

Brine
There are no brine extraction areas within 1000m of the site (Groundsure Data Report – Appendix G).

Gypsum
There are no gypsum extraction areas within 1000m of the site (Groundsure Data Report – Appendix G).

Significant Mining Risks:
None.

2.9 QUARRYING

The historical mapping information suggests there is no evidence of any non-coal mineral extraction having taken place within, or close to, the site area.

Significant Quarrying Risks:
None.

2.10 ENVIRONMENTAL INFORMATION

A Groundsure Environmental Report has been acquired for the site, with the full report presented in Appendix G.

A summary of the relevant information not included elsewhere in this report is presented below:

- There are no recorded licenced discharge consents within 250m of the site.
- There are no recorded pollution incidents of significance within 250m of the site.
- There are no recorded current or historic landfills within 250m of the site.
- There are no recorded waste treatment / disposal / transfer stations within 250m of the site.
- A number of historic potentially contaminative uses have been identified within 250m of the site including hospital, mortuary, chimney, unspecified workhouse, unspecified pit, unspecified heap, and unspecified ground workings. None of these are likely to pose a direct risk to the site.
- There are 8 records of category 3 or 4 radioactive substance authorisations within 250m of the site including keeping and disposal of radioactive materials. However, as they are associated with hospital it is likely that they have been disposed of appropriately and will not pose a risk to the site.
- There are a number of electricity substations within 250m of the site. However, due to the distance from site they are not considered to be a risk to the site.
- There are a number of current industrial activities within 250m of the site including tanks (generic), hospitals, medical equipment/supplies and pharmaceuticals, electrical features and gas features. None of these are likely to pose a contamination risk to the site.

Significant Features identified from Environmental data:
None – that are likely to pose a risk to the site.

2.11 ARCHAEOLOGY

Archaeological information has not been sought as part of this desk study. Some Local Authorities require at least an initial archaeological appraisal for development

sites. GRM can undertake such appraisals if required. Archaeological investigations occasionally reveal ground-related problems from ancient times (prior to the 1st Edition OS maps) and can occasionally cause foundation and contamination development hazards.

Archaeological Hazards:
Not researched.

2.12 INVASIVE PLANT SPECIES/ECOLOGY

GRM is not a specialist in this topic and has not conducted such a survey; however, we will endeavour to report easily recognisable issues such as Japanese Knotweed, Giant Hogweed, badger setts, etc, when seen on site. No such issues were identified during the walkover and due to the general absence of vegetation on-site, the risk posed by invasive plant species is considered negligible.

Invasive Plant Species/Ecological Hazards:
None.

2.13 RADON ASSESSMENT

The Health and Safety Executive (HSE) requires that if radon concentrations in air exceed 400 Bqm^{-3} in the workplace then mitigation measures may be required to reduce levels. This assessment can only be accurately carried out by undertaking measurements of radon level.

The level of 400 Bqm^{-3} in the workplace is considered to be analogous to the level of 200 Bqm^{-3} in the home, due to the reduced exposure time in the former.

The NRPB-W26: 'Radon Atlas of England and Wales' (2002), although officially superseded, is the only readily accessible source of data available for assessing the risk posed by radon to commercial/industrial developments. This document indicates that the average radon concentration in dwellings in the Manchester Council area is 11 Bqm^{-3}, with a highest value of 29 Bqm^{-3}. It is also recorded that 0% of homes are above the action level and therefore, radon protective measures are not required.

The guidelines produced by Public Health England in 'Radon in Homes in England: 2016 Data Report' (reference PHE-CRCE-032) indicates that the site is not within an area recorded to require radon protection measures; this will also apply to non-residential developments.

Radon Hazard:
None.

2.14 SUMMARY OF POTENTIAL GEOTECHNICAL/GENERAL HAZARDS

Potential geotechnical/general hazards have been identified in earlier sections and are summarised below:

Potential Hazard	Potential Consequence	Action
Existing structures / Retaining walls	Danger to personnel / Ground stability	Inspection by structural engineer / demolition required – health & safety guidelines
Previous buildings	Deepened foundations/ buried structures	Ground Investigation
Live services	Danger to personnel	Inform relevant parties for disconnection / diversion
Variable strata	Deepened foundations	Ground Investigation
Groundwater flooding	Flooded properties	Flood Risk Assessment

Potential sources, pathways and receptors are summarised in the Phase I Conceptual Model in Section 3, which is based on current relevant guidance, the principles of which are set out in Appendix A (iii).

2.15 CONTAMINANTS OF CONCERN

In addition to the general contaminants listed in Appendix A (ii), the following site specific contaminants have been identified:

- Asbestos containing materials associated with previous buildings (built pre 2000).
- TPH associated with hydrocarbon spills relating to current land use (car park).

3 PHASE I CONCEPTUAL SITE MODEL

HUMAN HEALTH			
Source	**Pathway**	**Receptor**	**Level of Risk**
Made ground (associated with previous buildings / development of site area).	Indoor and outdoor inhalation of soil dust, the ingestion of, and dermal contact with, contaminated soil and soil dust.	End users.	Negligible due to commercial end use.
		Construction and Maintenance Workers.	
Made ground (associated with previous buildings / development of site area).	Inhalation of ground gas.	End Users.	Low.
Infilled historical excavations (off-site)			
Asbestos in made ground.	Inhalation of fibres.	Construction Workers.	Low.
Made ground (associated with previous buildings / development of site area).	Migration of contamination through leaks and joints, degradation of pipe materials.	Water supply pipes.	Low.

CONTROLLED WATERS			
Made ground (associated with previous buildings / development of site area).	Leaching of contaminants and vertical migration to the groundwater.	Secondary A Aquifer (Superficial Deposits)	Low.
		Principal Aquifer (Chester Formation).	

4 CONTAMINATION / REMEDIATION RECOMMENDATIONS

Due to the commercial end use with no soft landscaping, the risk to end users from ground contamination is considered negligible.

The risk from ground gas is considered to be low.

Prior to development a ground investigation will be required, the scope of which is outlined in Section 6; However, at this stage based on the desk study information available it is considered that allowance be made for the following:

- There will be no requirement for any soil capping as the proposed commercial end use will have hardstanding throughout the site area. A worst case situation may require localised hotspot removal of made ground. The site in its current state (i.e. covered by hardstanding) presents no risk of ground contamination to future construction workers or end users.
- Standard water supply pipes placed in clean backfill material.
- At this stage, gas protection measures due to elevated carbon dioxide and methane gases are considered possible and it is recommended that gas monitoring is undertaken.

5 PRELIMINARY GEOTECHNICAL ASSESSMENT

It should be noted that the following comments and recommendations are based on the findings of this desk study which may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure, etc). Prior to development a ground investigation will be required to confirm the initial recommendations outlined below, the scope of which is outlined in Section 6. However, at this stage based on the desk based information available it is considered:

- The shallow ground conditions are likely to comprise made ground associated with previous buildings underlain by superficial Glaciofluvial deposits comprising granular strata. Nearby BGS boreholes record depths of superficial deposits of at least 10m begl. Solid geology of the Chester Formation comprising sandstone is not anticipated to be present at shallow depths.
- Providing deep made ground and/or soft or loose materials are not present the site is likely to be suitable for traditional pad foundations. However, a piled solution may need to be considered.
- At this stage, allowance should be made for the use of suspended floor slabs for the proposed building.
- Overly aggressive ground conditions are not expected and standard concrete should be suitable.
- CBR values of <2% are considered likely.

6 FURTHER INVESTIGATION

A Phase II ground investigation is recommended to determine more accurately the effect of the identified hazards on the development. Initially, this should include:

- A ground investigation designed to BS10175:2011 and BS5930:2015 and comprising window sampling and cable percussive boreholes will be required to confirm ground conditions and collect samples for analysis.
- Based on the Phase I Conceptual Model (Section 3) the ground gas risk has been assessed as low. A ground gas investigation designed to BS8576:2013 will be required (including gas installations) to determine the ground gas regime beneath the site and allow any necessary mitigation measures to be recommended. At this stage allowance for 4 monitoring visits over 3 months should be made to assess potential liabilities.
- Chemical analysis of soils followed by risk assessment so that the risk to human health and controlled waters can be determined.
- Geotechnical soils testing of the founding strata to assess its character (shrinkability, strength, etc) and suitable grades of buried concrete.

Following your review of this document, a copy of it should be submitted to the Planning Department of the Local Authority for comment and approval prior to any ground investigation works being undertaken, as this is often a condition of planning.

7 CONCLUSIONS

This Phase I Site Appraisal has shown the site is suitable for the proposed development, assuming compliance with all the recommendations contained within this report.