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Our Ref: P8079-phase 3

Date: 29th August 2018

Mr Peter Sutton
Sutton Land Development Ltd.
Charnwood Edge
Syston Road
Cossington
Leicestershire
LE7 4UZ

Dear Peter,

Re: Proposed Industrial Development at Stanton Lane, Stanton under Bardon – Additional Investigation

As requested, GRM has carried out some additional ground investigation works at the above site, primarily in the area in which ground levels are proposed to be significantly reduced as part of the development. A previous Phase II Site Appraisal report produced by GRM (Ref: GRM/P8079/F.1', dated September 2017) presented the findings on the initial ground investigation of the site. GRM's Standard Limitations of Reporting are provided in Appendix A.

Some exploratory holes carried out during GRM's previous investigation (exploratory hole references TP02, TP05, TP06 and TP07, and WS03 to WS05 inclusive) in the south-western part of this site failed to reach their target depths due to the presence of obstructions which were suspected to be rockhead or large boulders; these exploratory holes refused at depths of between 1.0m and 2.7m begl.

The primary aims of these works were therefore:

- To determine the nature of anticipated rock strata below the depths at which trial pitting and window sampling techniques refused as part of the investigation advanced previously.
- To confirm the likely founding strata in areas where significant reduction of ground level is proposed.
- To provide data to allow an assessment of the "rippability" of the rock strata likely to require excavation as part of the proposed development.
- To provide an indication of groundwater levels in areas where significant reduction of ground level is proposed.

Site Investigation

This additional investigation comprised two rotary cored boreholes and ten trial pits. A plan showing the exploratory hole locations is presented in Appendix B. The exploratory hole logs are provided in Appendix C.

Rotary Cored Boreholes

Two rotary boreholes (BH01 and BH02) were drilled close to the site's highest point along the western boundary; where the greatest amount of cut is proposed. Exploratory hole BH01 was advanced to a depth of 8.0m begl, whilst BH02 was advanced to a depth of 5.5m begl.

Borehole BH01 was "open-holed" to rockhead at 2.0m begl, with these shallow strata considered to be similar to those observed in the adjacent trial pit TP05 (medium dense to dense gravel of volcanoclastic siltstone and sandstone). The more competent rock strata were noted to be a medium strong to strong (locally weak), pinkish brown and greenish grey, thickly laminated volcanoclastic SILTSTONE, with occasional thickly laminated or very thinly bedded horizons of volcanoclastic sandstone. This is considered to represent the Bradgate Formation. These strata were noted to dip at approximately 60° and became more greenish grey and sandy with depth.

Borehole BH02 was "open-holed" to 1.0m begl, with these shallow strata considered to be similar to those observed in the adjacent borehole WS04 (medium dense sandy, gravelly to very gravelly SILT). The more competent rock strata were noted to be a medium strong to strong, pinkish brown and greenish grey, thickly laminated volcanoclastic SILTSTONE and SANDSTONE, which is representative of the Bradgate Formation. From 1.3m begl to 2.2m begl the volcanoclastic sediments appear to have been intruded by a strong, greenish grey locally pinkish brown, medium to coarse grained DIORITE, which is considered to represent an igneous intrusion associated with the South Charnwood Diorites. These were then again underlain by the volcanoclastic sediments (Bradgate Formation) to a depth of 2.85m begl, where they were underlain by 1.15m of dark grey mudstone, and then further SILTSTONE and subsidiary sandstone, to at least the base of the borehole at 5.5m begl.

Trial Pits

Ten additional trial pits (referenced TP101 to TP110 inclusive) were excavated across the site using an 18 tonne, 360° mechanical excavator with 1m wide toothed bucket.

Trial pits TP101 to TP105, TP108 and TP110 all encountered what was previously considered "Head" overlying the solid volcanoclastic strata of the Bradgate Formation. The "Head" deposits included:

- Dense, orangish brown and light brown, slightly clayey, sandy, gravelly COBBLES (and cobbly GRAVEL) of volcanoclastic siltstone with occasional angular boulders.
- Very dense, light brown, angular COBBLES of volcanoclastic siltstone.
- Medium dense, orangish brown, slightly clayey, very gravelly SAND.
- Firm, light brown, slightly sandy, gravelly to very gravelly, SILT.

The Bradgate Formation strata were encountered in the above trial pits at depths ranging between 1.3m and 2.3m begl.

Trial pits TP106 and TP109 only encountered the "Head" deposits, to depths of 3.6m and 3.4m begl, respectively.

Trial pit TP107 also revealed the "Head" deposits, to a depth of 2.4m begl. In contrast to the other trial pits, these deposits were underlain by the firm, reddish brown CLAY of the Edwalton Formation, which then became a sandstone at 3.90m begl.

Laboratory testing

Samples of rock core recovered from the rotary cored boreholes underwent Unconfined Compressive Strength (UCS) and Point Load Testing, to help assess likely bearing capacities and rippability of the rock strata. The results (presented in Appendix D) suggest unconfined compressive strengths for the Bradgate Formation range between 11.3 MPa to 69.6 MPa; the point load tests confirm the volcanoclastic siltstones are variable in strength. The variation in strength was attributed to the discontinuities frequently encountered within the formation.

Excavation/Rippability

Trial pit TP101 took approximately 6 hours to dig a trial pit to a depth of 3.3m begl. Below 1.5m begl, the use of a hydraulic breaker was required to achieve the maximum depth.

Borehole BH01, located close to TP101, revealed highly fractured rock (RQD of 0%) to a depth of 3.5m begl. Below this the rock quality improved with RQDs of 60% (3.5m to 4.5m begl) and then 30% (4.5 to 6.0m begl). Discontinuities were typically steeply dipping (60° or steeper).

Based on these observations and the reported rock strength it is suggested that whilst the upper 1.5 to 2.0m of soil/weathered rock should be excavatable using a large excavator, below this depth, vertical progress will be very slow, and a breaker will be required. Due to the dip of fractures in the Bradgate Formation strata, excavating into the slope horizontally will probably allow easier excavation; the use of a breaker is still likely to be required for the deeper rock strata.

Based on the layout and levels provided on a proposed layout dated October 2017 (Dwg Ref: 7627-03-004 Rev C) the following excavation depths and strata are anticipated (based on 0.5m dig below proposed floor level:

Unit 1 (FFL = 212.0m AOD)

Exploratory Hole	Anticipated depth of excavation (begl)	Strata to be removed (not including topsoil)
TP102	6.25m	1.1m "Dense" gravelly, cobbly CLAY 5.05m SILTSTONE
TP109	3.6m	0.4m Medium dense gravelly SILT 3.0m Firm gravelly CLAY
TP02	4.9m	0.7m Medium dense gravelly SILT 1.7m gravel and cobbles 2.2m gravel and possible rock near base
WS02	2.5m	2.2m Firm to stiff gravelly CLAY

Unit 2 (FFL = 213.5m AOD)

Exploratory Hole	Anticipated depth of excavation (begl)	Strata to be removed (not including topsoil)
BH01	6.25m	1.7m Medium dense to dense cobbly GRAVEL 4.25m SILTSTONE
TP05	6.25m	1.7m Medium dense to dense cobbly GRAVEL 4.25m SILTSTONE
TP101	6.5m	1.3m gravelly COBBLES 5.0m SILTSTONE
TP103	4.15m	0.7m very gravelly SAND 0.9m Dense cobbly GRAVEL 2.35m SILTSTONE
TP06	2.7m	2.5m Medium dense to dense cobbly GRAVEL
WS03	2.1m	1.8m Firm to stiff gravelly CLAY

Unit 3 (FFL = 213.5m AOD)

Exploratory Hole	Anticipated depth of excavation (begl)	Strata to be removed (not including topsoil)
BH02/WS04	5.2m	0.7m Medium dense gravelly SILT 2.45m SILTSTONE 1.15m MUDSTONE 0.9m Very strong DIORITE
TP107	3.6m	1.6m Dense SAND 0.6m Clayey GRAVEL 1.2m Firm reddish brown CLAY
TP108	3.5m	0.55m gravelly SAND 1.5m Dense GRAVEL and COBBLES 1.2m SILTSTONE
TP08	1.6m	1.3m Medium dense gravelly SAND

The exploratory hole location plan in Appendix B indicates the approximate area in which competent rock strata are anticipated to be encountered during excavations for the proposed units referenced above.

Groundwater

A groundwater monitoring standpipe was installed in borehole BH01. On a single monitoring visit after relatively dry weather, groundwater was recorded at 4.45m begl (214.8m AOD). Clearly this level is higher than the proposed floor levels of the buildings. It is anticipated therefore that some form of groundwater control/drainage will be required. It is recommended that further groundwater monitoring is undertaken to assess the regime which underlies the site.

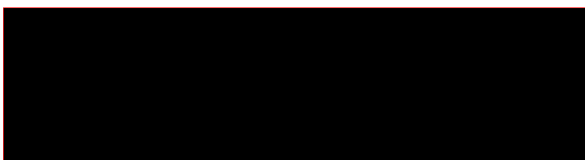
Foundations

The localised cohesive deposits at anticipated founding depths encountered in TP109, WS02, WS03, and TP107 were at least firm (locally firm to stiff) and should achieve an allowable bearing pressure of at least 110kN/m². The granular "Head" deposits (encountered in TP06 and TP08) were generally medium dense to dense and will achieve in excess of 220kN/m². The rock strata will achieve an allowable bearing pressure in excess of 500 kN/m².

Where foundations for the proposed developments are likely to span across two different rock strata, it is considered that differential settlements will be within tolerable limits, although this is subject to final load calculations which should be provided by a structural engineer.

We trust that the above is sufficient for your current requirements.

Yours sincerely,



Dr Tim Rogers CGeol FGS

Enc:

- Appendix A: GRM Standard Limitations of Reporting
- Appendix B: Exploratory Hole Location Plan
- Appendix C: Exploratory Hole Logs
- Appendix D: Laboratory Test Results



A P P E N D I X A

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multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
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GENERAL APPRAISAL COMMENTS

i INFORMATION SOURCES

Where available the following sources have been used for the identification and assessment of potential ground hazards:

- Relevant British Standards
- British Geological Survey (BGS) Geology Map Scale 1:10,000 for local area
- British Geological Survey (BGS) Geology Map Scale 1:50,000/1:63,320
- BGS Memoir
- BGS Borehole Records
- BGS online viewer: <http://www.bgs.ac.uk/data/mapViewers/home.html>
- Environment Agency Groundwater Vulnerability Maps
- Historical Ordnance Survey (OS) Maps
- Environmental Data Report
- Environment Agency Website: <http://www.environment-agency.gov.uk/>
- Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, UKWIR, 2010.
- Coal Authority Records / Coal Mining Report
- DEFRA/Environment Agency Contaminated Land publications and DoE Industry Profiles
- BRE Guide BR211 (2015), 'Radon: Guidance on protective measures for new buildings'
- HPA-RPD-033 (2007), 'Indicative Atlas of Radon in England and Wales'
- PHE-CRCE-032 (PHE, 2017), Radon in Homes in England: 2016 Data Report
- CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings'
- BS8485:2015, 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'
- Other technical references used throughout this document are detailed in the text.

ii CONTAMINANTS OF CONCERN

The DoE Industry Profiles are normally used to assess likely contaminants from past land use and potential nearby industrial sources. For land uses where no profile is available, likely contaminants of concern are selected by GRM based on past experience of similar sites, a general screening suite of contaminants covered by CLEA and common contaminants from the Industry Profiles.

- | | | |
|------------|-------------------|--|
| • Arsenic | • Copper | • Water soluble sulphate |
| • Cadmium | • Nickel | • PAH (polycyclic aromatic hydrocarbons) |
| • Chromium | • Zinc | |
| • Lead | • Phenols | |
| • Mercury | • cyanide (total) | |
| • Selenium | • pH | |

Asbestos and PCBs are listed in the vast majority of profiles. PCBs are listed as the profiles expect electricity substations and switch boxes on all industrial sites. There is the potential for asbestos containing material to be mixed up with made ground, following any demolition works.

CONCEPTUAL MODEL METHODOLOGY

The consideration of contamination is based upon the principles of risk assessment, using the 'source-pathway-receptor' model in order to establish the presence, or potential presence, of a pollutant linkage.

To create a risk, contamination must have the potential to cause harm to susceptible targets or receptors such as humans, the water environment or the built environment. The potential for harm to occur requires three conditions to be satisfied to form a pollutant linkage:

- The presence of substances that may cause harm (SOURCE).
- The presence of a target which may be harmed (RECEPTOR).
- The existence of a plausible migration route between the source and the receptor (PATHWAY).

In the absence of a plausible pollutant linkage there is no risk. Where a potential linkage is identified in order for it not to pose a risk to the identified receptor it must be broken.

iv INTRUSIVE INVESTIGATION SAMPLING METHODOLOGY

The ground investigation (including fieldwork, sampling, monitoring and laboratory analyses) has been designed to identify and assess potential ground related problems and to allow cost effective solutions to be advised. It has been planned on the basis of the desk study, site inspection and the proposed development layout (where available). All fieldwork and soil descriptions were carried out in general accordance with relevant British Standards.

The exploratory holes have been positioned and advanced to depths to determine the general ground/groundwater/gas conditions below the site. A general grid pattern has been adopted, where possible, to provide sufficient information based on the current proposed layout scheme. Some holes have been targeted at particular hazards identified in the Phase I assessment. The resultant exploratory hole density is considered to be commensurate with the complexity of the site conditions and detail of information required for this phase of the investigation.

v GROUND GAS RISK ASSESSMENT METHODOLOGY

Gas monitoring programmes undertaken by GRM are designed to broadly comply with the recommendations outlined in CIRIA Report C665 'Assessing risks posed by hazardous ground gas to buildings' (2007) and BS8576 'Guidance on Investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs) (2013).

To assess the risks posed by ground gases such as radon, carbon dioxide and methane, the relevant current guidance has been used. For radon the site has been assessed following the guidelines in 'Radon: guidance on protective measures for new dwellings (BR211: 2015)'. For methane and carbon dioxide the primary guidance document used to determine if protection measures are required is *BS8485:2015 Code of practice for the design of protective measures from methane and carbon dioxide ground gases for new buildings*. This uses hazardous gas flow rates (Q_{hg}), which are gas concentrations multiplied by borehole flow rates, to derive a Gas Flow Rate (GSV) for the site. The gas regime is then determined based on the GSV and other limiting factors such as gas concentrations.

Where flow is not recorded during the monitoring a default flow rate of 0.1l/hr will be used in the assessment to produce a positive result.

vi HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

Guidance contained in the Environment Agency's CLEA Reports has been used to assess the risks posed to human health.

For residential developments that include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land with plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered including the consumption of home-grown vegetables.

For residential developments that do not include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land without plant uptake' are used, i.e. a female with a start age class of

one and an end age class of six. All pathways are considered except the consumption of home-grown vegetables.

For commercial/industrial developments the default Tier 1 Assessment Criteria (TAC) for **'commercial/industrial' are used, i.e. a female with a start age class of sixteen and an end age class of eighteen**. All pathways are considered except the consumption of home-grown vegetables.

The TAC used by GRM include Category 4 Screening Levels (C4SLs) published by DEFRA, values calculated by GRM using the CLEA v1.071 risk assessment, and values and Suitable for Use Levels (S4UL) developed by LQM/CIEH. The TAC used in the assessment are selected based on the lowest site specific SOM values returned as part of the chemical analysis.

Where soil chemical analysis results are found to exceed the TAC, Site-Specific Risk Assessments may be undertaken using the CLEA v1.071 risk assessment software using the age classes and pathways described above.

vii **RISK TO SITE WORKERS – GENERAL COMMENTS**

The risks to site workers are similar to those posed to site end users, although likely to be less severe **due to the site workers' shorter exposure to the identified contamination**. However, site workers (particularly groundworkers) are more likely to come into direct contact with contaminated soils due to the nature of their work. On this basis ground and construction workers should be provided with basic **Personal Protective Equipment based on the site's general health and safety risk assessment**, but including as a minimum safety footwear, gloves and overalls.

A site specific risk assessment should be carried out for all hazards identified within the ground investigation in accordance with current health and safety legislation. This assessment should identify any measures required to further reduce risks i.e. providing further Personal Protective Equipment, welfare facilities and if necessary preventing access to certain areas.

Demolition and dismantling of existing structures on the site must be carried out to a safe and acceptable standard, in accordance with current UK guidance and best practice. Whilst not ground related, asbestos and hazardous substances surveys should be conducted prior to any demolition.

Any unusual colours, odours and suspicious ground should be reported immediately to site management and then GRM.

Whilst this appraisal has considered the long-term effects of contamination, GRM can also help during the formulation of Health and Safety documentation, if required.

viii **CONTROLLED WATERS RISK ASSESSMENT METHODOLOGY**

Where the desk study and fieldwork do not reveal a potential source of contamination no leachate or groundwater testing will be performed. Where a potential source is identified the testing will comprise leachate testing on the material considered most likely to pose a risk, groundwater testing will be undertaken if water is present at shallow depth.

The UK Drinking Water Standards (UKDWS) or Environmental Quality Standards (EQS) are usually adopted for comparison with the leachate/groundwater test results. When the most sensitive receptor is considered to be the aquifer (groundwater) UKDWS will be adopted as the Initial Tier 1 screening values. Where the most sensitive receptor is a surface water feature the EQS values will be used as Initial Tier I Screening values.

ix **CONSTRUCTION MATERIALS RISK ASSESSMENT METHODOLOGY**

The **'screening levels'** adopted for the assessment of risk to construction materials are taken from the following documents:

- UK Water Industry Research (UKWIR) Contamination thresholds for sub-surface water pipes, for the protection of buried pipes.
- Building Research Establishment (BRE) Special Digest SD1 (2005), 'Concrete in Aggressive Ground', for the protection of buried concrete.

x WASTE DISPOSAL, SITE WASTE MANAGEMENT PLANS AND MATERIAL MANAGEMENT PLANS

Under current Waste Management Regulations, waste soil materials produced from the site will require characterisation to enable it to be disposed of correctly.

The chemical analysis results included in this report should be provided to the relevant landfill operators to establish the characterisation of the waste, confirm its suitability for landfill disposal and provide estimated costings. If material is classified as hazardous, then the site will need to be registered with the **Environment Agency prior to the movement of the waste. Depending on the receiving landfill's current permit, further chemical analysis, incorporating Waste Acceptance Criteria (WAC) leachate analysis, may be required.**

All materials removed from the site will be classified as 'waste' and therefore must be removed by a suitably licensed carrier of waste. This applies whether or not the waste is contaminated. All waste removed to landfill will attract Landfill Tax.

The developer/builder is likely to be classed as the waste producer and therefore, has a duty of care to ensure that all waste is disposed of appropriately. This includes ensuring the waste carrier is licensed and disposes of the waste to a suitably licensed landfill site. They are also required to keep a paper trail from 'cradle to grave' including copies of the waste disposal tickets.

Efficient materials management on site is recommended as it can lead to significant cost savings when compared to the traditional side casting or single stockpile of arisings. GRM can assist in the production of Material Management Plans under the CL:AIRE Definition of Waste: Code of Practice. The DoWCoP enables:

- The direct transfer and re-use of clean naturally occurring soil materials between sites, and
- The re-use of both contaminated and uncontaminated materials on their site of origin and between sites within defined Cluster projects.

GRM can also undertake the role of Qualified Person and submit the DoW CoP project Declaration.

Likewise making the site as volume neutral as possible will reduce the costs of development. Whilst not a statutory requirement, Site Waste Management Plans allow better waste management practices, help to reduce the amount of waste produced and identify best environmental disposal options. Implementing a Site Waste Management Plan (SWMP) can reduce costs (increasing business profits) and maximise resource efficiency.

xi GEOTECHNICAL ASSESSMENT GENERAL COMMENTS

Where finished floor levels of proposed structures have not been provided by the Client, then for the purposes of initial assessment, GRM will assume that finished levels will not vary appreciably from the existing ground levels. If the depths of any underground engineering works (i.e. sewers, pumping stations etc.) are unknown they will not be taken in to account in the assessment and it will be assumed that any such works will not compromise foundation or ground stability.

Should the development proposals or finished levels be different from these assumptions then the comments/recommendations in the Geotechnical Assessment may require revising.

It should be noted that the results of window sampling and/or cable percussive boreholes may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure etc). GRM consider that that prior to development trial pitting should be undertaken to confirm the recommendations in the Geotechnical Assessment.

xii GEOTECHNICAL ASSESSMENT – ENGINEERING GROUND TREATMENT

Near surface soils have the potential to be disturbed by weathering and site traffic. Precautions should always be taken to avoid this, as excessive disturbance may leads to more onerous floor slab designs, road cap thickness and increased amounts of off-site disposal etc.

Near surface soils may need treatment or reinforcing to allow safe movement of construction plant and labour. An assessment by the contractor should be undertaken once the type of machinery/plant needed to complete the development is known.

xiii **GEOTECHNICAL ASSESSMENT – EXCAVATIONS**

Excavation instability (over-break) can result in damage to existing services or structures (e.g. foundations, roads or boundary walls/fences) both on and off-site, as well as increased foundation concrete costs. In order to minimise this, all excavations deeper than 1.2m deep (or any excavation within 1.5m of any existing structure or service) should be supported. Full support should be provided to the full depth of all near vertically sided excavations in made ground, soft and very soft clays and granular soils. A reduction to intermediate support should be acceptable within firm and stiffer natural clays.

Wherever possible, man entry into excavations should be prevented; however, where this is not possible, entry to, and time spent in, excavations should be kept to a minimum.

The build program should be tailored to reflect the impact that deep excavations through potentially unstable strata can have on adjacent properties, so that they are not undermined.

All excavations on site should be in accordance with HSE guidelines and stability should be practically maintained at all times. Reference should be made to HSE construction information sheet No. 8 (Revision 1) 'Safety in Excavations'.

Care should be taken to ensure that falls from excavation faces do not adversely affect the integrity of foundation concrete.

If contaminated water enters excavations it should be removed and transported to an appropriate treatment facility by a suitably licensed carrier before construction begins.

xiv **GEOTECHNICAL ASSESSMENT – SUBSTRUCTURES**

Where practicable, existing buried construction should be fully removed; however, if this is not practicable all new foundations should be carried down to fully penetrate it and it should be broken well away from all new structures.

There may be existing structures and/or infrastructure in close proximity to the proposed development. New build foundations may be constructed next to pavements with existing underground services beneath them, or excavations may be required near existing footings associated with adjacent properties. These potential hazards need to be taken into consideration when designing foundations and the groundworker needs to be made aware of their potential impact during the redevelopment works. Foundations close to existing underground services or buildings may require alternative foundation techniques (such as piling) to protect the integrity of these structures.

The contractor for the works should carry them out in such a fashion so as to not cause excessive overbreak, concrete usage or undermine existing buildings/roads/ services that are to be retained.

xv **GEOTECHNICAL ASSESSMENT – SOAKAWAYS**

Soakaway testing in trial pits by GRM is broadly carried out in accordance with BRE DG 365 (2016). The testing comprises the excavation of a test pit to a suitable depth, and the placement of water into the pit. The level of water present is then monitored over time. For borehole installations, the permeability testing (falling head/rising head) is undertaken in accordance with BS5930.

If it is decided to proceed with the use of soakaway drainage, then the following general points should be noted:

- Soakaways should not be placed so that water can be discharged through potentially contaminated made ground.
- The Environment Agency may require soakaways to be sealed systems such that only roof run off falls to soakaway.

- Interceptors are likely to be required for soakaways for highway drainage. The adopting authority for the highways should be consulted at the earliest opportunity regarding the use of soakaways for highways drainage.
- Consideration of site levels and slopes should be taken into account during the design.
- The construction of all soakaways should be in accordance with the current building regulations.
- Soakaways should not be placed within 5m of a proposed building.
- Placement of soakaways needs to be considered so as to avoid ponding of water down slope.
- The base of a soakaway should not be below the highest recorded water level.
- The Environment Agency prefer 1m of dry soil to be present between the base of a soakaway and the water table to provide attenuation for contamination.

xvi

GEOTECHNICAL ASSESSMENT – FOUNDATIONS

If soft or hard spots are encountered during foundation excavation then they should be replaced with suitably compacted material or the footings deepened to suitable strata, to avoid differential settlement.

If strata of differing bearing character (e.g. sand and clay) are encountered at foundation levels within the excavations for a single plot then the excavation depths should be altered as appropriate to ensure the foundations rest on a single stratum, or strata that will not induce differential settlement. Where this is impractical then GRM should be contacted to assess a reinforced concrete detail or an alternative foundation solution (e.g. piles or vibro-replacement).

General

GRM Development Solutions Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement had been executed, or with whom an assignment had been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from GRM Development Solutions Limited; a charge may be levied against such approval.

GRM Development Solutions Limited accepts no responsibility or liability for:

- a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and
- b) the consequences of this document being used by any third party with whom an agreement has not been executed.

Phase I Environmental Audits/ Desk Studies

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, GRM Development Solutions Limited reserves the right to review such information and as considered necessary and appropriate to modify the opinions accordingly. It should be noted that any risks identified in a Phase 1 report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits (Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, and controlled waters.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as provisional only and must, in any event, be confirmed by a commercial adviser.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. Whilst exploratory testing is intended to gain an accurate representation of the site, the very nature of sampling and testing is such that it cannot ensure that all localised conditions are detected.

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

Phase II Geo-environmental Investigations (Combined Geotechnical and Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions to provide a reasonable assessment of the environment risks together with engineering and development implications. If costs have been included in relation to site development a commercial adviser must confirm these.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site for each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time the site work was conducted. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects. The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.



A P P E N D I X B

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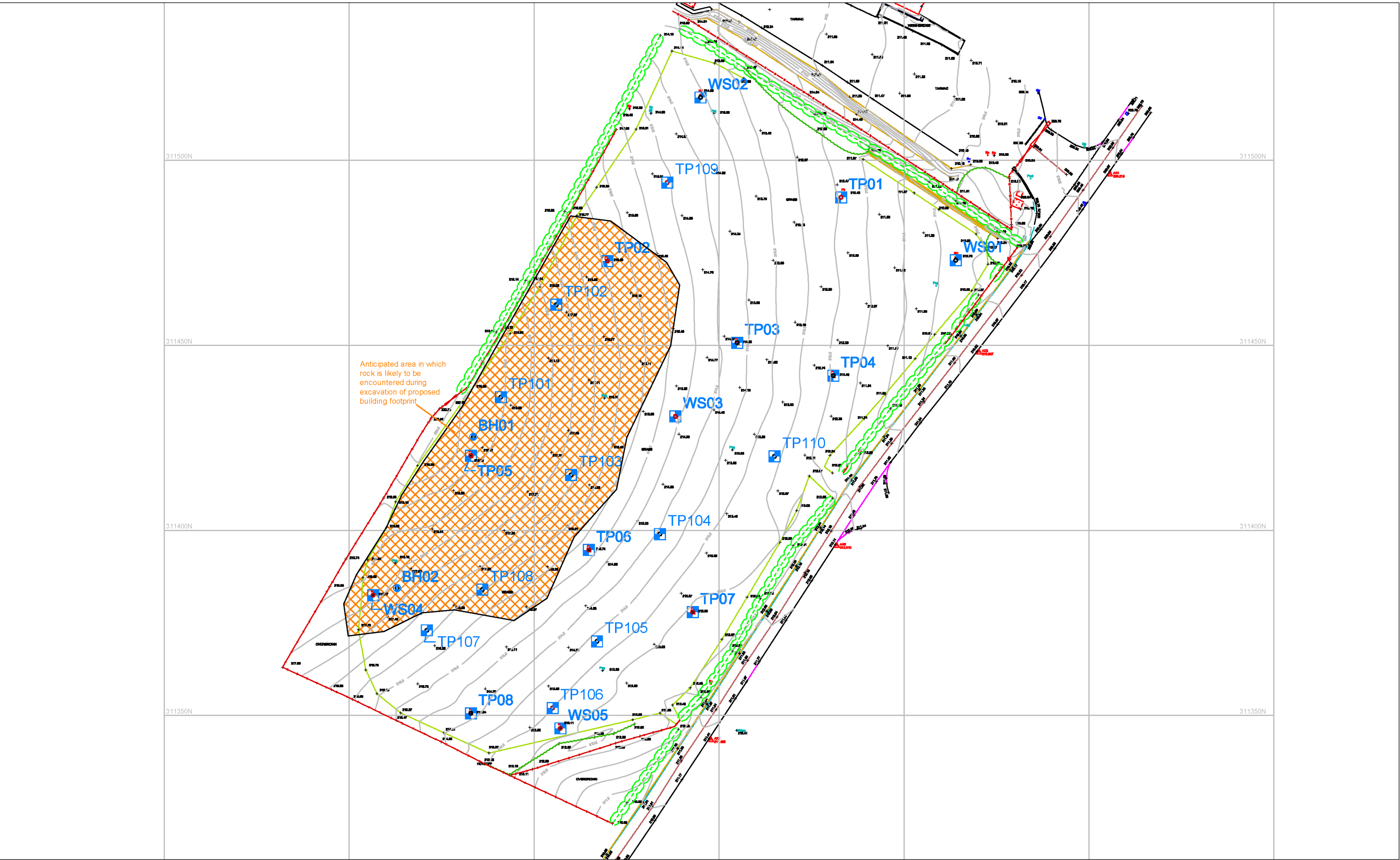
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 Laurus House, First Avenue, Centrum 100 Burton on Trent, Staffs, DE14 2WH Tel: (01283) 551249 Fax: (01283) 211968	CLIENT	Sutton Land Developments	DATE	16/08/2018
	PROJECT	Stanton Lane, Stanton	REF	P8079
	TITLE	Exploratory Hole Location Plan	DRAWING NO	001
			REV	B
			DRAWN BY	RDH/TDSR
			CHECKED	TDSR



A P P E N D I X C

**GRM Development Solutions provides
multi-disciplinary consultancy services, UK-wide:**

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

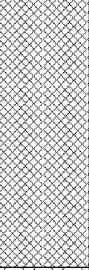
Tel:



Fax:



 GRM Development Solution Ltd, Tel (HQ): 01283 551249 Email: info@grm-uk.com Web: www.grm-uk.com		Rotary Core Log				Borehole No. BH01 Sheet 1 of 1	
Site Name: Stanton Lane, Stanton under Bardon						Ground Level (mAOD) 219.25	
Client: Sutton Land Development				GRM Project Ref: P8079		Coordinates 446884 E 311425 N	

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							2.00	217.25		Openhole Drilling. See trial pit TP05.	1
		2.00 - 3.00		60	25	0				Strong locally weak pinkish brown, locally black and greenish grey, thickly laminated, extremely closely to closely fractured volcaniclastic SILTSTONE. Occasional very thickly laminated/very thinly bedded medium-grained volcaniclastic sandstone. Strata dip at c.60° Discontinuities dip at c.60° or steeper, not all are parallel to bedding. BRADGATE FORMATION	2
		3.00 - 3.50		20	0	0		3			
		3.50 - 4.50		75	60	60		4			
		4.50 - 6.00		80	50	30		5			
		6.00 - 7.00		50	50	40		6			
		7.00 - 8.00		100	70	60		7			
							8.00	211.25		Higher % greenish grey than above. Higher % sandy bands.	8
										End of Borehole at 8.00m	9
											10

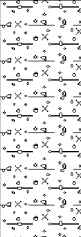
Crew: Dynamic Sampling Ltd.	Equipment: Commachio 405	Logger: TDSR
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General Remarks:
2.0-2.6m recovered as coarse gravel.

Groundwater Remarks:
No groundwater encountered.

Hole Started: 29/05/2018	Hole Complete: 29/05/2018	Version: FINAL	Scale: 1:56
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		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log		Trial Pit No TP05 Sheet 1 of 1	
Site Name: Stanton Lane, Stanton under Bardon						Ground Level (mAOD) 219.25	
Client: Sutton Land Development				GRM Project Ref: P8079		Coordinates 446883 E 311420 N	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20 0.20	D ES		0.30	218.95	 	Soft, dark brown, slightly sandy slightly gravelly CLAY topsoil. Sand is fine to medium. Gravel is fine to coarse, subangular sandstone, volcanic sandstone, siltstone and chert. TOPSOIL	1 2 3 4
	0.50 - 0.60	B		1.10	218.15		Medium dense to dense, light brown and orange slightly clayey sandy silty cobbly GRAVEL of fine to coarse, subangular volcanic sandstone and siltstone. HEAD	
	End of Pit at 1.10m							

Date Excavated: 08/08/2017 Date Backfilled: 08/08/2017 Shoring: None Stability: Stable Plant Used: Tracked 8 Ton Excavator Logged by: RDH	Groundwater Observations: No groundwater encountered.
	Trial Pit Dimensions (m): 0.70  3.10 Reason for termination of Trial Pit: Excavator bucket scraping along base of trial pit.

General Remarks: None.

Strata consistencies/densities determined by observation only	Version: FINAL	Scale: 1:25
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GRM Development Solution Ltd,
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Rotary Core Log

Borehole No.

BH02

Sheet 1 of 1

**Ground Level
(mAOD)**

218.20

Site Name: Stanton Lane, Stanton under Bardon

Client: Sutton Land Development

GRM Project Ref: P8079

Coordinates

446863 E

311384 N

Well	Water Strikes	Depth (m)	Type /FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description					
				TCR	SCR	RQD									
										Openhole Drilling. See borehole WS04.					
		1.00 - 2.50		50	10	0	1.00	217.20		Pale grey thinly laminated volcaniclastic SILTSTONE.	1				
															BRADGATE FORMATION
															Greenish grey fine to coarse grained volcaniclastic SANDSTONE.
															Pale grey and greenish grey thinly to thickly laminated volcaniclastic SILTSTONE.
															BRADGATE FORMATION
		2.50 - 4.00		40	25	0	2.20	216.00		Pale grey and greenish grey thinly to thickly laminated volcaniclastic SILTSTONE.	2				
															BRADGATE FORMATION
															Greenish grey fine to coarse grained volcaniclastic SANDSTONE.
															BRADGATE FORMATION
															Strong greenish grey locally pinkish brown medium to coarse grained DIORITE.
		4.00 - 5.50		95	75	50	2.85	215.35		SOUTH CHARNWOOD DIORITES	3				
															Strong grey, greenish grey and pinkish grey thinly to thickly laminated volcaniclastic SILTSTONE.
															BRADGATE FORMATION
															Strong pinkish brown, locally black and greenish grey, thickly laminated, extremely closely to closely fractured volcaniclastic SILTSTONE.
															BRADGATE FORMATION
							4.00	214.20		Medium strong dark grey thinly laminated MUDSTONE/SILTSTONE.	4				
															BRADGATE FORMATION
															Strong pinkish brown, locally black and greenish grey, thickly laminated, extremely closely to closely fractured volcaniclastic SILTSTONE.
							5.50	212.70		Occasional very thickly laminated/very thinly bedded medium-grained volcaniclastic sandstone.	5				
															BRADGATE FORMATION
															End of Borehole at 5.50m
											6				
											7				
											8				
											9				
											10				
Crew: Dynamic Sampling Ltd.				Equipment: Commachio 405				Logger: TDSR							
General Remarks: 1.0-2.5m recovered as coarse gravel and occasional boulders.															
Groundwater Remarks: No groundwater encountered.															
Hole Started: 29/05/2018			Hole Complete: 30/05/2018			Version: FINAL			Scale: 1:56						

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS04 Sheet 1 of 1			
Site Name: Stanton Lane, Stanton under Bardon							Ground Level (mAOD) 218.16			
Client: Sutton Land Development					GRM Project Ref: P8079		Coordinates 446856 E 311383 N			
Installation/ Backfill	Water Strike	Samples/Tests			Dynamic Probing (Blows per 100mm)	Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	Result						
		0.60 - 0.70	D			0.30	217.86		Soft, dark brown, slightly sandy slightly gravelly CLAY topsoil. Sand is fine to medium. Gravel is fine to coarse, subangular sandstone, volcanic sandstone, siltstone and chert.	1
		1.00	S	50 (5,14/50 for 215mm)		1.00	217.16		TOPSOIL Medium dense, light brown slightly sandy gravelly to very gravelly SILT. Gravel is fine to coarse, angular to subangular volcanoclastic siltstone. HEAD	
									End of Borehole at 1.00m	2
										3
										4
Crew: Dynamic Sampling Ltd.					Logger: RDH		Weather: Dry			
Equipment: Premier Compact 120 Series										
Reason for termination of borehole: SPT refusal										
Groundwater Remarks: No groundwater encountered.										
General Remarks: None.										
Hole Started: 07/08/2017		Hole Complete: 07/08/2017		Version: FINAL		Scale: 1:25				



GRM Development Solutions Ltd

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Trial Pit Log

Trial Pit No

TP101

Sheet 1 of 1

Site Name: Stanton Lane, Stanton under Bardon**Ground Level (mAOD)**

219.50

Client: Sutton Land Development**GRM Project Ref:** P8079**Coordinates**

446891 E

311436 N

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20	219.30		Soft, dark brown, slightly gravelly CLAY topsoil. Gravel is fine to medium subangular volcanic siltstone. TOPSOIL.	
				0.80	218.70		Dense, orangish brown and light brown, slightly clayey sandy gravelly COBBLES of volcanic siltstone. Regular angular boulders. HEAD	1
				1.50	218.00		Very dense, light brown angular COBBLES of volcanoclastic siltstone. HEAD	
				1.50	218.00		Strong, light grey and blueish grey, laminated volcanoclastic SILTSTONE. BRADGATE FORMATION	2
				3.30	216.20		End of Pit at 3.30m	3
								4

Date Excavated: 04/06/2018**Date Backfilled:** 04/06/2018**Shoring:** None**Stability:** Stable during excavation**Plant Used:** JCB JS130LC Tracked Excavator**Logged by:** RDH**Groundwater Observations:**

No groundwater encountered.

Trial Pit Dimensions (m):

3.00

4.00

Reason for termination of Trial Pit:

Time constraints.

General Remarks: Trial pit dug to investigate break-ability of rock strata. Pit took all day to complete. Breaker from 1.5m begl.

Strata consistencies/densities determined by observation only

Version: FINAL**Scale:** 1:25

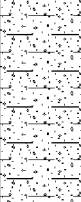
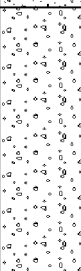
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP102 Sheet 1 of 1	
Site Name: Stanton Lane, Stanton under Bardon							Ground Level (mAOD) 217.75	
Client: Sutton Land Development					GRM Project Ref: P8079		Coordinates 446906 E 311461 N	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20	217.55		Soft, dark brown, slightly gravelly CLAY topsoil. Gravel is fine to medium subangular volcanic siltstone. TOPSOIL.	1
				1.30	216.45		Dense, orangish brown and brown, gravelly cobbly CLAY. Gravel and cobbles are fine to coarse, angular to subangular volcanic siltstone. HEAD	
				1.90	215.85		Medium strong volcanoclastic SILTSTONE. BRADGATE FORMATION	
							End of Pit at 1.90m	2
								3
								4

Date Excavated: 05/06/2018		Groundwater Observations:	
Date Backfilled: 05/06/2018		No groundwater encountered.	
Shoring: None			
Stability: Stable during excavation			
Plant Used: JCB JS130LC Tracked Excavator		Reason for termination of Trial Pit:	
Logged by: RDH		Solid geology identified.	
General Remarks: None.			

Strata consistencies/densities determined by observation only	Version: FINAL	Scale: 1:25
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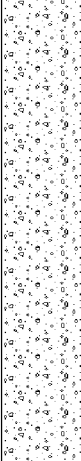
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log		Trial Pit No TP103 Sheet 1 of 1	
Site Name: Stanton Lane, Stanton under Bardon						Ground Level (mAOD) 217.15	
Client: Sutton Land Development				GRM Project Ref: P8079		Coordinates 446910 E 311415 N	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20	216.95		Soft, dark brown, slightly gravelly CLAY topsoil. Gravel is fine to medium subangular volcanoclastic siltstone. TOPSOIL.	
				0.90	216.25		Medium dense, orangish brown, slightly clayey very gravelly SAND. Gravel is fine to coarse, angular to subangular volcanoclastic siltstone. HEAD	1
				1.80	215.35		Dense, light brown, cobbly GRAVEL of fine to coarse, angular to subangular volcanoclastic siltstone. HEAD	
				1.90	215.25		Hard, light brown and blueish grey volcanoclastic SILTSTONE. BRADGATE FORMATION	2
							End of Pit at 1.90m	
								3
								4

Date Excavated: 05/06/2018		Groundwater Observations:	
Date Backfilled: 05/06/2018		No groundwater encountered.	
Shoring: None			
Stability: Stable during excavation			
Plant Used: JCB JS130LC Tracked Excavator		Reason for termination of Trial Pit:	
Logged by: RDH		Solid geology identified.	
General Remarks: None.			

Strata consistencies/densities determined by observation only		Version: FINAL	Scale: 1:25
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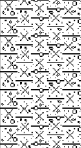
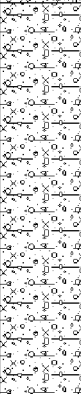
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log		Trial Pit No TP104 Sheet 1 of 1	
Site Name: Stanton Lane, Stanton under Bardon						Ground Level (mAOD) 214.45	
Client: Sutton Land Development				GRM Project Ref: P8079		Coordinates 446934 E 311399 N	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	Scale
	Depth	Type	Results					
				0.20	214.25		Soft, dark brown, slightly gravelly CLAY topsoil. Gravel is fine to medium subangular volcanic siltstone.	1
				0.40	214.05		Loose, light brown gravelly SAND. Gravel is fine to coarse, subangular sandstone.	
							Dense, brown, very sandy cobbly GRAVEL of angular volcanoclastic siltstone.	
				2.00	212.45		Strong blueish grey laminated volcanoclastic SILTSTONE. BRADGATE FORMATION	2
				2.25	212.20		End of Pit at 2.25m	3
								4

Date Excavated: 05/06/2018 Date Backfilled: 05/06/2018 Shoring: None Stability: Stable during excavation Plant Used: JCB JS130LC Tracked Excavator Logged by: RDH	Groundwater Observations: No groundwater encountered.
	Trial Pit Dimensions (m): 0.70 3.00 Reason for termination of Trial Pit: Solid geology identified.

General Remarks: None.		
Strata consistencies/densities determined by observation only	Version: FINAL	Scale: 1:25

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log		Trial Pit No TP105 Sheet 1 of 1	
Site Name: Stanton Lane, Stanton under Bardon						Ground Level (mAOD) 213.90	
Client: Sutton Land Development				GRM Project Ref: P8079		Coordinates 446917 E 311370 N	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20	213.70		Soft, dark brown, slightly gravelly CLAY topsoil. Gravel is fine to medium subangular volcanic siltstone. TOPSOIL	
				0.50	213.40		Loose, orangish brown slightly gravelly SAND. Gravel is fine to coarse, subangular sandstone and volcanoclastic siltstone. HEAD	
				1.00	212.90		Firm, light brown, slightly sandy gravelly to very gravelly clayey SILT. Gravel is fine to coarse, subangular volcanoclastic siltstone. HEAD	1
				2.30	211.60		Very dense, light brown and orange, volcanoclastic siltstone COBBLES in a silty clayey sandy gravelly matrix. HEAD	2
				2.60	211.30		Strong laminated blueish grey volcanoclastic SILTSTONE. BRADGATE FORMATION	3
							End of Pit at 2.60m	4

Date Excavated: 05/06/2018		Groundwater Observations:	
Date Backfilled: 05/06/2018		No groundwater encountered.	
Shoring: None			
Stability: Stable during excavation			
Plant Used: JCB JS130LC Tracked Excavator		Reason for termination of Trial Pit:	
Logged by: RDH		Solid geology identified.	

Trial Pit Dimensions (m):
 0.70 
 3.00

General Remarks: None.

Strata consistencies/densities determined by observation only	Version: FINAL	Scale: 1:25
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GRM Development Solutions Ltd

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Trial Pit Log

Trial Pit No

TP106

Sheet 1 of 1

Site Name: Stanton Lane, Stanton under Bardon

Ground Level
(mAOD)

213.50

Client: Sutton Land Development

GRM Project Ref: P8079

Coordinates

446905 E

311352 N

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20	213.30		Soft, dark brown, slightly gravelly CLAY topsoil. Gravel is fine to medium subangular volcanic siltstone. TOPSOIL	
				1.00	212.50		Medium dense, light brown gravelly SAND. Sand is fine to coarse. Gravelly is fine to coarse angular to subangular volcanoclastic siltstone. HEAD	1
				3.00	210.50		Very dense, brown and orangish brown cobbly GRAVEL of subangular volcanoclastic siltstone and sandstone. HEAD	2
				3.60	209.90		Very dense, light brown gravelly cobbly SAND. Gravel is fine to coarse, subangular volcanoclastic siltstone. HEAD	3
							End of Pit at 3.60m	4

Date Excavated: 05/06/2018

Date Backfilled: 05/06/2018

Shoring: None

Stability: Stable during excavation

Plant Used: JCB JS130LC Tracked
Excavator

Logged by: RDH

Groundwater Observations:

No groundwater encountered.

Trial Pit Dimensions (m):

0.70



3.00

Reason for termination of Trial Pit:

Maximum bucket depth.

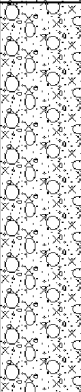
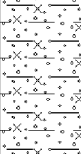
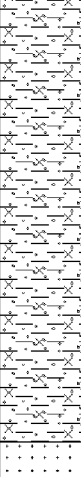
General Remarks: None.

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log		Trial Pit No TP107 Sheet 1 of 2	
Site Name: Stanton Lane, Stanton under Bardon						Ground Level (mAOD) 216.60	
Client: Sutton Land Development				GRM Project Ref: P8079		Coordinates 446871 E 311373 N	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20	216.40		Soft, dark brown, slightly gravelly CLAY topsoil. Gravel is fine to medium subangular volcanic siltstone. TOPSOIL	
				0.50	216.10		Loose, brown gravelly SAND. Gravel is fine to coarse, subangular sandstone and volcanoclastic siltstone. HEAD	
				1.80	214.80		Dense, light brown, slightly clayey silty SAND with cobbles and gravel of subangular volcanoclastic siltstone. HEAD	1
				2.40	214.20		Firm, orangish brown and reddish brown volcanoclastic siltstone GRAVEL in a clay matrix. HEAD	2
				3.90	212.70		Firm, reddish brown mottled grey, slightly gravelly silty CLAY. Gravel is fine to medium, subangular siltstone, mudstone and carbon fragments. EDWALTON FORMATION	3
							Extremely weak, light grey and green SANDSTONE with subordinate clay layers.	4
Continued on Next Sheet								

Date Excavated: 05/06/2018 Date Backfilled: 05/06/2018 Shoring: None Stability: Stable during excavation Plant Used: JCB JS130LC Tracked Excavator Logged by: RDH	Groundwater Observations: No groundwater encountered.
	Trial Pit Dimensions (m): 0.70 3.00 Reason for termination of Trial Pit: Solid geology identified.

General Remarks: None.

Strata consistencies/densities determined by observation only	Version: FINAL	Scale: 1:25
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		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP107 Sheet 2 of 2	
Site Name: Stanton Lane, Stanton under Bardon							Ground Level (mAOD) 216.60	
Client: Sutton Land Development					GRM Project Ref: P8079		Coordinates 446871 E 311373 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				4.30	212.30		EDWALTON FORMATION End of Pit at 4.30m	
Date Excavated: 05/06/2018 Date Backfilled: 05/06/2018 Shoring: None Stability: Stable during excavation Plant Used: JCB JS130LC Tracked Excavator Logged by: RDH Groundwater Observations: No groundwater encountered.								
				Trial Pit Dimensions (m): 0.70  3.00		Reason for termination of Trial Pit: Solid geology identified.		
General Remarks: None.								
Strata consistencies/densities determined by observation only					Version: FINAL		Scale: 1:25	



GRM Development Solutions Ltd

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Trial Pit Log

Trial Pit No

TP108

Sheet 1 of 1

Site Name: Stanton Lane, Stanton under Bardon

Ground Level
(mAOD)

216.50

Client: Sutton Land Development

GRM Project Ref: P8079

Coordinates

446886 E
311384 N

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.25	216.25		Soft, dark brown, slightly gravelly CLAY topsoil. Gravel is fine to medium subangular volcanic siltstone. TOPSOIL	
				0.80	215.70		Medium dense, orangish brown gravelly SAND. Gravel is fine to medium subangular sandstone and volcanoclastic siltstone. HEAD	
							Dense, brown and orangish brown, slightly clayey silty sandy GRAVEL and COBBLES of angular to subangular volcanoclastic siltstone. HEAD	1
				2.30	214.20		Strong light brown and blueish grey laminated volcanoclastic SILTSTONE.	2
				2.50	214.00		BRADGATE FORMATION End of Pit at 2.50m	3
								4

Date Excavated: 05/06/2018

Date Backfilled: 05/06/2018

Shoring: None

Stability: Stable during excavation

Plant Used: JCB JS130LC Tracked
Excavator

Logged by: RDH

Groundwater Observations:

No groundwater encountered.

Trial Pit Dimensions (m):

0.70



3.00

Reason for termination of Trial Pit:

Solid geology identified.

General Remarks: None.

Strata consistencies/densities determined by observation only

Version: FINAL

Scale: 1:25

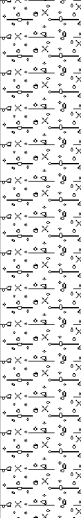
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log		Trial Pit No TP109 Sheet 1 of 1	
Site Name: Stanton Lane, Stanton under Bardon						Ground Level (mAOD) 215.10	
Client: Sutton Land Development				GRM Project Ref: P8079		Coordinates 446936 E 311494 N	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20	214.90		Soft, dark brown, slightly gravelly CLAY topsoil. Gravel is fine to medium subangular volcanic siltstone. TOPSOIL	
				0.60	214.50		Medium dense, light brown and orange, slightly clayey slightly sandy gravelly SILT. Gravel is fine to coarse, subangular volcanic siltstone and sandstone. HEAD	
							Firm, orangish brown and grey, sandy gravelly CLAY. Gravel is fine to coarse, angular to subangular volcaniclastic siltstone. HEAD	
				3.40	211.70		End of Pit at 3.40m	

Date Excavated: 05/06/2018 Date Backfilled: 05/06/2018 Shoring: None Stability: Stable during excavation Plant Used: JCB JS130LC Tracked Excavator Logged by: RDH	Groundwater Observations: No groundwater encountered.
	Trial Pit Dimensions (m): 0.70 3.00 Reason for termination of Trial Pit: Maximum bucket depth.

General Remarks: None.

Strata consistencies/densities determined by observation only	Version: FINAL	Scale: 1:25
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		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP110 Sheet 1 of 1	
Site Name: Stanton Lane, Stanton under Bardon							Ground Level (mAOD) 213.10	
Client: Sutton Land Development					GRM Project Ref: P8079		Coordinates 446965 E 311420 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.25	212.85		Soft, dark brown, slightly gravelly CLAY topsoil. Gravel is fine to medium subangular volcanic siltstone. TOPSOIL	
							Medium dense to very dense, orangish brown, slightly clayey very sandy gravelly COBBLES of angular to subangular volcanic siltstone and sandstone. HEAD	1
				2.00	211.10		Strong, blueish grey, laminated volcanoclastic SILTSTONE.	2
				2.10	211.00		BRADGATE FORMATION End of Pit at 2.10m	
								3
								4
Date Excavated: 05/06/2018 Date Backfilled: 05/06/2018 Shoring: None Stability: Stable during excavation Plant Used: JCB JS130LC Tracked Excavator Logged by: RDH				Groundwater Observations: No groundwater encountered.				
				Trial Pit Dimensions (m): 0.70  3.00		Reason for termination of Trial Pit: Solid geology identified.		
General Remarks: None.								
Strata consistencies/densities determined by observation only					Version: FINAL		Scale: 1:25	



A P P E N D I X D

**GRM Development Solutions provides
multi-disciplinary consultancy services, UK-wide:**

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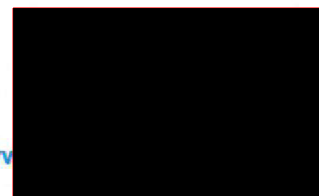
Kiwa CMT



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Kiwa CMT Testing
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T
F
E
wv



Date: 25th June 2018

Lab Ref: 57729

Order Ref: Project P8079

Site: Stanton under Bardon

Originator: Tim Rogers

Samples: A number of borehole core samples, nominally 86mmØ, were delivered, by the client, to Kiwa CMT Testing on the 7th June 2018. Each of the samples were labelled individually.

Requirements: To assess various samples for Unconfined Compressive Strength (5No) and Point Load Index (11No) at locations, and depths, selected by the client.

Results: Tabulated values are included overleaf, detailing test results and sample location.

Kiwa CMT Testing



G.Peach AMICT
Department Manager
Building Products

Test Results

Ref	Depth (m)	Test Type	I _s (MPa)	I _{s(50)} (MPa)	UCS (N/mm ²)
BH01	2.4-2.5	PL	1.208	1.207	-
BH01	3.8-4.1	UCS	-	-	11.3
BH01	3.8-4.1	PL	1.012	1.055	-
BH01	4.1-4.25	PL	0.264	0.290	-
BH01	4.5-4.75	UCS	-	-	69.6
BH01	5.0-5.2	UCS	-	-	22.4
BH01	5.8-5.9	PL	2.534	2.285	-
BH01	6.13-6.5	UCS	-	-	56.6
BH01	6.13-6.5	PL	1.122	1.215	-
BH01	6.8-6.94	PL	2.345	2.515	-
BH01	7.0-7.2	PL	1.208	1.354	-
BH01	7.47-7.67	UCS	-	-	54.7
BH02	1.7	PL	3.224	3.458	-
BH02	2.8-2.9	PL	2.024	2.244	-
BH02	3.2-3.35	PL	1.879	1.906	-
BH02	4.8-5.0	PL	4.189	4.608	-

Comments:

I_{s(50)} is the corrected Point Load strength when converted to a value of I_s that would have been measured by a diametral test with a Ø of 50mm. All UCS values have been corrected for the tested height of the core sample.

Samples tested between the 12th and 22nd June 2018.

Kiwa CMT Testing

G.Peach AMICT
Department Manager
Building Products