GeoDyne

Geotechnical &
Environmental
Consultants

Shakespeare Park
Avon Road
Braunstone

Phase II Exploratory Investigation
For
Braunstone Town Council

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Project No: 37327		**Date: 18th December 2017**	
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Comments			

EXECUTIVE SUMMARY

Ground Conditions	Dark brown clayey silty sandy TOPSOIL was encountered to depths of 0.25m to 0.35m begl in the majority of the exploratory holes. Locally there was vegetation debris and grass overlying the Topsoil. Subsoil was encountered underlying the topsoil in WS1 and beneath the Made Ground in WS5, and typically comprised stiff brown slightly gravelly slightly sandy CLAY / dark grey mottled brown clayey SAND to depths of between 0.50m and 0.55m begl. Made Ground was encountered in exploratory hole WS5 to a depth of 0.40m begl and comprised decaying vegetation overlying dark brown sandy topsoil (to 0.35m) beneath which gravel hardstanding was encountered. Beneath the Topsoil / Subsoil and Made Ground (where present), strata assigned as the Oadby Member was encountered in all the exploratory holes to the maximum depth investigated (5.00m begl) but the stratum was not fully penetrated. The strata typically comprised firm to very stiff brown, light brown and grey becoming dark grey sandy gravelly CLAY / gravelly CLAY, locally with pockets and bands of water bearing sand. In WS1 medium dense grey slightly gravelly SAND was encountered between 2.80m and 3.40m begl. The bedrock of the Edwalton Member was not encountered in any of the exploratory holes.
Foundation Design	In-situ strength testing indicates that the natural strata predominantly comprising Clay with subordinate Sand represents suitable bearing strata for typical 1/2 storey buildings. Foundations may be traditional strip or trench fill designed to suit the loading characteristics of the proposed building. The strength tests at depths of 1.00m begl appears to reveal conditions suitable to support a nett allowable ground bearing pressure of up to 100kN/m^2. Foundations should be advanced to a minimum of 0.90m below existing or proposed ground level (whichever is deeper). Foundations should be advanced through any soft spots, Made Ground and disturbed ground to encounter suitably geotechnically competent Natural Strata.
Building Near Trees	Foundation designs should be adjusted in full accordance with NHBC Standards Chapter 4.2 '*Building near trees*', assuming soils of Medium volume change potential.
Floor Slab	Based on our findings, a suspended floor slab (i.e. beam and block) is recommended due to the shrinkable nature of the cohesive strata encountered.
Ground Gas	No significant sources of ground gases (Methane and Carbon Dioxide) have been identified. Based on our exploratory hole findings ground gas protection measures are not required at this site.
Water	Shallow excavations across the majority of the site are unlikely to require significant dewatering. Any water collecting in open pits may be managed with simple sump pumping techniques. Some dewatering may also be required where excavations are left open during periods of adverse weather (with rainwater likely to accumulate within open pits due to the cohesive nature of the soils in these areas).
Excavations / Stability	Shallow excavations where water bearing granular strata is encountered may require sidewall support locally for stability, and excavations may also require support for health and safety reasons. The assessment of excavations and provision of support will be the responsibility of the contractor on site. The natural cohesive soils may be subject to deterioration and softening if excavations are left open and exposed to wet weather. Any softened soils should be removed from excavations prior to the pouring of concrete and foundation construction.
Sulphate Classification	BRE Special Digest 1:2005 Design Sulfate Class DS-1 and ACEC classification AC-1.
CBRs	A CBR value of between <2% and 4% can be anticipated within the shallow Natural Strata, subject to confirmation by in-situ testing.
Surface Water Drainage	The use of soakaways is considered unlikely to be suitable at the site, and it is recommended that alternative methods of surface water disposal are considered at this stage.

Contamination Assessment	<u>Human Health</u> The Topsoil and Natural Strata samples tested are considered to be chemically uncontaminated assuming a proposed commercial end use. <u>Controlled Waters</u> The soil test results have revealed the general absence of any significant potentially mobile contamination beneath the subject site. On the basis of the foregoing, the risks posed to Controlled Waters from the redevelopment area is considered to be low. No specific remediation is considered necessary in relation to potential risks to groundwater.
Re-use of Soils / Topsoil Importation	Based on the chemical analysis of the site-won Topsoil and Natural Strata, the soil test results indicate it is chemically suitable for re-use onsite (if required). In the unlikely event that additional topsoil is required it should be tested at source to ensure its chemical suitability for use at the site, and should ideally conform to BS3882: 2015 '*Specification for topsoil*', with respect to the presence of deleterious material and nutrient levels etc. Alternatively, topsoil may be sourced from a reputable supplier with appropriate certification. Prior to placing the topsoil, we would recommend that the formation layer is inspected by the contractor and any deleterious material removed from the formation layer.
Construction Workers	It is recommended that construction personnel involved with direct contact with the soils at the site use appropriate equipment together with welfare facilities in accordance with general health and safety guidelines.
Utilities	This report should be supplied to utility companies and their recommendations relating to appropriate supply pipes adhered to.
Unforeseen Circumstances	Should any areas of potentially contaminated soil be encountered during site construction works we would recommend consultation with GeoDyne Limited to ensure that our recommendations continue to apply.
Licenses, Permits, Registrations, Plans and Approvals	The Contractor/Developer is responsible for, and must ensure that, all necessary licenses, permits, registrations, plans and approvals are in place prior to commencing with the earthworks at the site.
Statutory Consultation	A copy of our report should be issued by the Client to the Local Authority (and NHBC or other warranty provider, if necessary) for review/comment and approval prior to commencing with the development of the site.

1.0 INTRODUCTION

1.1 Introduction

GeoDyne Limited has been appointed by the Client, Braunstone Town Council, to undertake a Phase II Exploratory Investigation at a site located at Shakespeare Park, Avon Road, Braunstone.

The location of the site is shown on the plan presented in Appendix I (Figure No. 37327/01).

1.2 Scope of Works

The scope of our works comprised the following:

- A sub-contracted sub-surface utility scan.
- Advancement of 6No. windowless sampling boreholes (designated WS1 to WS6) to a maximum depth of 5.00m begl.
- Geotechnical and environmental soils testing.
- Falling head infiltration testing in borehole WS6.

A Phase 1 Desk Study was not undertaken as part of our works.

1.3 Project Understanding

We understand that the Client intends to demolish the existing pavilion building in the west of the site and construct a new pavilion building in the east of the site adjacent to the east of the existing bowling green. The existing car park will be extended into the area of the demolished building.

A copy of the proposed site plans are included as Appendix X.

If our understanding is incorrect, it would be necessary to review our report to ensure it continues to apply.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made based on the findings of the investigation. Where comments are made based on information obtained from third parties, GeoDyne Limited assumes that all third party information is true and correct. No independent action has been undertaken to validate the findings of third parties.

We would note that the scope of laboratory testing and our assessment of the chemical soil test results have been primarily focussed on potential risks to human health.

This report has been prepared in accordance with our understanding of current good practice. However changes to good practice, guidance or legislation may necessitate revision of this report after the date of issue.

GeoDyne Limited has prepared this report for the sole use and reliance of the Client, Braunstone Town Council, in accordance with our Standard Conditions and Limitations (included in Appendix XII). This report may not be used or relied upon by any unauthorised third party without the explicit written agreement of GeoDyne Limited.

1.5 Confidentiality

The risk assessment herein remains the intellectual property and trade secret of GeoDyne Limited. The information contained within this report must not be disclosed or divulged to any commercial Consultant or other third party without the prior written agreement of GeoDyne Limited.

2.0 SITE SUMMARY

2.1 Site Description

The site comprises a parcel of land adjacent to the east of Avon Road and to the west of Shakespeare Park, Braunstone and may be located centred around approximate Ordnance Survey National Grid Reference 455362E 302552N. The site extends to approximately 0.65Ha. The site was accessible via an access road off Avon Road and is located in a predominantly residential area.

The site comprises a macadam access road and small car parking area leading to tennis courts and a pavilion building. A bowling green is accessible via two sets of gates to the east of the pavilion building and is separated from Shakespeare Park by a group of dense mature trees and a palisade fence.

To the north of the access road is a gated entrance to a grass path leading to the onsite play area and adjacent offsite Shakespeare Park (no boundary is defined on the ground). At the rear of the tennis courts is an area of dense overgrown vegetation and to the rear of the bowling green is an area recently (November 2017) cleared of dense overgrown vegetation.

This report is targeted to the area recently cleared of vegetation where the new building is proposed.

An annotated site plan (Figure No. 37327/02) is included as Appendix II. A plan showing general views of the site (Figure No. 37327/03) is presented in Appendix III.

2.2 Geology

The BGS Geology Viewer indicates that the superficial Oadby Member comprising Diamicton directly underlies the site. The BGS Lexicon describes the Oadby Member as '*Diamicton, grey, weathering brown, characterised by Cretaceous and Jurassic rock fragments; subordinate lenses of sand and gravel, clay and silt. Clay, brown to grey, and silty clay, with chalk and flint fragments*'.

The site is indicated to be underlain at depth by the bedrock of the Edwalton Member comprising Mudstone and described in the BGS Lexicon as *'Mudstone and siltstone, red-brown and greenish grey, with beds of indurated, variably dolomitic siltstone and very fine-grained sandstone common in the lower half; finely disseminated gypsum common in upper half'.*

3.0 GROUND INVESTIGATION

3.1 Introduction

Sub-Surface Utility Scan

Prior to the commencement of our intrusive works at the site a sub-contracted sub-surface utility scan of proposed exploratory hole locations was undertaken to attempt to avoid buried services. Based on the results of the service scan, the exploratory holes were positioned in accessible areas of the site in order to maximise the amount of information obtained during our site works, whilst avoiding known utilities.

Window Sample Boreholes

A total of 6No. window sample boreholes (WS1 to WS6) were advanced across the site on 22nd November 2017 to depths ranging between 3.00m and 5.00m below existing ground level (begl) with WS1 to WS5 terminated within nominally competent Natural Strata.

Standard penetration tests (SPTs) were undertaken at 1m centres throughout advancement of boreholes WS1 to WS5.

Exploratory hole WS6 was terminated at 3.00m begl to enable falling head infiltration tests to be undertaken.

Exploratory Hole Locations/Logs

The approximate locations of the exploratory holes are shown on the plan presented in Appendix IV (Figure No. 37327/04). The exploratory hole logs are presented in Appendix V of this report.

A photographic record of the exploratory investigation was obtained during the intrusive works. Selected photographs of the borehole arisings are presented in the Plates included in Appendix XI of this report (Plates P1 to P3).

3.2 Ground Conditions

Topsoil

In exploratory holes WS1 to WS4 and WS6, dark brown clayey silty sandy TOPSOIL was encountered to depths of 0.25m to 0.35m begl.

Locally there was vegetation debris (WS1) and grass (WS6) overlying the topsoil.

Subsoil

Underlying the topsoil in WS1 was Subsoil comprising stiff brown slightly gravelly slightly sandy CLAY to a depth of 0.50m begl.

Subsoil was also encountered in WS5 (beneath the Made Ground) to a depth of 0.55m begl and comprised dark grey mottled brown clayey SAND.

Made Ground

Made Ground was encountered in exploratory hole WS5 to a depth of 0.40m begl and comprised decaying vegetation overlying dark brown sandy topsoil (to 0.35m) beneath which gravel hardstanding was encountered.

Superficial Deposits

Beneath the Topsoil/Subsoil and Made Ground (where present), strata assigned as the Oadby Member was encountered in all the exploratory holes to the maximum depth investigated (5.00m begl) but the stratum was not fully penetrated.

The strata typically comprised firm to very stiff brown, light brown and grey becoming dark grey sandy gravelly CLAY / gravelly CLAY, locally with pockets and bands of water bearing sand.

In WS1 medium dense grey slightly gravelly SAND was encountered between 2.80m and 3.40m begl.

Strata interpreted as the bedrock of the Edwalton Member was not encountered in any of the exploratory holes.

3.3 Summary

The findings from the exploratory holes advanced within the site are summarised in Table 1.

TABLE 1 - SUMMARY OF EXPLORATORY HOLE FINDINGS			
Stratum	Locations Encountered	Depth to base of stratum (m begl)	Typical Description
TOPSOIL	WS1 to WS4 and WS6	0.25m to 0.35m	Clayey silty sandy TOPSOIL
SUBSOIL	WS1 and WS5	0.50m to 0.55m	Slightly gravelly slightly sandy CLAY / Clayey SAND
MADE GROUND	WS5	0.40m	Sandy topsoil over gravel hardstanding
Oadby Member	WS1 to WS6	Base of strata not encountered	Sandy gravelly CLAY / Gravelly CLAY Slightly gravelly SAND

3.4 Water

Water was encountered in boreholes WS1 to WS4 and WS6 generally within the pockets of sand and gravel at depths between 1.85m begl to 3.80m begl.

3.5 Stability

The sides of the boreholes were found to be generally stable for the short duration of time that they remained open following completion.

3.6 Infiltration Rate Testing

Falling head testing was undertaken in borehole WS6 during the site work. Testing comprised filling the well with water and measuring the fall in water level to assist with the calculation of an infiltration rate for the Natural Strata.

The findings of the falling head permeability test are summarised in Table 2 below.

TABLE 2 – SUMMARY OF FALLING HEAD PERMEABILITY TESTING DATA			
Test Pit	Duration of Test (mins)	Drop in Level (m)	Derived Infiltration Rate (m/s)
WS1	185	0.05	6.54×10^{-8}

The infiltration rate calculation sheet is included as Appendix VI.

3.7 Shear Vane Values

Ex-situ shear vane testing was undertaken on the core arisings recovered from boreholes WS1, WS2 and WS6 where visually cohesive soils were encountered.

The results revealed ex-situ soil shear strength values in the Oadby Member varied across the site between 37kN/m^2 and 100kN/m^2, at depths of between 0.40m and 3.50m begl, but generally increased with depth.

The shear vane values are detailed on the borehole logs in Appendix V, and are graphically displayed on the chart included on Page 7.

3.8 Penetrometer Values

Penetrometer testing was undertaken on the core arisings recovered from boreholes WS2 to WS5 where visually cohesive soils were encountered.

The penetrometer test measures the Unconfined Compressive Strength (UCS) of the cohesive soil which is double the Undrained Shear Strength (USS) of the soil.

The results revealed ex-situ UCS values in the Oadby Member varied across the site between 175kPa and 450kPa (USS approximately 87kN/m^2 to 225kN/m^2) at depths of between 0.50m and 4.50m begl. The UCS values generally increased with depth.

The penetrometer values are detailed on the borehole logs in Appendix V, and are graphically displayed on the chart included on Page 8.

3.9 In-Situ Strength Testing

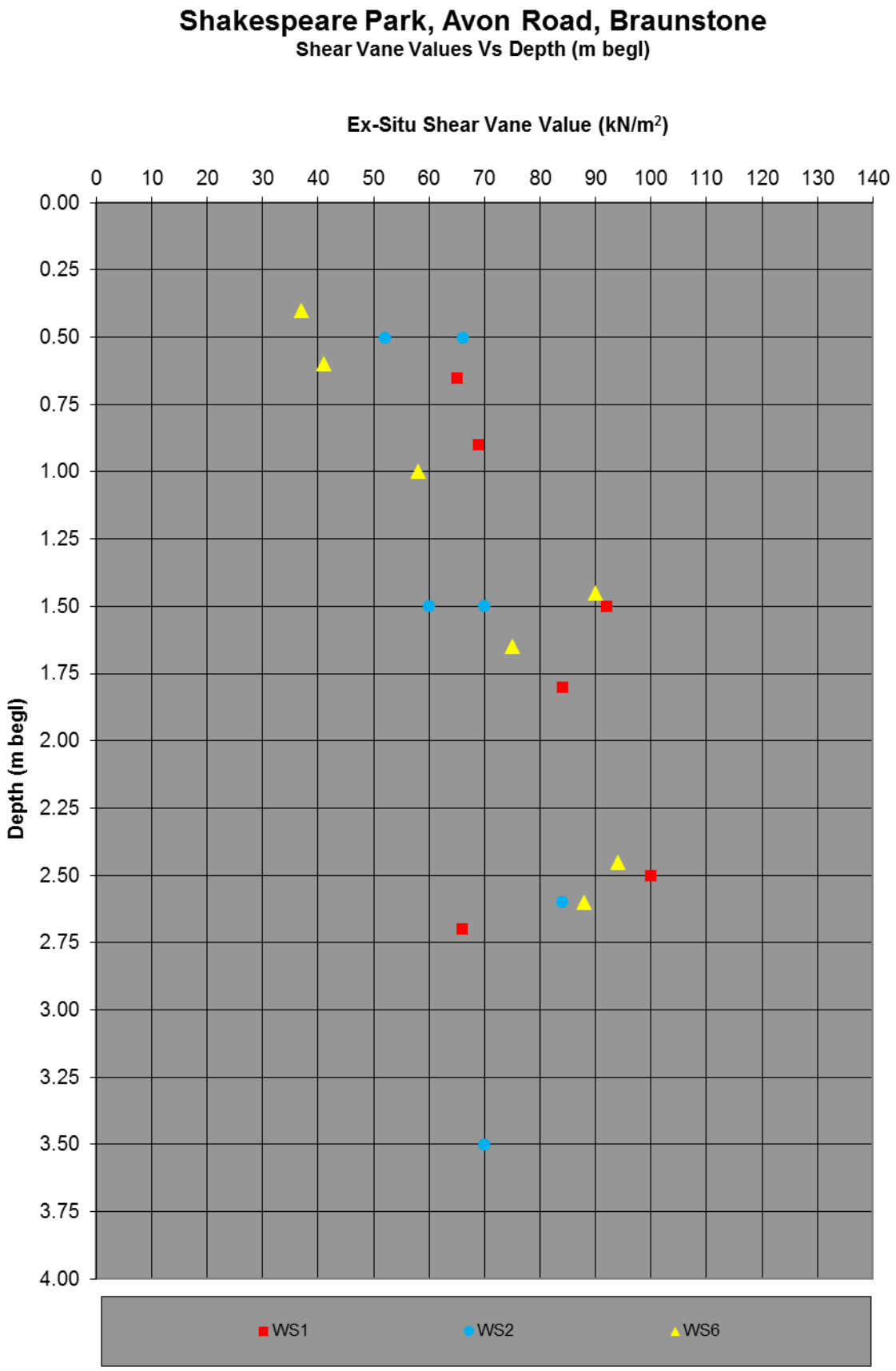
Standard Penetration Testing (SPT) was undertaken in order to establish a strength/depth profile of the strata encountered in the window sampling boreholes (WS1 to WS5).

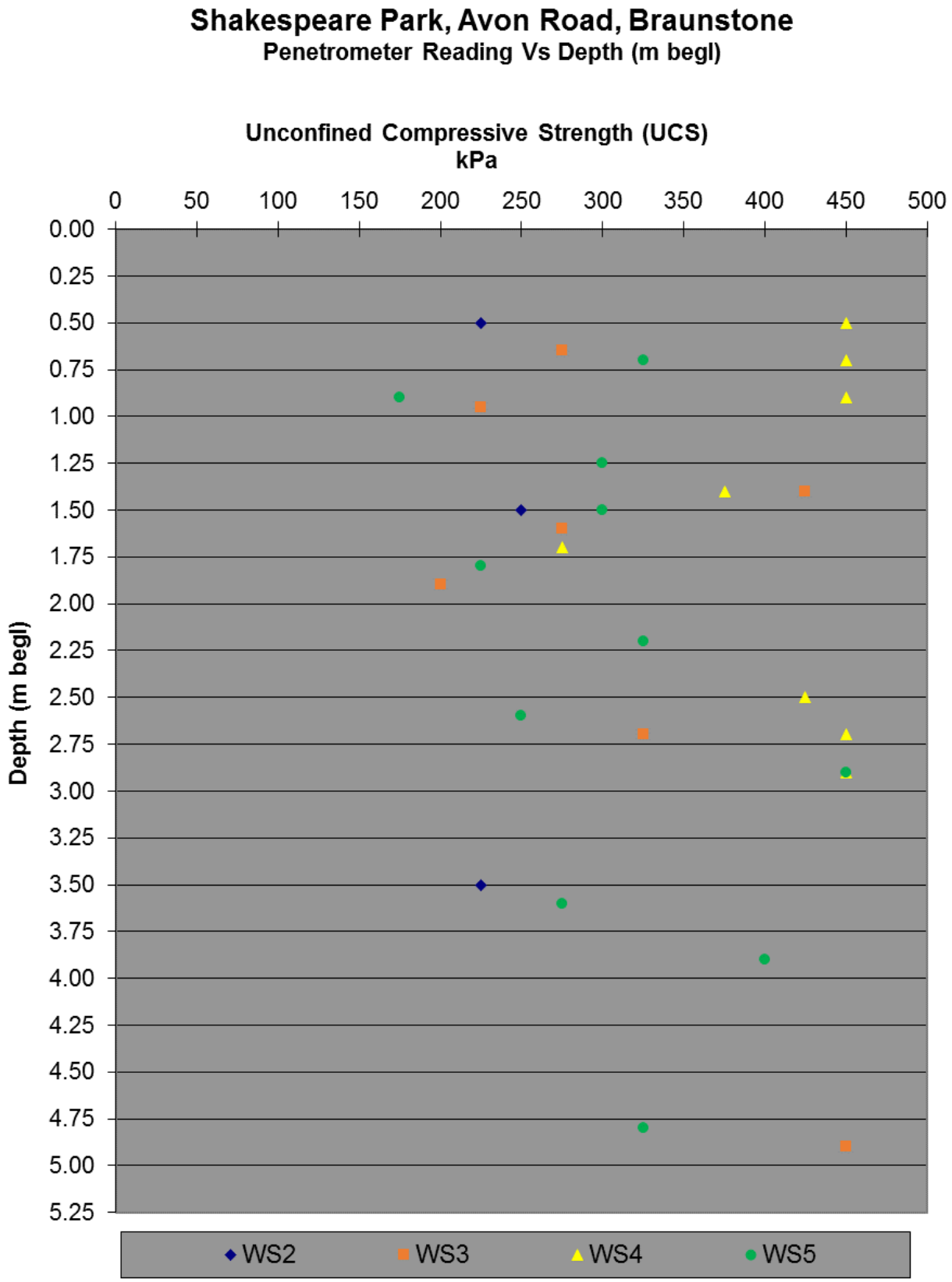
Within the cohesive superficial strata (Oadby Member) encountered in the boreholes, SPT 'N' values were found to range between 8 and 18 at 1m depth, with 'N' values ranging between 16 and 32 at depths of between 2m and 3m begl. This confirms the general soil description with strengths of initially firm to stiff, becoming very stiff (to hard clay) with depth.

Within the granular strata of the superficial Oadby Member encountered in borehole WS1 between 2.80m and 3.40m begl, the SPT 'N' value at a depth of 3m begl was 30 (Medium dense).

Generally the SPT 'N' values indicated an increase in strength with depth.

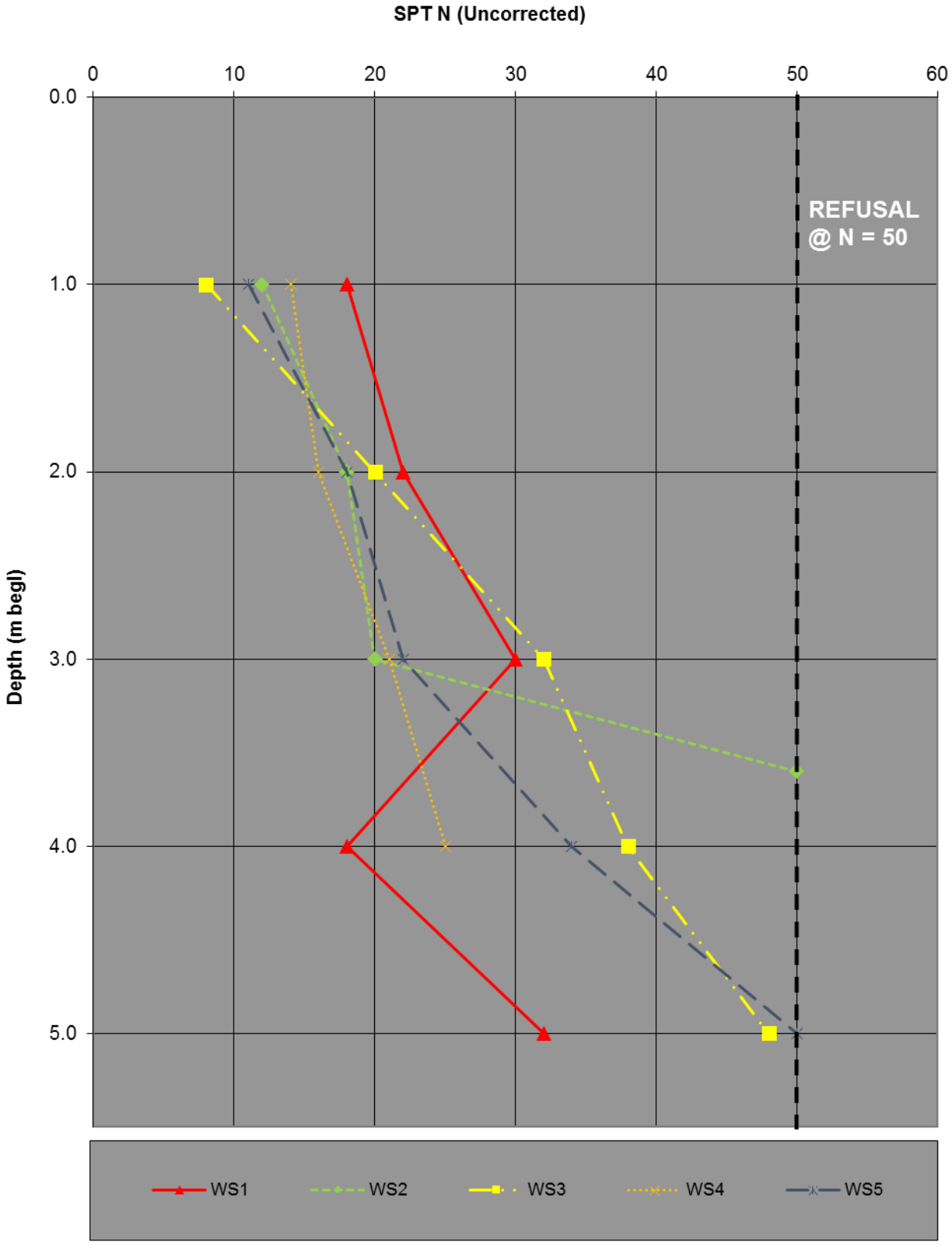
A summary of the SPT testing undertaken at the site is included in the chart presented on Page 9 and presented on the exploratory hole logs in Appendix V.


Shakespeare Park, Avon Road, Braunstone
Shear Vane Values Vs Depth (m begl)
Ex-Situ Shear Vane Value (kN/m2)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
Depth (m begl)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
WS1
WS2
WS6


Shakespeare Park, Avon Road, Braunstone
Penetrometer Reading Vs Depth (m begl)
Unconfined Compressive Strength (UCS)
kPa
0
50
100
150
200
250
300
350
400
450
500
Depth (m begl)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
5.25
WS2
WS3
WS4
WS5

Shakespeare Park, Avon Road, Braunstone

SPT N Values Vs Depth (m begl)



4.0 LABORATORY TESTING & CONTAMINATION ASSESSMENT

4.1 Introduction

The following environmental soil testing was carried out on visually representative samples recovered from the exploratory holes, based on the current and proposed land use of the site and the standard requirements of Local Authorities and the Environment Agency.

- 4No. Standard contamination suites (including metals, speciated Polycyclic Aromatic Hydrocarbons (PAH) and Total Organic Carbon).
- 2No. Asbestos screening tests.

Geotechnical soil testing comprised the following:

- 6No. Plasticity Index tests.
- 9No. Moisture Content tests.
- 3No. Water soluble sulphate tests.
- 6No. pH tests.

All laboratory soil test results are included in Appendix VII.

4.2 Geotechnical Soil Test Results

Water Soluble Sulphate/pH

Water soluble sulphate testing was undertaken on 3No. soil samples of the Natural Strata obtained during the site works. The testing revealed water soluble sulphate concentrations ranging between <0.01g/l SO_4 and 0.07g/l SO_4 within the samples analysed.

A total of 6No. pH tests were undertaken on samples obtained during the site works (comprising samples of Topsoil, Subsoil and the Natural Strata), which revealed pH values ranging between 7.36 and 8.50.

In accordance with the Building Research Establishment publication Special Digest 1 '*Concrete in Aggressive Ground*' (2005) the highest sulphate concentration should be used to indicate the Design Sulphate Class (i.e. 0.07g/l SO_4), together with the pH result (7.36).

Therefore, in accordance with Special Digest 1:2005 the site falls into Design Sulfate Class DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-1.

The foregoing designation assumes a natural ground location with potentially mobile groundwater.

Plasticity Index (PI) Testing

A total of 6No. Plasticity Index tests and 9No. Moisture Content tests have been undertaken on selected samples of the Natural Strata obtained during the site works.

In accordance with NHBC standards Chapter 4.2 *'Building Near Trees'* and BRE Digest 240 '*Low-rise buildings on shrinkable clay soils: Part 1*' (1993) the reported PI values may be modified based on the portion of the sample passing the 425μm sieve.

The results of the PI analyses are summarised in Table 3.

TABLE 3 – SUMMARY OF PLASTICITY INDEX (PI) DATA				
Sample Ref., Depth (m begl) & Stratum	Reported PI Value (%)	Portion Passing 425µm Sieve (%)	Modified PI Value (%)	Volume Change Potential
WS1, 1.70m, Clay	23	98	23	Medium
WS2, 1.00m, Clay	23	95	22	Medium
WS2, 2.00m, Clay	20	99	20	Medium
WS2, 3.00m, Clay	21	95	20	Medium
WS4, 0.80m, Clay	25	88	22	Medium
WS6, 1.00m, Clay	20	95	19	Low

In accordance with BRE Guidance, Table 3 reveals that the cohesive soil (clay) analysed has Low to Medium volume change potential. At this stage, we would recommend soils of a worst case Medium volume change potential is assumed for design purposes.

Desiccation Assessment

The Building Research Establishment (BRE) Digest 412 *'Desiccation in clay soils'* (1996) provides guidance on the assessment of desiccation in clay soils. Whilst there is no single method for the assessment of desiccation of clay soils, a number of possible techniques are provided in the BRE guidance. Two such approaches have been adopted herein.

1. Comparisons of soil water contents with soil index properties.

BRE 412 notes the following:

'The basis of these methods is that there is a water content at which a soil can be considered to be desiccated and that this water content can be related to the soil's index properties (for example its Liquid Limit (W_l), and plastic Limit (W_p). The most commonly used criterion is that the onset of significant desiccation occurs when the soil's water content is at 0.4 times the Liquid Limit. If therefore $W<0.4W_l$ then the soil is significantly desiccated. The $W<0.4W_l$ criterion was intended as a crude estimate of the onset of significant desiccation…'

2. Liquidity Index

With respect to the Liquidity Index (I_l) the guidance notes that the Liquidity Index may be calculated as follows:

$I_l = (W – W_p)/I_p$

Where:

I_l = Liquidity Index
W = Moisture Content
W_p = Plastic Limit
I_p = Plasticity Index

A value of $I_l = 0$ means that the soil's water content it at the Plastic Limit, while negative values indicate that the soil is drier than the Plastic Limit.

The Plasticity Index and Moisture Content laboratory soil test results from the window sample boreholes have been input in an Excel Spreadsheet and the Ratio of W and W_l calculated, together with the Liquidity Index (I_l).

The Ratio of W to W_l was found to range between 0.49 (highest) and 0.24 (lowest). The ratio of W to W_l was found to be below 0.4 in 2 of the 6No. samples tested (33% of the samples).

The Liquidity Index was calculated for the 6No. samples. The Liquidity Index was found to range between 0.05 (highest) and -0.52 (lowest). The liquidity index was found to be lower than 0 (i.e. negative) in 4 of the 6No. samples (66% of the samples).

Charts showing Moisture Content versus depth, the ratio of W/W_l and Liquidity Index are included in Appendix VIII.

Plasticity indices ranged between 20% and 25%.

4.3 Contamination Assessment Rationale

We understand that it is proposed to demolish the existing pavilion building in the west of the site and construct a new pavilion building in the east of the site adjacent to the east of the existing Bowling Green. The existing car park will be extended into the area of the demolished building.

4.3.1 Assessment Methodology

In order to undertake a Generic Quantitative Risk Assessment (GQRA) we have adopted the Suitable for Use Levels (S4ULs) published by LQM/CIEH in their publication referenced: Nathanail, C.P., McCaffrey, C. Gillett, A.G., Ogden, R.C. and Nathanail, J.F, 2015. '*The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham. All rights reserved.*' In the absence of an S4UL screening value, we have made reference to the Category 4 Screening Levels (C4SLs) published by DEFRA.

In consideration of the available generic land uses utilised in the derivation of the adopted screening criteria, we have adopted a commercial end-use scenario for the purposes of our assessments.

For assessment purposes, we have adopted a policy whereby determinands within the dataset are individually compared to the relevant screening value (i.e. individual S4ULs or C4SLs).

Where determinands within the dataset are less than the appropriate screening value, the determinand is considered to be present at an acceptable concentration and no further assessment is required. Additional comment, statistical assessment or further Detailed Quantitative Risk Assessment (DQRA) may be provided where elevated values are revealed.

4.3.2 Selection of Soil Organic Matter (SOM) Content

The SOM content and soil type are used to provide an assessment of the applicability of the screening values adopted (the S4UL values are typically based upon SOM of 1%, 2.5% and 6%, as applicable).

Determinands have in the first instance, been compared to screening values adopting a conservative SOM of 1%. Where the determinand exceeds the relevant screening value at 1% SOM, a site specific SOM may be adopted as appropriate to derive more site-specific screening values and the dataset reassessed.

4.4 Sampling Strategy

The sampling strategy for the site was primarily to retrieve visually representative soil samples from a selection of locations that provide a good coverage across the site area. The rationale for exploratory hole location is provided in Table 4 below.

TABLE 4 – REASONING FOR EXPLORATORY HOLE LOCATION	
Exploratory Hole Reference	Reasoning Behind Location
WS1 to WS6	Positioned for general site coverage
Key WS – Window Sample Borehole	

The ground conditions encountered during our Phase II works revealed the presence of four distinct types of material, i) Topsoil, ii) Subsoil, iii) Made Ground and iv) the underlying Natural Strata.

Representative samples of these soil types were obtained during our Phase II works, and selected samples were subjected to chemical analysis for a suite of contaminants deemed appropriate based on the current and proposed site use and the ground conditions encountered during the intrusive investigation. The localised Made Ground comprising 50mm of gravel hardstanding in WS5 was not tested.

4.5 Contamination Analysis

A total of 4No. standard chemical contamination tests (including speciated PAH and TOC) were carried out on selected soil samples obtained during the site works, which comprised 2No. tests of the Topsoil and 2No. tests of the underlying Natural Strata.

In addition, Asbestos screening tests were undertaken on 2No. samples of Topsoil and Subsoil obtained from across the site.

For initial assessment purposes, the laboratory test results have been combined into a single dataset, for individual comparison against appropriate GACs.

4.6 Contamination Soil Test Results

The contamination assessment for the soils analysed at the site is summarised in Table 5.

Please note that screening values have only been used for determinands where they are present at concentrations in excess of the Limit of Detection (LOD) of the method of analysis employed by the laboratory on at least one occasion.

TABLE 5 – SUMMARY OF TIER 1 GAC ASSESSMENT COMMERCIAL END-USE				
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	Tier 1 GAC Exceeded (Yes/No)
Metals				
Arsenic	4	10 – 12	640 S4UL	No
Cadmium	4	1.0 – 1.5	190 S4UL	No
Chromium III	4	18 – 39	8600 S4UL	No
Copper	4	14 – 23	68000 S4UL	No
Lead	4	9 – 73	2300 C4SL	No

TABLE 5 – SUMMARY OF TIER 1 GAC ASSESSMENT COMMERCIAL END-USE				
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	Tier 1 GAC Exceeded (Yes/No)
Nickel	4	24 – 33	980 S4UL	No
Selenium	4	<1 – 2	12000 S4UL	No
Zinc	4	40 – 102	730000 S4UL	No
PAH				
Fluoranthene	4	<0.1 – 0.1	23000 S4UL	No

Key
S4UL – CIEH/LQM Suitable 4 Use Levels (2015). Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3026. All rights reserved.
C4SL –value for Lead taken from DEFRA publication SP1010.

All of the determinands assessed were present at individual concentrations below the Limit of Detection of the method of analysis adopted by the laboratory or below the appropriate Tier 1 GAC based on a commercial end-use. By inspection samples were also below more conservative residential screening values.

4.6.1 Asbestos Testing

Two samples obtained from the exploratory holes, one from the Topsoil in WS4 and one from the subsoil (beneath the Made Ground) in WS5 were tested for the presence of Asbestos.

We would note that no visual evidence of any suspected Asbestos Containing Materials (ACMs) was noted during the site works in the exploratory holes.

No Asbestos fibres were detected in the samples tested.

4.7 Contamination Assessment Summary

Human Health

The Topsoil and Natural Strata samples tested are considered to be chemically uncontaminated assuming a proposed commercial end use.

Controlled Waters

The soil test results have revealed the general absence of any significant potentially mobile contamination beneath the subject site. On the basis of the foregoing, the risks posed to Controlled Waters from the redevelopment area is considered to be low.

5.0 CONCEPTUAL SITE MODEL

5.1 General

The DEFRA publication '*Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance*' (dated April 2012) states the following with regards to the production of a Conceptual Site Model (CSM) for a site:

'*The process of risk assessment involves understanding the risks presented by land, and the associated uncertainties. In practice, this understanding is usually developed and communicated in the form of a "conceptual model"*'. The development of a CSM is typically undertaken in an iterative process, reflecting the changes in understanding as more detailed site information becomes available.

In developing a CSM, and specifically in the context of land contamination, consideration needs to be given to three essential elements; which form the basis of any risk present. The statutory guidance sections 3.8 and 3.9 (April 2012) states the following with respect to Part 2A.

'Under Part 2A, for a relevant risk to exist there needs to be one or more contaminant-pathway-receptor [CPR] *linkages – "contaminant linkage" – by which a relevant receptor might be affected by the contaminants in question. In other words, for a risk to exist there must be contaminants present in, on or under the land in a form and quantity that poses a hazard, and one or more pathways by which they might significantly harm people, the environment, or property; or significantly pollute controlled waters. For the purposes of this guidance:*

(a) A "contaminant" is a substance which is in, on or under the land and which has the potential to cause significant harm to a relevant receptor, or to cause significant pollution of controlled waters.
(b) A "receptor" is something that could be adversely affected by a contaminant, for example a person, an organism, an ecosystem, property, or controlled waters. The various types of receptors that are relevant under the Part 2A regime are explained in later sections.
(c) A "pathway" is a route by which a receptor is or might be affected by a contaminant.

The term "contaminant linkage" means the relationship between a contaminant, a pathway and a receptor. All three elements of a contaminant linkage must exist in relation to a particular land before the land can be considered potentially to be contaminated land under Part 2A, including evidence of the actual presence of contaminants. The term "significant contaminant linkage", as used in this Guidance, means a contaminant linkage which gives rise to a level of risk sufficient to justify a piece of land being determined as contaminated land. The term "significant contaminant" means the contaminant which forms part of a significant contaminant linkage.'

With respect to the presence of background levels of contaminants, section 3.21 to 3.23 states '*The Part 2A regime was introduced to help identify and deal with land which poses unacceptable levels of risk. It was not intended to apply to land with levels of contaminants in soil that are commonplace and widespread throughout England or parts of it, and for which in the very large majority of cases there is no reason to consider that there is an unacceptable risk.*

Normal levels of contaminants in soil should not be considered to cause land to qualify as contaminated land, unless there is a particular reason to consider otherwise. Therefore, if it is established that land is at or close to normal levels of particular contaminants, it should usually not be considered further in relation to the Part 2A regime...

For the purpose of this Guidance, "normal" levels of contaminants in soil may result from:

(a) The natural presence of contaminants (e.g. caused by soil formation processes and underlying geology) at levels that might reasonably be considered typical in a given area and have not been shown to pose an unacceptable risk to health or the environment.
(b) The presence of contaminants caused by low level diffuse pollution, and common human activity other than specific industrial processes. For example, this would include diffuse pollution caused by historic use of leaded petrol and the presence of benzo(a)pyrene from vehicle exhausts, and the spreading of domestic ash in gardens at levels that might reasonably be considered typical.'

In selecting appropriate generic assessment criteria Section 3.27 of the Guidance states:

'It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work would be warranted'.

With respect to assessing contaminated land, section 4.17 of the Guidance states:

'In deciding whether or not land is contaminated land on grounds of significant possibility of significant harm to human health, the local authority should use the categorisations described in paragraphs 4.19 – 4.30 below. Categories 1 and 2 would encompass land which is capable of being determined as contaminated land on the grounds of significant possibility of harm to human health. Categories 3 and 4 would encompass land which is not capable of being determined on such grounds.'

In relation to the use of GAC values in the assessment of contaminated land, section 3.29 of the Guidance states:

'GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regards to such GACs:

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.
(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which the GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.
(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risk to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.
(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.'

In undertaking a risk assessment and deriving a CSM for the purposes of the redevelopment of a site (i.e. planning and development control) reference has been made to both the Model Procedures for the Management of Land Contamination, as well as the National Planning Policy Framework (NPPF, dated March 2012). Reference has also been made to the Contaminated Land Statutory Guidance (referenced above), although this is primarily concerned with Local Government determinations of Statutory '*Contaminated Land*', which is separate to planning framework requirements.

5.2 Contaminant-Pathway-Receptor [CPR] Considerations

The following CPR assessment has been undertaken based on the current and future land use of the site.

5.3 Consideration of Potential Sources of Contamination [C]

The potential sources of contamination are based on the current land use of the site and are:

- Metals and Metalloids.
- Polycyclic Aromatic Hydrocarbons (PAH) associated with any ashy inclusions in near surface Made Ground.
- Asbestos.
- Acid/sulphate contaminated soils.

5.4 Consideration of Potential Pathways [P]

The potential pathways at the site are primarily:

- Direct ingestion of soil.
- Inhalation of dust and vapours.
- Direct skin contact with the ground.
- Direct contact with building materials.
- Vertical and lateral migration of contamination.

5.5 Consideration of Potential Receptors [R]

The potential receptors at the site are:

- The construction personnel (i.e. site workers) involved with the development of the site (typically short term (acute) exposure).
- The final end users (i.e. site staff (Groundskeepers) - typically long term (chronic) exposure and site visitors – typically short term exposure).
- Controlled Waters (i.e. underlying groundwater).
- Buildings/construction materials.

5.6 Summary

GeoDyne Limited's conceptual site model of possible CPR pollutant linkages, applicable to the subject site and proposed site usage, and based on the information available, is summarised in Table 6.

TABLE 6 – SUMMARY OF CPR ASSESSMENT					
Contaminant	Pathway	Receptor	Comments	Mitigation Required	Possible Mitigation
Contaminated Soils	*Direct Ingestion & Direct Contact*	*Site Workers*	The Topsoil and Natural Strata may be considered to be chemically uncontaminated on the basis of the testing undertaken for a proposed 'commercial' end-use.	No	Site workers should wear appropriate PPE and conform to general health and safety requirements.
Contaminated Soils	*Inhalation of Dust and Vapours*	*Site Workers*	The Topsoil and Natural Strata may be considered to be chemically uncontaminated on the basis of the testing undertaken for a proposed 'commercial' end-use.	No	Site workers should wear appropriate PPE and conform to general health and safety requirements.
Contaminated Soils	*Direct Ingestion & Direct Contact*	*End Users Staff & Visitors*	The Topsoil and Natural Strata may be considered to be chemically uncontaminated on the basis of the testing undertaken for a proposed 'commercial' end-use.	No	No specific remedial measures are considered necessary at the site. Topsoil from site is chemically suitability for re-use if required.
Contaminated Soils	*Inhalation of Dust and Vapours*	*End Users Staff & Visitors*	The Topsoil and Natural Strata may be considered to be chemically uncontaminated on the basis of the testing undertaken for a proposed 'commercial' end-use. Following site development, generation of significant levels of dust on a chronic basis unlikely.	No	No specific remedial measures are considered necessary at the site. Topsoil from site is chemically suitability for re-use if required.
Contaminated Soils	*Vertical and lateral migration*	*Controlled Waters*	The Natural Strata may be considered to be chemically uncontaminated on the basis of the testing undertaken. The soil concentrations recorded at the site are considered unlikely to represent a potentially significant risk to Controlled Waters. Water was encountered in the majority of the boreholes generally within the pockets of sand and gravel at depths between 1.85m begl to 3.80m begl.	No	No specific remedial measures are considered necessary at the site in relation to Controlled Waters.
Contaminated Soils	*Direct contact*	*Building Materials*	Design Class DS-1/ACEC Class AC-1 (BRE Spec. Digest 1).	No	Adopt appropriate concrete mix to all buried concrete.
Contaminated Soils	*Direct contact*	*Services*	The Natural Strata may be considered to be chemically uncontaminated on the basis of the testing undertaken.	No	Consult utility companies regarding appropriate utility materials (including water supply pipes).

TABLE 6 – SUMMARY OF CPR ASSESSMENT					
Contaminant	Pathway	Receptor	Comments	Mitigation Required	Possible Mitigation
Elevated Ground Gases	***Vertical and lateral migration***	***End Users & Building Envelope***	No significant sources of ground gases (Methane and Carbon Dioxide) have been identified onsite.	No	Bases on current findings Ground Gas protection measures are not required at this site.

KEY

Where text is in ***Bold Italic*** item is potentially present. Where normal text is used item is not present/plausible.

No – Mitigation not required.
Yes – Mitigation Required.
? – Insufficient information, further work necessary.
The requirement for mitigation is subject to review and confirmation by the appropriate regulatory authority.

In the foregoing CPR assessment, determinands identified by chemical analysis are only considered to be contaminated with respect to generic guidance where the determinand is present above their respective screening criteria.

6.0 CONCLUSIONS & RECOMMENDATIONS

6.1 Site Summary

The site comprises a parcel of land adjacent to the east of Avon Road and to the west of Shakespeare Park, Braunstone. The site comprises a macadam access road and small car parking area leading to tennis courts, a pavilion building and a bowling green.

To the north of the access road is a gated entrance to a grass path leading to the onsite play area and adjacent offsite Shakespeare Park (no boundary is defined onsite). At the rear of the tennis courts is an area of dense overgrown vegetation and to the rear of the bowling green is an area recently (November 2017) cleared of dense overgrown vegetation.

The BGS Geology Viewer indicates that the superficial Oadby Member comprising Diamicton directly underlies the site. The BGS Lexicon describes the Oadby Member as '*Diamicton, grey, weathering brown, characterised by Cretaceous and Jurassic rock fragments; subordinate lenses of sand and gravel, clay and silt. Clay, brown to grey, and silty clay, with chalk and flint fragments*'.

The site is indicated to be underlain at depth by the bedrock of the Edwalton Member comprising Mudstone and described in the BGS Lexicon as *'Mudstone and siltstone, red-brown and greenish grey, with beds of indurated, variably dolomitic siltstone and very fine-grained sandstone common in the lower half; finely disseminated gypsum common in upper half'.*

6.2 Ground Conditions

Dark brown clayey silty sandy TOPSOIL was encountered to depths of 0.25m to 0.35m begl in exploratory holes WS1 to WS4 and WS6. Locally there was vegetation debris (WS1) and grass (WS6) overlying the topsoil.

Underlying the Topsoil in WS1, Subsoil was encountered comprising stiff brown slightly gravelly slightly sandy CLAY to a depth of 0.50m begl. Subsoil was also encountered in WS5 (beneath the Made Ground) to a depth of 0.55m begl and comprised dark grey mottled brown clayey SAND.

Made Ground was encountered in exploratory hole WS5 to a depth of 0.40m begl and comprised decaying vegetation overlying dark brown sandy topsoil (to 0.35m) beneath which gravel hardstanding was encountered.

Beneath the Topsoil/Subsoil and Made Ground (where present), strata assigned as the Oadby Member was encountered in all the exploratory holes to the maximum depth investigated (5.00m begl) but the stratum was not fully penetrated.

The strata typically comprised firm to very stiff brown, light brown and grey becoming dark grey sandy gravelly CLAY / gravelly CLAY, locally with pockets and bands of water bearing sand.

In WS1 medium dense grey slightly gravelly SAND was encountered between 2.80m and 3.40m begl.

The bedrock of the Edwalton Member was not encountered in any of the exploratory holes.

6.3 Foundation Design

In-situ strength testing indicates that the natural strata predominantly comprising Clay with subordinate Sand represents suitable bearing strata for typical 1/2 storey buildings. Foundations may be traditional strip or trench fill designed to suit the loading characteristics of the proposed building.

The strength testing at depths of 1.00m begl appears to reveal conditions suitable to support a nett allowable ground bearing pressure of up to 100kN/m^2.

Foundations should be advanced to a minimum of 0.90m below existing or proposed ground level (whichever is deeper).

Foundations should be advanced through any soft spots, significant roots, Made Ground and disturbed ground to encounter suitably geotechnically competent Natural Strata.

6.4 Building Near Trees

It is understood that some of the existing trees onsite will be removed and some retained. New trees are also proposed. Consideration to the type of trees planted should be given based on the water demand of the tree and volume change potential of the soil.

The boreholes advanced at the site revealed predominantly cohesive (clay) strata which were locally noted to be dry or desiccated (WS4).

Analysis of the moisture content and plasticity index testing was revealed that the Clay soils were desiccated with $W<0.4W_l$ in 33% of the samples tested. Furthermore, the Liquidity Index revealed negative values in 4No of the 6No. samples tested.

W/W_l values were less than 0.4 to a maximum depth of 1.00m begl (where the lowest ratio of 0.24 was revealed in WS4). Liquidity Index values were negative to a maximum depth of 3.00m begl.

Consequently, foundations should be designed in accordance with BRE guidance, taking full account of the desiccation of the soils revealed at the site.

The geotechnical laboratory test results have also revealed that the cohesive soils encountered across the site have Low to Medium volume change potential characteristics. As a precautionary approach, it is recommended that a Medium volume change potential should be assumed for design purposes.

Foundation designs will require adjusting in accordance with NHBC Standards Chapter 4.2 and BRE Digest 240 '*Low-rise buildings on shrinkable clay soils: Part 1*' (1993) when building near existing, recently removed or proposed trees due to the presence of cohesive soils at the site.

6.5 Floor Slab Design

Based on our findings, a suspended floor slab (i.e. beam and block) is recommended due to the shrinkable nature of the cohesive strata encountered.

6.6 Ground Gas

Specific ground gas protection measures for the ingress of Methane and Carbon Dioxide into the building are considered not to be required for the site based on our onsite findings and the development proposals.

6.7 Water

Water was encountered in boreholes WS1 to WS4 and WS6 generally within the pockets of sand and gravel at depths between 1.85m begl to 3.80m begl.

On the basis of the foregoing, shallow excavations across the majority of the site are unlikely to require significant dewatering. Any water collecting in open pits may be managed with simple sump pumping techniques.

Some dewatering may also be required where excavations are left open during periods of adverse weather (with rainwater likely to accumulate within open pits due to the cohesive nature of the soils in these areas).

6.8 Excavations / Stability

The sidewalls of the boreholes were found to be generally stable for the short duration of time that they remained open following completion.

Shallow excavations where water bearing granular strata is encountered may require sidewall support locally for stability, and excavations may also require support for health and safety reasons. The assessment of excavations and provision of support will be the responsibility of the contractor on site.

The natural cohesive soils may be subject to deterioration and softening if excavations are left open and exposed to wet weather. Any softened soils should be removed from excavations prior to the pouring of concrete and foundation construction.

6.9 Sulphate Classification

In accordance with BRE Special Digest 1:2005 the site falls into Design Sulfate Class DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-1, based on the assumption of a natural ground location and the presence of potentially mobile groundwater conditions beneath the site.

Therefore, an appropriate concrete mix should be adopted in accordance with BRE Special Digest 1 for all buried concrete in contact with the ground.

6.10 California Bearing Ratios (CBRs)

A CBR value of between <2% and 4% can be anticipated within the shallow Natural Strata, subject to confirmation by in-situ testing.

6.11 Surface Water Drainage

The ground conditions encountered during our works comprised typically cohesive deposits.

During the course of the site investigation works a total of 1No. falling head test was undertaken in exploratory hole WS6. Infiltration rate testing undertaken in the hole revealed an infiltration rate of 6.54 x 10^{-8} m/s.

Based on the testing undertaken, the use of traditional soakaways to dispose of surface water from the proposed redevelopment does not appear feasible.

On this basis, it is recommended that alternative methods of surface water disposal are considered at this stage.

6.12 Soil Contamination Assessment

Human Health

The Topsoil and Natural Strata samples tested are considered to be chemically uncontaminated assuming a proposed commercial end use. By inspection samples may also be considered uncontaminated based on more conservative residential values.

The Topsoil is considered to be chemically suitable for retention and re-use at the site in areas of proposed soft landscaping if required.

Controlled Waters

The soil test results have revealed the general absence of any significant potentially mobile contamination beneath the subject site. On the basis of the foregoing, the risks posed to Controlled Waters from the redevelopment area is considered to be low.

No specific remediation is considered necessary in relation to potential risks to groundwater.

6.13 Re-Use of Soils/Topsoil Importation

Topsoil

Based on the chemical analysis of the site-won Topsoil, the soil test results indicate it is chemically suitable for re-use onsite (if required).

Natural Strata

Based on the chemical analysis of the natural soils, the soil test results indicate that the Natural Strata encountered may be considered suitable for re-use within the site (if required).

Topsoil Importation

In the unlikely event that additional Topsoil is required it should be tested at source to ensure its chemical suitability for use at the site, and should ideally conform to BS3882: 2015 '*Specification for topsoil*', with respect to the presence of deleterious material and nutrient levels etc.

Alternatively, topsoil may be sourced from a reputable supplier with appropriate certification. Prior to placing the topsoil, we would recommend that the formation layer is inspected by the contractor and any deleterious material should be removed from the formation layer.

The results of the pre-importation chemical analysis on the topsoil should ideally be forwarded to the Local Authority for approval prior to importation.

Where excess volumes of topsoil are generated from enabling works, it is recommended that consideration be given to the potential re-use of this material on other development sites rather than disposing of excess soil volumes to landfill.

The re-use of site won arisings may be subject to the preparation of an appropriate Materials Management Plan (MMP) or Environmental Permit, and will be dependent on the approval of the relevant Local Planning Authorities and the Environment Agency.

6.14 Off-site Disposal

If off-site disposal is required the chemical testing regime can be different to the chemical testing required to assess the suitability of the soils for retention on site and the risks to human health and controlled waters.

Therefore, effectively a new contamination assessment may be required to classify the soils for off-site disposal with testing criteria to assess whether the soil is hazardous, non-hazardous or inert waste. In the first instance, the test results from this investigation should be supplied to landfill operators.

6.15 Construction Workers

It is recommended that construction personnel involved with direct contact with the soils at the site use appropriate PPE equipment (i.e. boots, gloves, overalls etc.) together with hygiene facilities in accordance with general health and safety guidelines.

A copy of this report should be included in the site health and safety file, and site workers (including future maintenance workers) should be made fully aware of the sites setting.

6.16 Utilities

We would recommend that this report is supplied to utility companies (including water supply), and that their recommendations relating to appropriate supply pipes are adhered to.

6.17 Unforeseen Circumstances

Should any areas of potentially contaminated soil be encountered during site construction works we would recommend consultation with GeoDyne Limited to ensure that our recommendations continue to apply.

Any potentially contaminated soils should be left in-situ and subjected to further assessment, to potentially include further chemical testing and risk assessment.

The following procedure should be adhered to if any areas of previously unidentified suspected contamination are encountered during the development of the site:

i. Suspected contaminated material will remain in-situ.
ii. GeoDyne Limited to be notified. We will then undertake a visual assessment of the possible contamination, followed by appropriate sampling/testing.
iii. If necessary, contamination will then be treated or removed from site. All necessary remediation works should be validated by testing in accordance with an approved strategy, with the relevant Regulators informed accordingly.

6.18 Licences, Permits, Registrations, Plans & Approvals

The Contractor/Developer is responsible for, and must ensure that, all necessary licenses, permits, plans, registrations and approvals are in place prior to commencing with the construction works at the site.

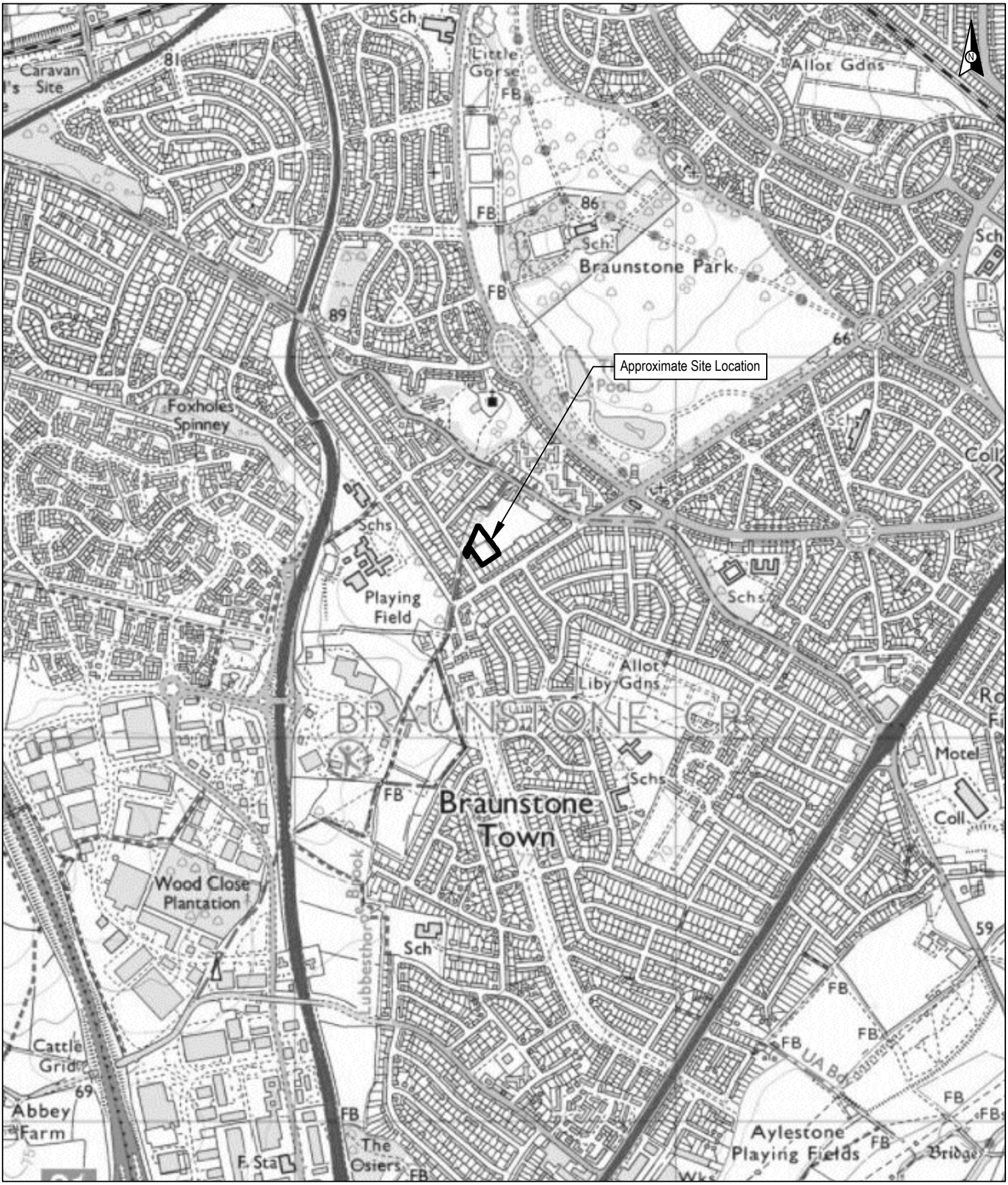
These may include any Materials Management Plans (MMPs), Site Waste Management Plans (SWMPs) and/or Environmental Permits/Exemptions as necessary to enable the completion of the proposed works.

6.19 Statutory Consultation

In accordance with normal planning requirements, we would recommend that a copy of our report is issued by the Client to the Local Authority (and NHBC or other warranty provider, if necessary) for review/comment and approval prior to commencing with the development of the site.

APPENDIX I

Site Location Plan
(Figure No. 37327/01)

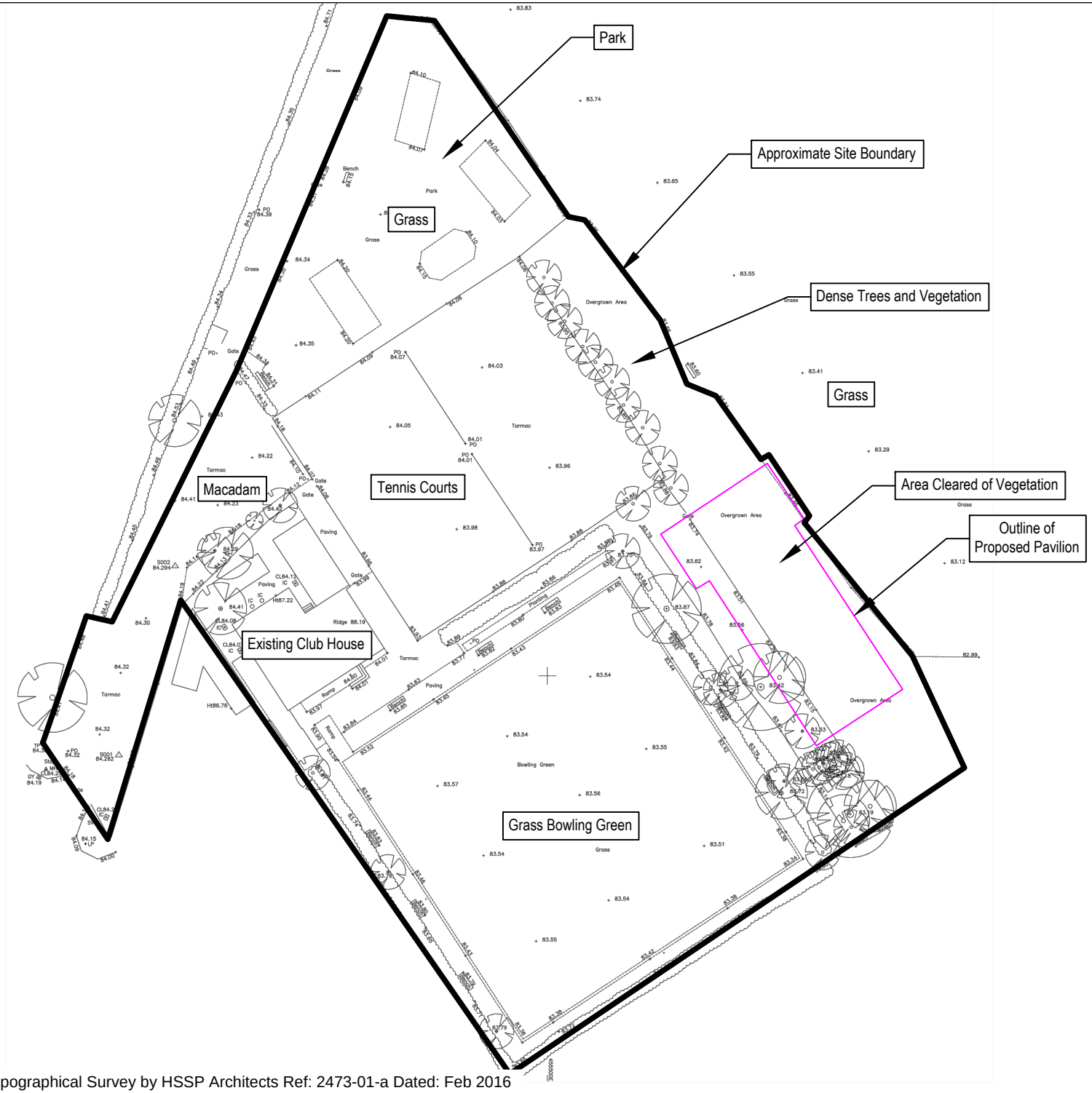


Project No.	37327	Drawn By	HW
Client	Braunstone Town Council	Checked By	NC
		Approved By	JPH
Project	Shakespeare Park, Avon Road, Braunstone	Scale	NTS
		Date Drawn	23/11/2017
Title	Site Location Plan	Revision	
		Figure No.	37327/01

GeoDyne
Unit 2.2, Clarendon House, Clarendon Park, Clumber Avenue, Nottingham
NG5 1AH
Tel: 0115 962 0001
9 Brunel Parkway, Pride Park, Derby DE24 8HR
Tel: 01332 290 798
info@geodyne.co.uk

APPENDIX II

Annotated Site Plan
(Figure No. 37327/02)



Drawing based on Topographical Survey by HSSP Architects Ref: 2473-01-a Dated: Feb 2016

Project No.	37327
Client	Braunstone Town Council
Project	Shakespeare Park, Avon Road, Braunstone
Title	Annotated Site Plan
Drawn By	HW
Checked By	NC
Approved By	JPH
Scale	NTS
Date Drawn	23/11/2017
Revision	
Figure No.	37327/02

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APPENDIX III

Site Plan Showing General Site Views
(Figure No. 37327/03)

Drawing based on Topographical Survey by HSSP Architects Ref: 2473-01-a Dated: Feb 2016

Project No.	37327
Client	Braunstone Town Council
Project	Shakespeare Park, Avon Road, Braunstone
Title	Site Plan Showing General Site Views
Drawn By	HW
Checked By	NC
Approved By	JPH
Scale	NTS
Date Drawn	23/11/2017
Revision	
Figure No.	37327/03

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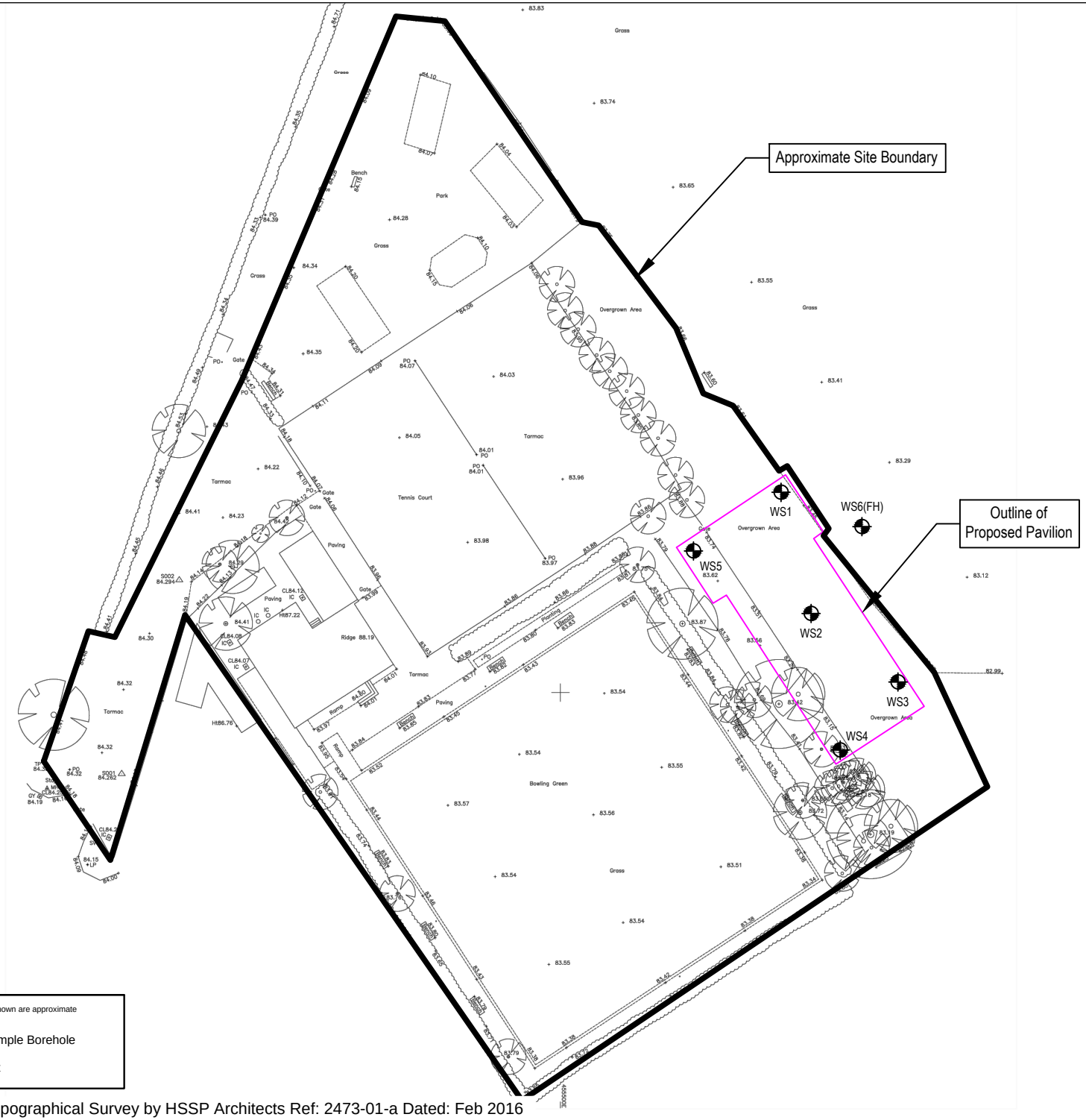
APPENDIX IV

Exploratory Hole Location Plan
(Figure No. 37327/04)



KEY

NB: All locations shown are approximate

⊕	WS - Window Sample Borehole
(FH)	Falling Head Test

Drawing based on Topographical Survey by HSSP Architects Ref: 2473-01-a Dated: Feb 2016

Project No.	37327
Client	Braunstone Town Council
Project	Shakespeare Park, Avon Road, Braunstone
Title	Exploratory Hole Location Plan
Drawn By	HW
Checked By	NC
Approved By	JPH
Scale	NTS
Date Drawn	23/11/2017
Revision	
Figure No.	37327/04

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APPENDIX V

Exploratory Hole Logs

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WS1

Project No. 37327

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
0.20	D	D1		Vegetation debris (leaves and twigs) over root bound dark brown clayey silty sandy TOPSOIL (TOPSOIL)		(0.35) 0.35			
0.60	D	D2		...occasional coarse roots at 0.20m to 0.25m		0.50			
1.00 - 1.45	C		18	Stiff brown slightly gravelly slightly sandy CLAY with rare fine roots. Gravel is fine sub-rounded quartzite (SUBSOIL)					
1.50	D	D3		Stiff brown mottled light brown and grey slightly sandy gravelly CLAY with roots. Gravel is fine to medium, rare coarse, rounded to sub-rounded chalk, chert, flint and sandstone (OADBY MEMBER)		(1.85)			
1.70 - 2.00	B	B1		...shear vane at 0.65m = 65kN/m²					
2.00 - 2.45	C		22	...shear vane at 0.90m = 69kN/m² ...shear vane at 1.50m = 92kN/m² ...shear vane at 1.80m = 84kN/m²					
2.50	D	D1		...becoming dark brown mottled dark grey at 2.00m ...pockets of orange-brown fine to medium sand at 2.30m		2.35			
3.00 - 3.45	C		30	Stiff dark grey gravelly CLAY. Gravel is fine to medium sub-rounded white chalk (OADBY MEMBER) ...shear vane at 2.50m = 100kN/m² ...pockets of grey fine sand at 2.70m ...shear vane at 2.70m = 66kN/m² ...pockets of brown fine to medium sand at 2.75m		(0.45) 2.80 (0.60) 3.40			
3.70 - 4.00	B	B2		Medium dense grey slightly gravelly fine to medium SAND. Gravel is fine to coarse sub-angular chalk (OADBY MEMBER)					
4.00 - 4.45	C		18	...becoming clayey at 3.00m					
				Very stiff dark grey gravelly CLAY. Gravel is fine to coarse sub-angular white chalk with pockets of grey sand (OADBY MEMBER)		(1.60)			
5.00 - 5.45	C		32	End of Borehole at 5.00m		5.00			

Remarks
1. Borehole sides cased to 1.00m.
2. Water encountered at 2.80m.
3. Borehole terminated at 5.00m.
4. Borehole backfilled with arisings upon completion.

Key
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
V = Vial Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project:	Shakespeare Park, Avon Road, Braunstone			**Client:**	Braunstone Town Council		
Logged:	NC	**Checked:**	JPH	**Field Book Ref:**	**Plant:**	Competitor Rig	**Drawing Ref:**
Date:	22/11/2017	**Approved:**	JPH	NC17/02	**Scale:**	1:50	WS1

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WS2

Project No. 37327

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
0.15	D	D1		Dark brown clayey silty sandy TOPSOIL (TOPSOIL)		(0.35)			
0.50	D	D2		Stiff brown sandy slightly gravelly CLAY. Gravel is fine to medium sub-angular flint (OADBY MEMBER) ...shear vane at 0.50m = 52, 66kN/m² ...pocket penetrometer at 0.50m = 225kPa		0.35 0.60			
1.00	B	B1							
1.00 - 1.45	C		12	Stiff brown mottled grey gravelly CLAY with rare fine root traces. Gravel is fine to medium, rare coarse, sub-rounded to sub-angular chalk with small pockets of quartzite (OADBY MEMBER) ...shear vane at 1.50m = 70, 60kN/m² ...pocket penetrometer at 1.50m = 250kPa		(2.10)			
1.50	D	D3							
2.00	B	B2							
2.00 - 2.45	C		18						
2.50	D	D4		...with pockets of brown fine sand at 2.50m ...shear vane at 2.60m = 84kN/m² ...with pockets of brown fine sand between 2.65m and 2.70m		2.70			
3.00	B	B3							
3.00 - 3.45	C		20	Stiff to very stiff dark grey gravelly CLAY. Gravel is fine to medium sub-rounded chalk (OADBY MEMBER) ...with pockets of sand at 2.80m ...with pockets of sand at 3.40m ...shear vane at 3.50m = 70kN/m² ...pocket penetrometer at 3.50m = 225kPa		(0.90)			
3.60	B	B4				3.60			
3.60 - 4.05	C		50/230mm						
				End of Borehole at 3.60m					

Remarks
1. Borehole sides cased to 1.00m.
2. Water encountered at 2.30m.
3. Borehole terminated at 3.60m due to SPT refusal.
4. Borehole backfilled with arisings upon completion.

Key

D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
V = Vial Sample
W = Water Sample

S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
= Water Strike (m)
= Steady Water Level (m)

Project:	Shakespeare Park, Avon Road, Braunstone			**Client:**	Braunstone Town Council		
Logged:	NC	**Checked:**	JPH	**Field Book Ref:**	**Plant:**	Competitor Rig	**Drawing Ref:**
Date:	22/11/2017	**Approved:**	JPH	NC17/02	**Scale:**	1:50	WS2

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WS3

Project No. 37327

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
0.15	D	D1		Dark brown clayey silty sandy TOPSOIL with frequent fine to coarse roots (TOPSOIL)		(0.35) 0.35			
0.60	D	D2		Firm to stiff brown mottled orange-brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium sub-angular to sub-rounded chalk and chert with occasional fine roots (OADBY MEMBER)		(0.40) 0.75			
0.80 - 1.00	B	B1							
1.00 - 1.45	C		8	...pocket penetrometer at 0.65m = 275kPa					
1.60	D	D3		Stiff brown mottled grey and orange-brown slightly sandy gravelly CLAY. Gravel is fine sub-rounded chalk with pockets of orange-brown sand (OADBY MEMBER)		(1.05)			
1.60 - 2.60	D	D4		...pocket penetrometer at 0.95m = 225kPa		1.80			
1.80 - 2.00	B	B2		...pocket penetrometer at 1.40m = 425kPa					
2.00 - 2.45	C		20	...pocket penetrometer at 1.60m = 275kPa					
2.50 - 2.80	B	B3		Very stiff dark brown grey sandy gravelly CLAY. Gravel is fine to medium sub-angular to sub-rounded flint and chalk (OADBY MEMBER) ...pocket penetrometer at 1.90m = 200kPa ...pocket penetrometer at 2.70m = 325kPa					
3.00 - 3.45	C		32	...with pockets of grey sandy gravel of coarse chalk between 2.80m and 2.95m		(3.20)			
4.00 - 4.45	C		38	...with a band of wet fine to medium gravel of mudstone at 3.80m					
4.80 - 5.00	B	B4		...with a band of mudstone gravel at 4.50m ...becoming dark red-brown at 4.60m					
5.00 - 5.45	C		48	...pocket penetrometer at 4.90m = 450kPa		5.00			

End of Borehole at 5.00m

Remarks
1.Borehole sides cased to 1.00m.
2.Water encountered at 3.80m.
3.Borehole terminated at 5.00m.
4.Borehole backfilled with arisings upon completion.

Key
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
V = Vial Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
= Water Strike (m)
= Steady Water Level (m)

Project:	Shakespeare Park, Avon Road, Braunstone			**Client:**	Braunstone Town Council		
Logged:	NC	**Checked:**	JPH	**Field Book Ref:**	**Plant:**	Competitor Rig	**Drawing Ref:**
Date:	22/11/2017	**Approved:**	JPH	NC17/02	**Scale:**	1:50	WS3

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WS4

Project No. 37327

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
0.15	D	D1		Dark brown root bound slightly clayey silty sandy TOPSOIL with rare fine gravel (TOPSOIL)		(0.30) 0.30			
0.50	D	D2		...becoming dry at 0.20m		(0.40) 0.70			
0.80 - 1.00	B	B1		Stiff dry brown mottled orange-brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium sub-angular flint. Frequent fine to medium roots (OADBY MEMBER)		(0.40) 1.10			
1.00 - 1.45	C		14	...pocket penetrometer at 0.50m = 450kPa					
1.50	B	B2		Stiff dry brown mottled orange-brown sandy gravelly CLAY with thin bands of sand. Gravel is fine to coarse sub-rounded chalk (OADBY MEMBER)		(1.20) 2.30		▽	
2.00 - 2.45	C		16	...pocket penetrometer at 0.70m = 450kPa ...pocket penetrometer at 0.90m = 450kPa					
2.50	D	D3		Stiff to very stiff brown mottled grey slightly sandy gravelly CLAY with frequent pockets of brown silt and rare fine roots. Gravel is fine to medium sub-rounded quartzite (OADBY MEMBER)					
2.70	D	D4		...pocket penetrometer at 1.40m = 375kPa					
3.00 - 3.45	C		21	...pocket of fine brown sand at 1.55m to 1.60m ...pocket penetrometer at 1.70m = 275kPa ...with pockets of water bearing medium gravelly sand at 1.85m to 2.30m		(1.70) 4.00			
4.00 - 4.45	C		25	Very stiff dark grey sandy gravelly CLAY. Gravel is fine to medium sub-rounded chalk (OADBY MEMBER) ...pocket penetrometer at 2.50m = 425kPa ...pocket of medium grey sand between 2.55m and 2.65m ...pocket penetrometer at 2.70m = 450kPa ...pocket penetrometer at 2.90m = 450kPa ...very poor recovery between 3.00m and 4.00m					
				End of Borehole at 4.00m					

Remarks
1.Borehole sides stable.
2.Water encountered at 1.85m.
3.Borehole terminated at 4.00m due to very stiff clay strata encountered and lack of recovery.
4.Borehole backfilled with arisings upon completion.

Key
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
V = Vial Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project:	Shakespeare Park, Avon Road, Braunstone			**Client:**	Braunstone Town Council		
Logged:	NC	**Checked:**	JPH	**Field Book Ref:**	**Plant:**	Competitor Rig	**Drawing Ref:**
Date:	22/11/2017	**Approved:**	JPH	NC17/02	**Scale:**	1:50	WS4

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WS5

Project No. 37327

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
0.20	D	D1		Decaying vegetation over dark brown sandy topsoil (MADE GROUND)		(0.35) 0.35			
0.45	D	D2		Gravel hardstanding (MADE GROUND)		0.40			
				Dark grey mottled brown clayey SAND with frequent fine roots (sub-soil) (SUBSOIL)		0.55 (0.45)			
1.00 - 1.45	C		11	Firm to stiff brown mottled orange-brown and grey slightly sandy gravelly CLAY. Gravel is fine to medium sub-rounded chalk (OADBY MEMBER) ...pocket penetrometer at 0.70m = 325kPa ...pocket penetrometer at 0.90m = 175kPa		1.00 (1.35)			
2.00	B	B1		Stiff to very stiff dark brown mottled dark grey slightly sandy gravelly CLAY. Gravel is fine to medium sub-rounded chalk with small pockets of sand (OADBY MEMBER) ...pocket penetrometer at 1.25m = 300kPa ...pocket penetrometer at 1.50m = 300kPa ...pocket penetrometer at 1.80m = 225kPa ...with pockets of sand at 2.00m		2.35			
2.00 - 2.45	C		18						
3.00	D	D3							
3.00 - 3.45	C		22	...pocket penetrometer at 2.20m = 325kPa					
				Very stiff dark brown and dark grey gravelly CLAY. Gravel is fine to medium sub-rounded chalk and sub-angular quartzite (OADBY MEMBER) ...pocket penetrometer at 2.60m = 250kPa ...pocket penetrometer at 2.90m = 450kPa ...pocket penetrometer at 3.60m = 275kPa ...pocket penetrometer at 3.90m = 400kPa ...with mudstone gravel at 4.00m		(2.65)			
4.00 - 4.45	C		34						
5.00 - 5.45	C		50/200mm	...pocket penetrometer at 4.80m = 325kPa ...with pockets of grey fine to medium sand between 4.85m to 5.00m		5.00			
				End of Borehole at 5.00m					

Remarks
1.Borehole sides cased to 1.00m.
2.No water encountered.
3.Borehole terminated due to SPT refusal at 5.00m.
4.Borehole backfilled with arisings upon completion.

Key
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
V = Vial Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
= Water Strike (m)
= Steady Water Level (m)

Project:	Shakespeare Park, Avon Road, Braunstone			**Client:**	Braunstone Town Council		
Logged:	NC	**Checked:**	JPH	**Field Book Ref:**	**Plant:**	Competitor Rig	**Drawing Ref:**
Date:	22/11/2017	**Approved:**	JPH	NC17/02	**Scale:**	1:50	WS5

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WS6

Project No. 37327

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
0.15	D	D1		Grass over dark brown clayey silty sandy TOPSOIL with rare black charcoal fragments (TOPSOIL)		0.25			
0.50	D	D2		Firm brown sandy CLAY (OADBY MEMBER) ...shear vane at 0.40m = 37kN/m² ...becoming soft and very sandy at 0.60m ...shear vane at 0.60m = 41kN/m²		(0.75) 1.00			
				Firm to stiff dark orange-brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine chalk and rare black carbonaceous material (OADBY MEMBER) ...shear vane at 1.00m = 58kN/m² ...pockets of brown clayey fine to medium sand between 1.15m and 1.35m ...shear vane at 1.45m = 90kN/m² ...pockets of sand at 1.60m ...shear vane at 1.65m = 75kN/m² ...pockets of sand at 1.70m ...pockets of brown clayey fine to medium sand at 1.80m to 2.00m ...pockets of sand at 2.30m		(1.40) 2.40 (0.60) 3.00		▽	
				Firm to stiff dark brown and dark grey slightly sandy gravelly CLAY. Gravel is fine to medium sub-angular to sub-rounded chalk (OADBY MEMBER) ...shear vane at 2.45m = 94kN/m² ...shear vane at 2.60m = 88kN/m²					
				End of Borehole at 3.00m					

Remarks
1. Borehole sides stable.
2. Water encountered at 1.80m
3. Borehole terminated at 3.00m to allow for falling head test to be undertaken.
4. Pipe placed into borehole for falling head test.
5. Borehole backfilled with arisings upon completion.

Key
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
V = Vial Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project:	Shakespeare Park, Avon Road, Braunstone			**Client:**	Braunstone Town Council		
Logged:	NC	**Checked:**	JPH	**Field Book Ref:**	**Plant:**	Competitor Rig	**Drawing Ref:**
Date:	22/11/2017	**Approved:**	JPH	NC17/02	**Scale:**	1:50	WS6

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APPENDIX VI

Soil Infiltration Results

SOIL INFILTRATION RATE CALCULATIONS (FALLING HEAD TESTS)

WS6

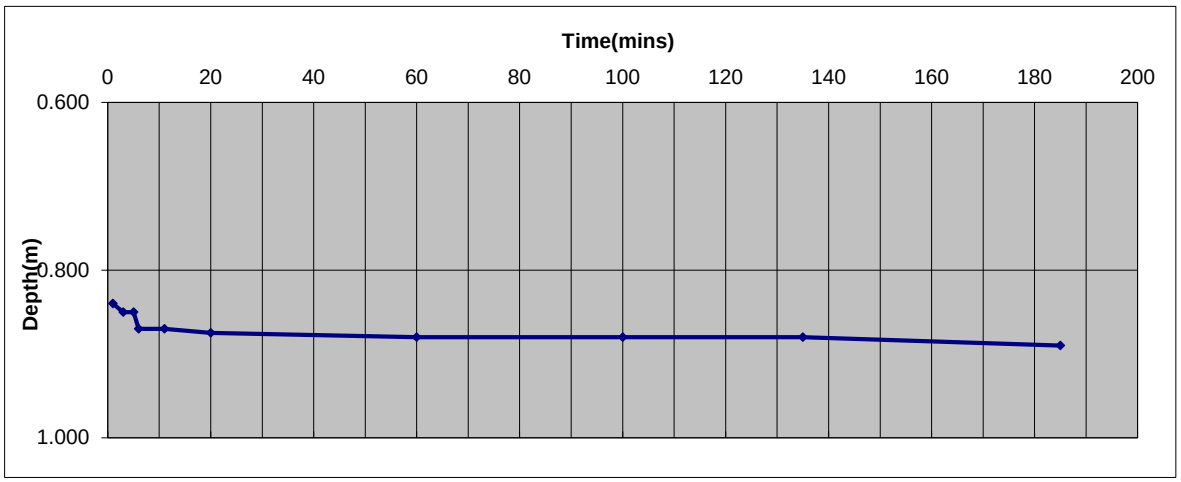
Time(mins)	Depth(m)
1	0.840
3	0.850
5	0.850
6	0.870
11	0.870
20	0.875
60	0.880
100	0.880
135	0.880
185	0.890

Client :	Braunstone Town Council
Site :	Shakespeare Park, Avon Road, Leicester
Site ref :	37327

Is borehole installed with monitoring pipe and gravel surround? (If YES, use alternative sheet)	No

Borehole Dimensions	
Outside Diameter (m)	Depth (m)
0.090	3.00

Depth from water level at start of test to bottom of pit =	2.16



75% effective depth(m)	=	0.85
25% effective depth(m)	=	0.88

Time at 75% effective depth(mins)	=	5.00
Time at 25% effective depth(mins)	=	135.00

Volume outflowing, V_{p75-25} = 0.000159

Area, a_{p50} = 0.311725

Time, T_{75-25} = 130.0

Infiltration Rate, F = 6.54E-08 m/s

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APPENDIX VII

Laboratory Soil Test Results

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

UKAS TESTING 4041

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

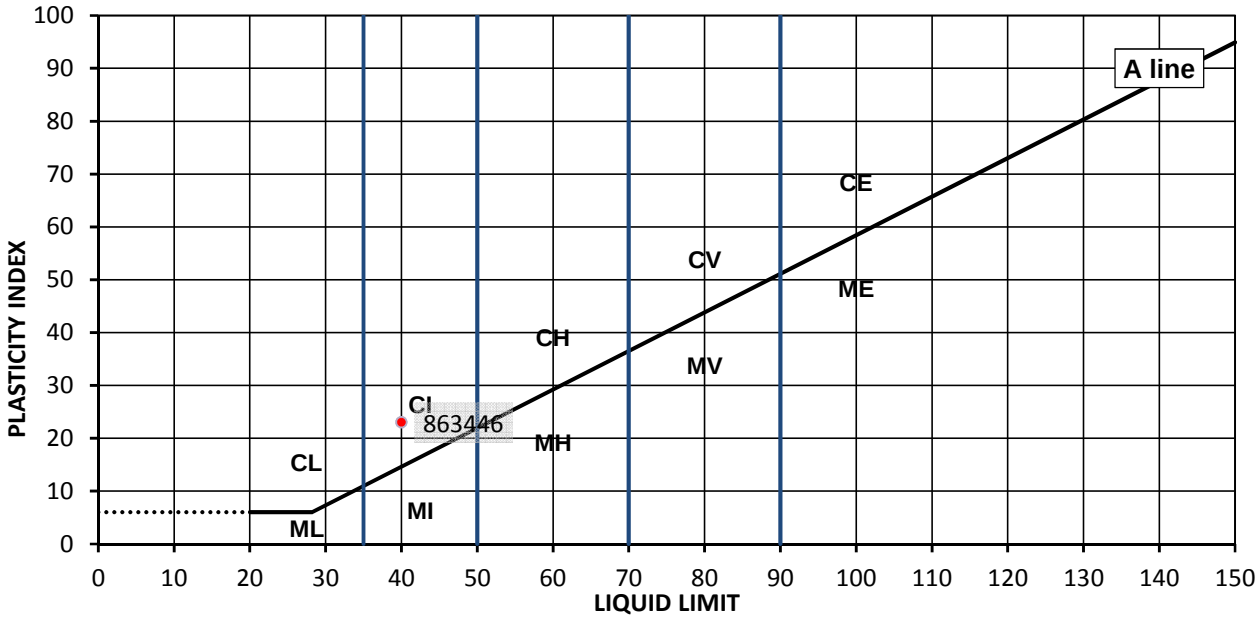
Client:	Geodyne	Client Reference:	37327
Client Address:	Unit 2.2 Clarendon House Clarenden Business Park Clumber Avenue Nottingham, NG5 1AH	Job Number:	17-68617
		Date Sampled:	Not Given
		Date Received:	23/11/2017
Contact:	Stephen Sellers	Date Tested:	04/12/2017
Site Name:	Shakespeare Park, Avon Road, Braunstone	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 863446
Sample Reference: Not Given

Description:	Yellowish brown slightly gravelly sandy CLAY	Sample Type:	B
Location:	WS1	Depth Top [m]:	1.70
Sample Preparation:	Tested after >425um removed by hand	Depth Base [m]:	2.00

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
18	40	17	23	98



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 07/12/2017

for and on behalf of i2 Analytical Ltd

GF 105.11

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

UKAS TESTING 4041

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

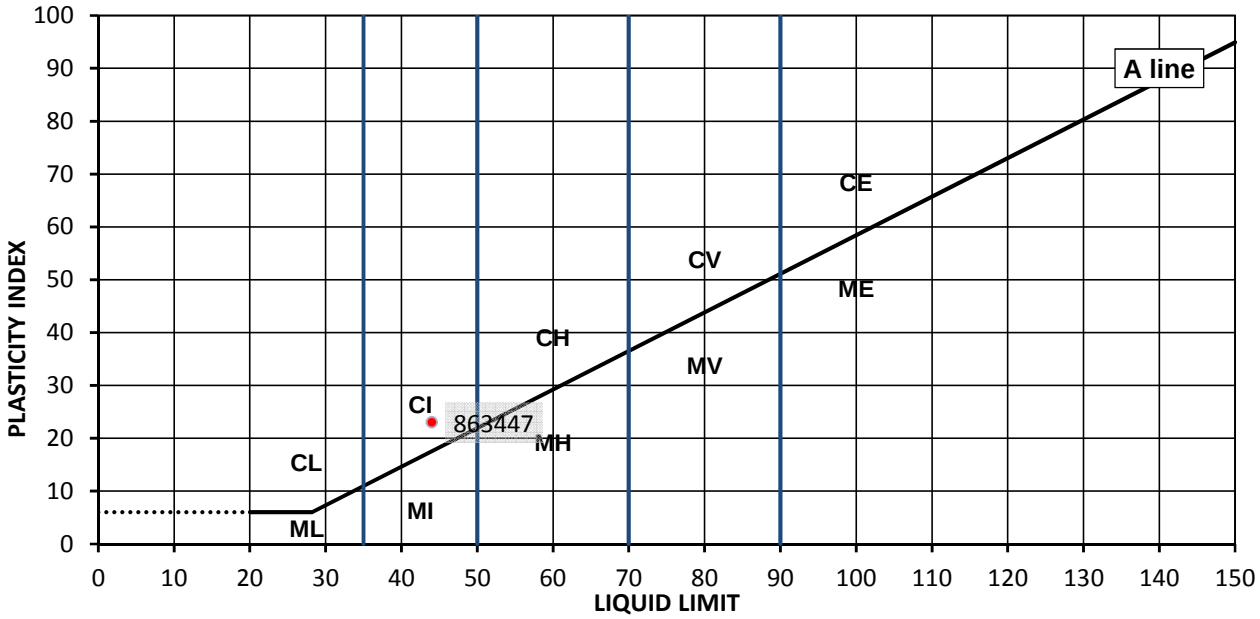
Client:	Geodyne	Client Reference:	37327
Client Address:	Unit 2.2 Clarendon House Clarenden Business Park Clumber Avenue Nottingham, NG5 1AH	Job Number:	17-68617
		Date Sampled:	Not Given
		Date Received:	23/11/2017
Contact:	Stephen Sellers	Date Tested:	04/12/2017
Site Name:	Shakespeare Park, Avon Road, Braunstone	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 863447
Sample Reference: Not Given

Description:	Yellowish brown slightly gravelly sandy CLAY	Sample Type:	B
Location:	WS2	Depth Top [m]:	1.00
Sample Preparation:	Tested after >425um removed by hand	Depth Base [m]:	Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
15	44	21	23	95



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 07/12/2017

for and on behalf of i2 Analytical Ltd

GF 105.11

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

UKAS TESTING 4041

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

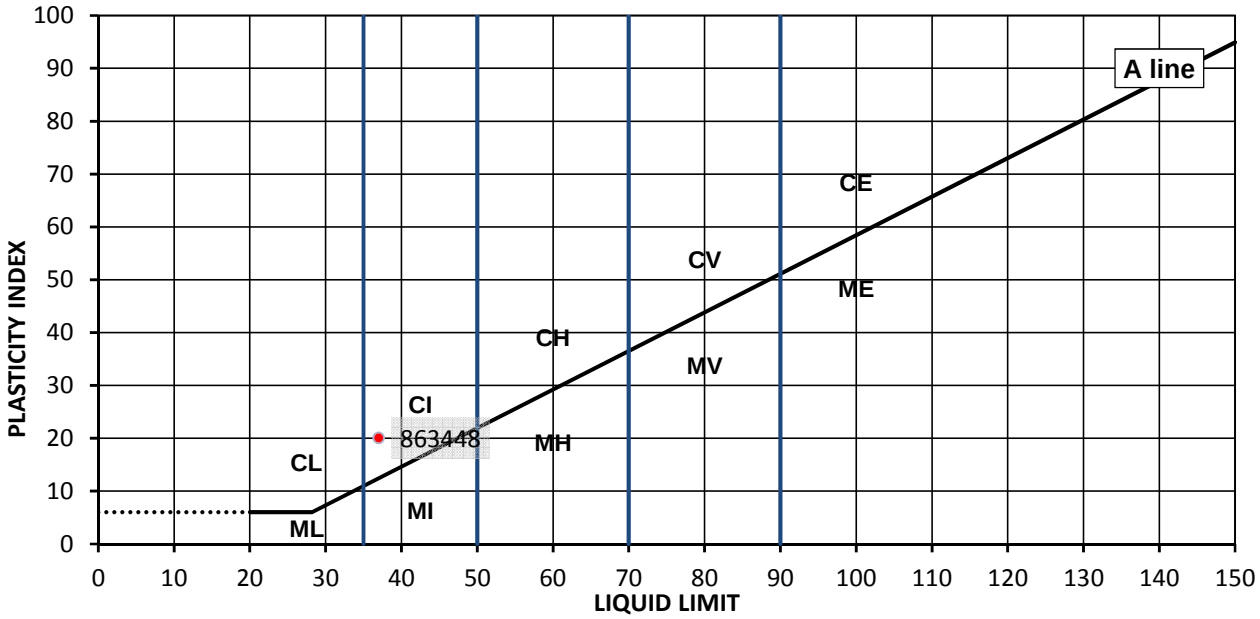
Client:	Geodyne	Client Reference:	37327
Client Address:	Unit 2.2 Clarendon House Clarenden Business Park Clumber Avenue Nottingham, NG5 1AH	Job Number:	17-68617
		Date Sampled:	Not Given
		Date Received:	23/11/2017
Contact:	Stephen Sellers	Date Tested:	04/12/2017
Site Name:	Shakespeare Park, Avon Road, Braunstone	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 863448
Sample Reference: Not Given

Description:	Yellowish brown slightly gravelly sandy CLAY	Sample Type:	B
Location:	WS2	Depth Top [m]:	2.00
Sample Preparation:	Tested after >425um removed by hand	Depth Base [m]:	Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
18	37	17	20	99



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 07/12/2017

for and on behalf of i2 Analytical Ltd

GF 105.11

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

UKAS TESTING 4041

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

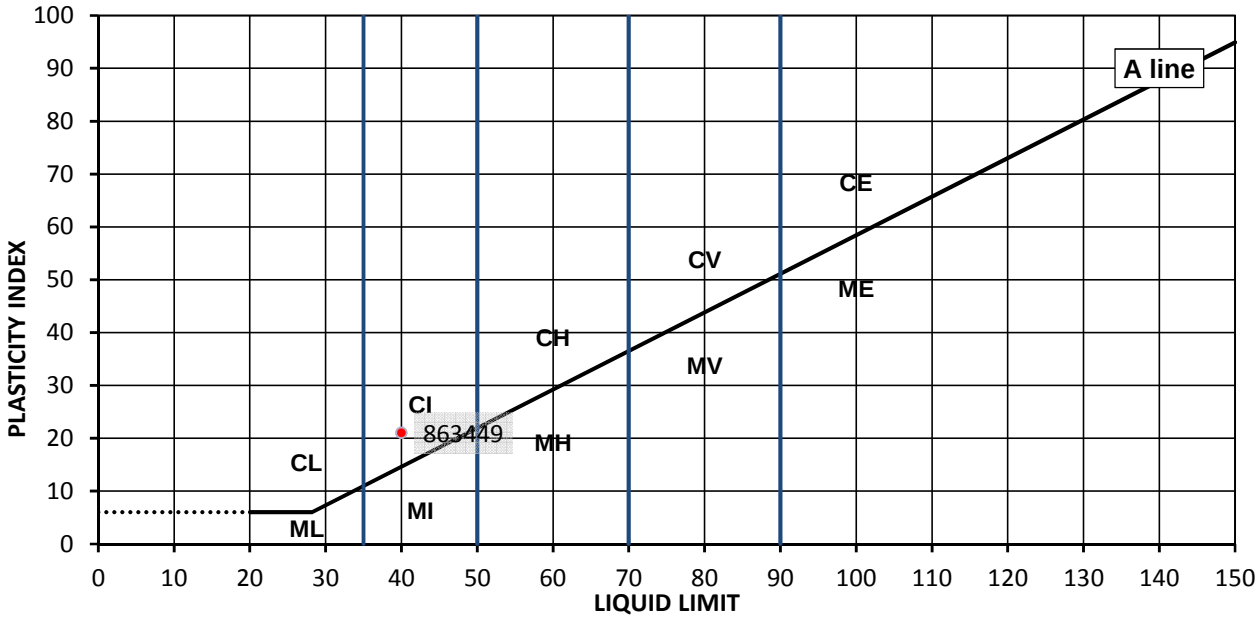
Client:	Geodyne	Client Reference:	37327
Client Address:	Unit 2.2 Clarendon House Clarenden Business Park Clumber Avenue Nottingham, NG5 1AH	Job Number:	17-68617
		Date Sampled:	Not Given
		Date Received:	23/11/2017
Contact:	Stephen Sellers	Date Tested:	04/12/2017
Site Name:	Shakespeare Park, Avon Road, Braunstone	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 863449
Sample Reference: Not Given

Description:	Yellowish brown slightly gravelly sandy CLAY	Sample Type:	B
Location:	WS2	Depth Top [m]:	3.00
Sample Preparation:	Tested after >425um removed by hand	Depth Base [m]:	Not Given

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
18	40	19	21	95



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 07/12/2017

for and on behalf of i2 Analytical Ltd

GF 105.11

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

UKAS TESTING 4041

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

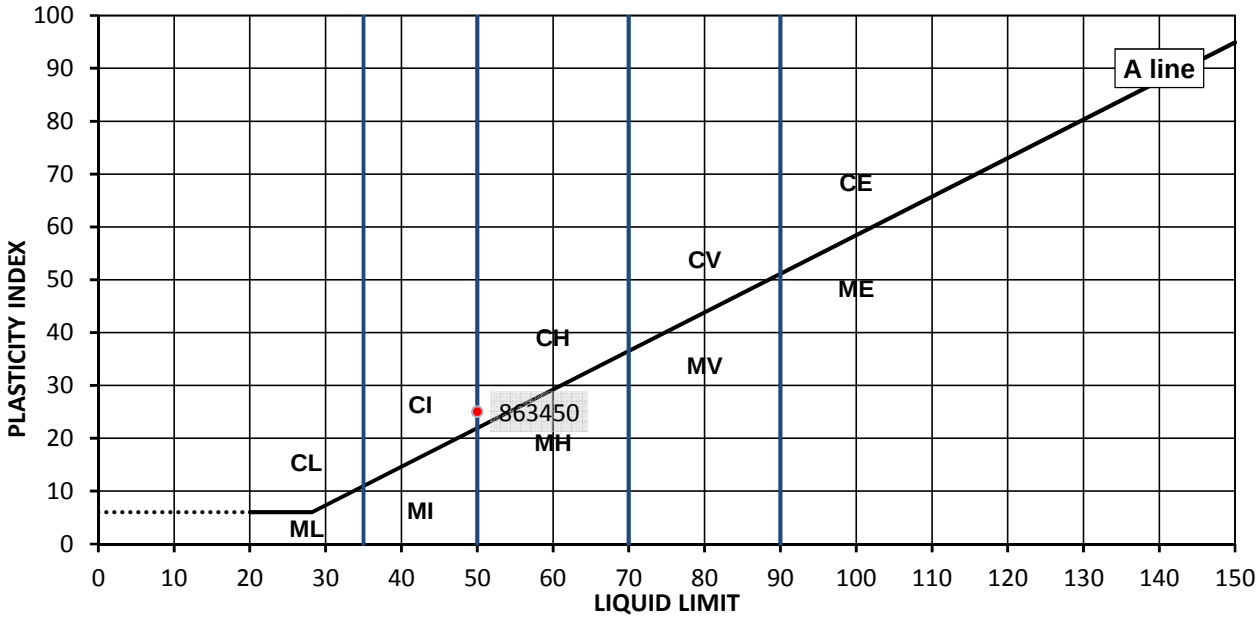
Client:	Geodyne	Client Reference:	37327
Client Address:	Unit 2.2 Clarendon House Clarenden Business Park Clumber Avenue Nottingham, NG5 1AH	Job Number:	17-68617
		Date Sampled:	Not Given
		Date Received:	23/11/2017
Contact:	Stephen Sellers	Date Tested:	04/12/2017
Site Name:	Shakespeare Park, Avon Road, Braunstone	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 863450
Sample Reference: Not Given

Description:	Yellowish brown slightly gravelly slightly sandy CLAY	Sample Type:	B
Location:	WS4	Depth Top [m]:	0.80
Sample Preparation:	Tested after washing to remove >425um	Depth Base [m]:	1.00

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
12	50	25	25	88



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 07/12/2017

for and on behalf of i2 Analytical Ltd

GF 105.11

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

UKAS TESTING 4041

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

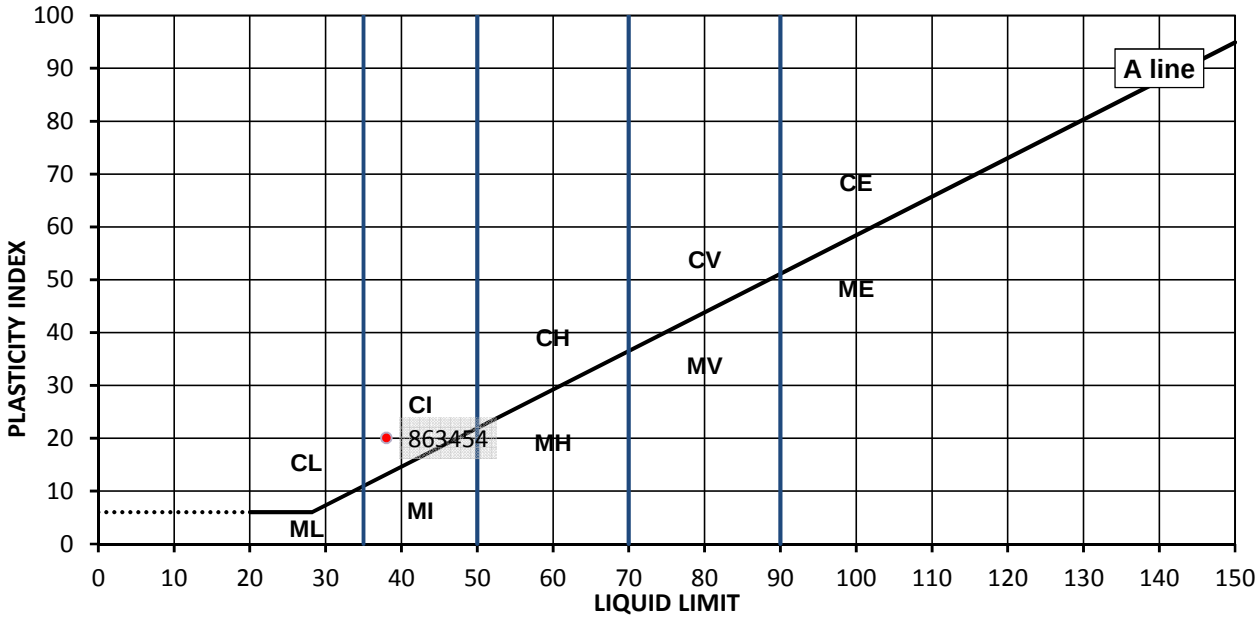
Client:	Geodyne	Client Reference:	37327
Client Address:	Unit 2.2 Clarendon House Clarenden Business Park Clumber Avenue Nottingham, NG5 1AH	Job Number:	17-68617
		Date Sampled:	Not Given
		Date Received:	23/11/2017
Contact:	Stephen Sellers	Date Tested:	04/12/2017
Site Name:	Shakespeare Park, Avon Road, Braunstone	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 863454
Sample Reference: Not Given

Description:	Yellowish brown slightly gravelly sandy CLAY	Sample Type:	B
Location:	WS6	Depth Top [m]:	1.00
Sample Preparation:	Tested after >425um removed by hand	Depth Base [m]:	1.20

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
16	38	18	20	95



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 07/12/2017

for and on behalf of i2 Analytical Ltd

GF 105.11

TEST CERTIFICATE

Summary of Classification Test Results

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client: Geodyne
Client Address: Unit 2.2 Clarendon House
Clarenden Business Park
Clumber Avenue
Nottingham, NG5 1AH
Contact: Stephen Sellers
Site Name: Shakespeare Park, Avon Road, Braunstone
Site Address: Not Given

Client Reference: 37327
Job Number: 17-68617
Date Sampled: Not Given
Date Received: 23/11/2017
Date Tested: 04/12/2017
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Soil Description	Density		M/C	Atterberg				PD
		Reference	Top depth [m]	Base depth [m]	Type		bulk Mg/m3	dry Mg/m3	%	% Passing 425um %	LL %	PL %	PI %	Mg/m3
863446	WS1	Not Given	1.70	2.00	B	Yellowish brown slightly gravelly sandy CLAY			18	98	40	17	23	
863447	WS2	Not Given	1.00	Not Given	B	Yellowish brown slightly gravelly sandy CLAY			15	95	44	21	23	
863448	WS2	Not Given	2.00	Not Given	B	Yellowish brown slightly gravelly sandy CLAY			18	99	37	17	20	
863449	WS2	Not Given	3.00	Not Given	B	Yellowish brown slightly gravelly sandy CLAY			18	95	40	19	21	
863450	WS4	Not Given	0.80	1.00	B	Yellowish brown slightly gravelly slightly sandy CLAY			12	88	50	25	25	
863451	WS5	Not Given	1.00	Not Given	B	Yellowish brown slightly gravelly slightly sandy CLAY			20					
863452	WS5	Not Given	2.00	Not Given	B	Yellowish brown slightly gravelly slightly sandy CLAY			19					
863453	WS5	Not Given	3.00	Not Given	B	Grey slightly gravelly CLAY			14					
863454	WS6	Not Given	1.00	1.20	B	Yellowish brown slightly gravelly sandy CLAY			16	95	38	18	20	

Comments:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Darren Berrill
Geotechnical General Manager

Date Reported: 07/12/2017

for and on behalf of i2 Analytical Ltd

GF 159.4

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 17/07998
Issue Number: 1 **Date:** 01 December, 2017

Client: GeoDyne (Nottingham)
Unit 2.2 Clarendon House
Clarendon Park
Clumber Avenue
Nottingham
Nottinghamshire
UK
NG5 1AH

Project Manager: Nina Copson
Project Name: Shakespeare Park, Avon Road, Braunstone
Project Ref: 37327
Order No: 37327/NC
Date Samples Received: 24/11/17
Date Instructions Received: 24/11/17
Date Analysis Completed: 01/12/17

Prepared by:

Richard Wong
Client Manager

Approved by:

John Gustafson
Director

Envirolab Job Number: 17/07998

Client Project Name: Shakespeare Park, Avon Road, Braunstone

Client Project Ref: 37327

Lab Sample ID	17/07998/1	17/07998/3	17/07998/7	17/07998/10	17/07998/13	17/07998/18	17/07998/19		Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS3	WS4	WS5	WS5			
Depth to Top	0.20	1.50	1.50	0.60	0.15	0.45	1.00			
Depth To Bottom										
Date Sampled	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	6E	5A	5A	6	6AE	6A	6A			
% Stones >10mm$_{A}$	<0.1	1.7	<0.1	<0.1	1.7	-	<0.1		% w/w	A-T-044
pH$_{D}$	7.36	8.50	8.48	8.39	7.94	-	8.33		pH	A-T-031s
Sulphate (water sol 2:1)$_{D}^{M\#}$	-	<0.01	0.01	-	-	-	0.07		g/l	A-T-026s
Total Organic Carbon$_{D}^{M\#}$	5.33	-	-	1.23	2.86	-	0.33		% w/w	A-T-032s
Arsenic$_{D}^{M\#}$	10	-	-	10	12	-	12		mg/kg	A-T-024s
Cadmium$_{D}^{M\#}$	1.3	-	-	1.5	1.4	-	1.0		mg/kg	A-T-024s
Copper$_{D}^{M\#}$	21	-	-	19	23	-	14		mg/kg	A-T-024s
Chromium$_{D}^{M\#}$	39	-	-	32	25	-	18		mg/kg	A-T-024s
Chromium (hexavalent)$_{D}$	<1	-	-	<1	<1	-	<1		mg/kg	A-T-040s
Chromium (trivalent)	39	-	-	32	25	-	18		mg/kg	Calc
Lead$_{D}^{M\#}$	58	-	-	39	73	-	9		mg/kg	A-T-024s
Mercury$_{D}$	<0.17	-	-	<0.17	<0.17	-	<0.17		mg/kg	A-T-024s
Nickel$_{D}^{M\#}$	25	-	-	33	24	-	27		mg/kg	A-T-024s
Selenium$_{D}^{M\#}$	1	-	-	2	<1	-	<1		mg/kg	A-T-024s
Zinc$_{D}^{M\#}$	102	-	-	68	83	-	40		mg/kg	A-T-024s

Envirolab Job Number: 17/07998

Client Project Name: Shakespeare Park, Avon Road, Braunstone

Client Project Ref: 37327

Lab Sample ID	17/07998/1	17/07998/3	17/07998/7	17/07998/10	17/07998/13	17/07998/18	17/07998/19		Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS3	WS4	WS5	WS5			
Depth to Top	0.20	1.50	1.50	0.60	0.15	0.45	1.00			
Depth To Bottom										
Date Sampled	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	6E	5A	5A	6	6AE	6A	6A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{A}^{\#}$	-	-	-	-	NAD	NAD	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	-	-	-	-	N/A	N/A	-			

Envirolab Job Number: 17/07998

Client Project Name: Shakespeare Park, Avon Road, Braunstone

Client Project Ref: 37327

Lab Sample ID	17/07998/1	17/07998/3	17/07998/7	17/07998/10	17/07998/13	17/07998/18	17/07998/19		Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS3	WS4	WS5	WS5			
Depth to Top	0.20	1.50	1.50	0.60	0.15	0.45	1.00			
Depth To Bottom										
Date Sampled	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17	22-Nov-17			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	6E	5A	5A	6	6AE	6A	6A			
PAH 16										
Acenaphthene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Acenaphthylene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Anthracene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Chrysene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Fluoranthene$_{A}^{M\#}$	0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Fluorene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Naphthalene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Phenanthrene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
Pyrene$_{A}^{M\#}$	<0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s
PAH (total 16)$_{A}^{M\#}$	0.1	-	-	<0.1	<0.1	-	<0.1		mg/kg	A-T-019s

REPORT NOTES

General:
This report shall not be reproduced, except in full, without written approval from Envirolab.
All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

GeoDyne

APPENDIX VIII

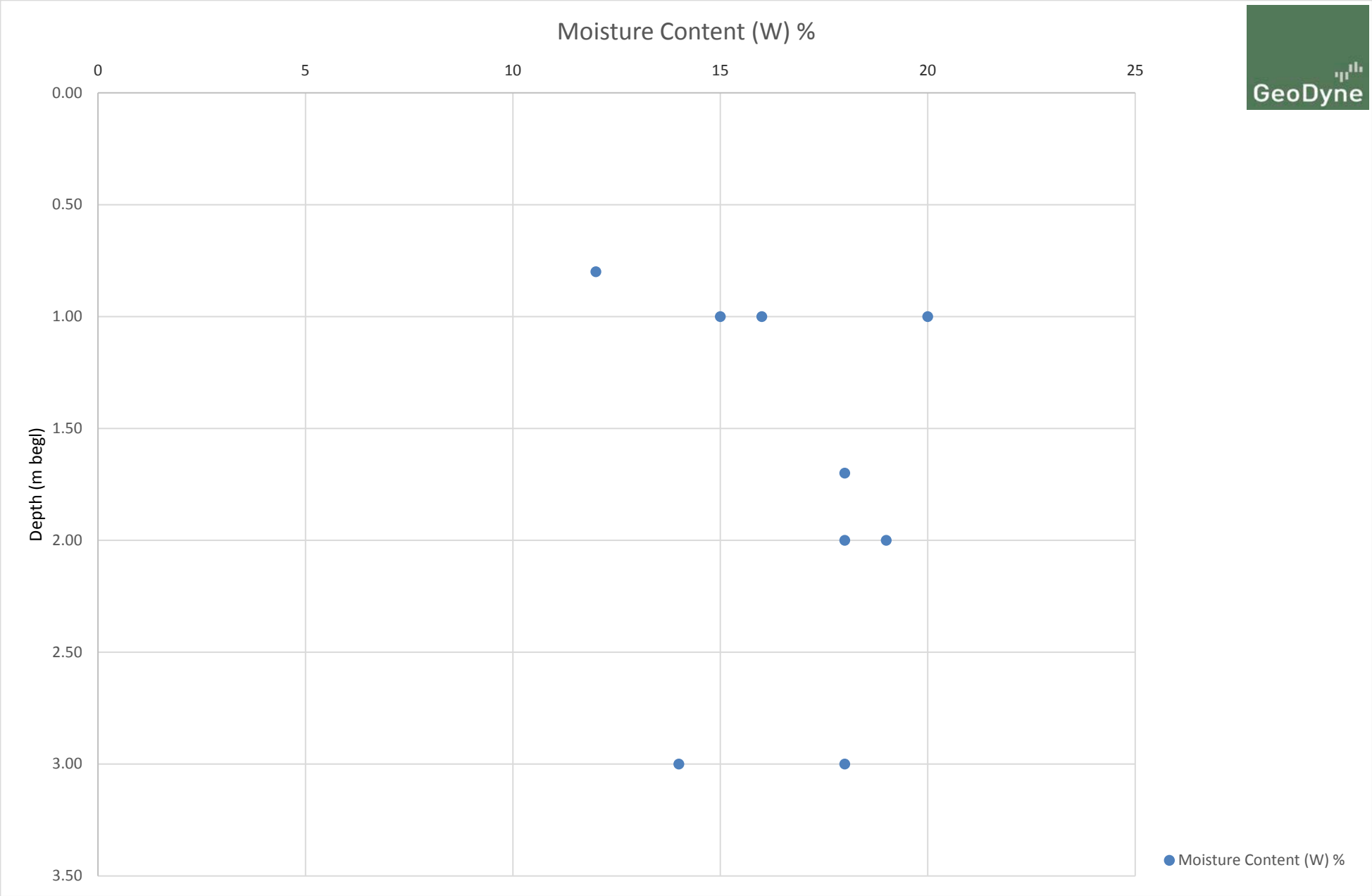
Desiccation Assessment

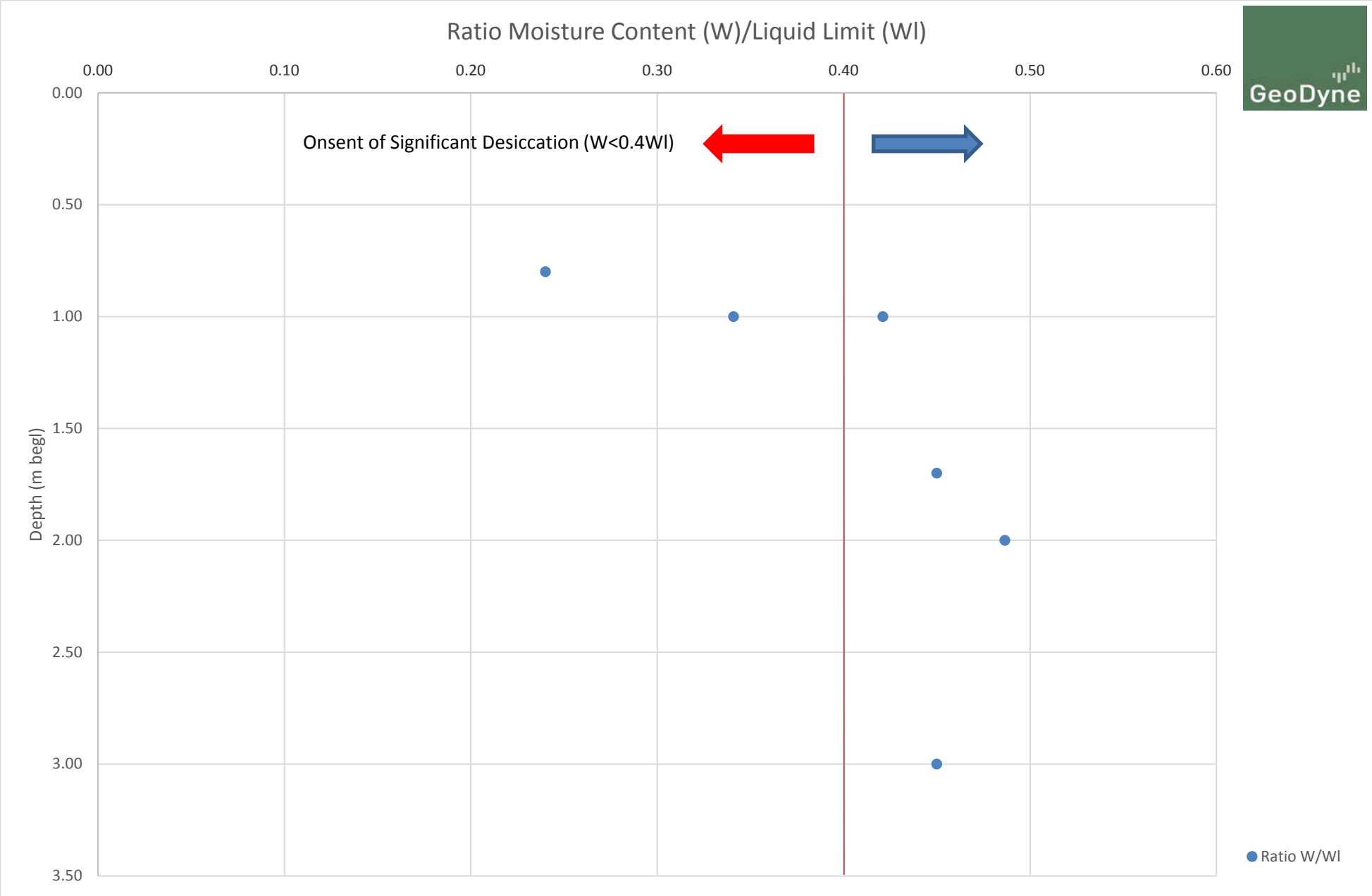
Client	Braunstone Town Council
Site	Shakespeare Park, Avon Road, Braunstone
Our Ref	37327
Date	Desiccation Assessment
Date	14/12/2017

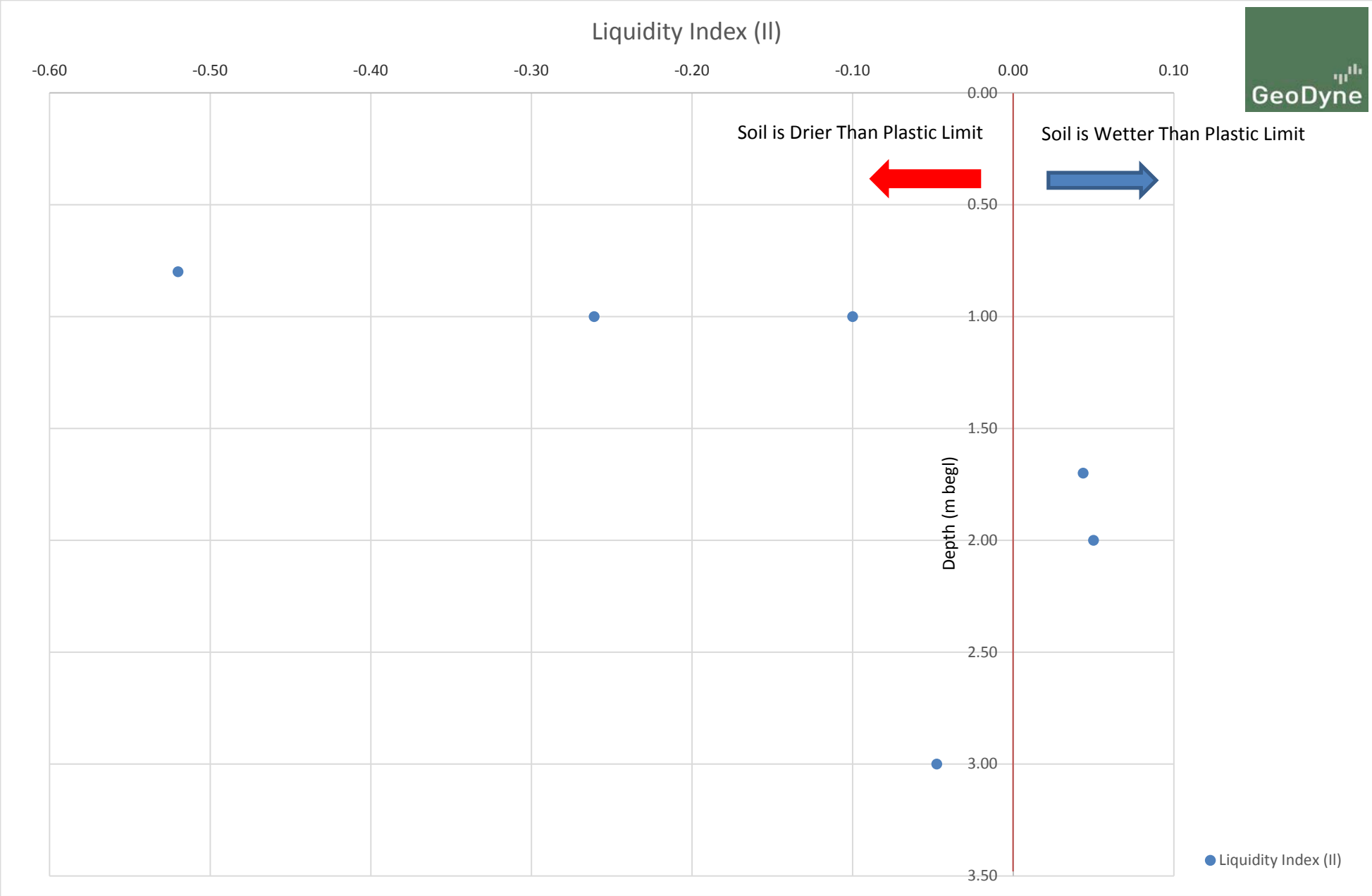
GeoDyne

Unit 2.2 Clarendon House
Clarendon Park
Clumber Avenue
Nottingham, NG5 1AH
Tel: 0115 962 0001
Email: info@geodyne.co.uk

Exploratory Hole No.	Depth Top (m begl)	Moisture Content (W) %	Liquid Limit (Wl) %	Plastic Limit (Wp) %	Plasticity Index (Ip) %	Ratio W/Wl	Liquidity Index (Il)
WS1	1.70	18	40	17	23	0.45	0.04
WS2	1.00	15	44	21	23	0.34	-0.26
WS2	2.00	18	37	17	20	0.49	0.05
WS2	3.00	18	40	19	21	0.45	-0.05
WS4	0.80	12	50	25	25	0.24	-0.52
WS6	1.00	16	38	18	20	0.42	-0.10
WS5	1.00	20					
WS5	2.00	19					
WS5	3.00	14					


Moisture Content (W) %
0
5
10
15
20
25
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Depth (m begl)
Moisture Content (W) %
GeoDyne

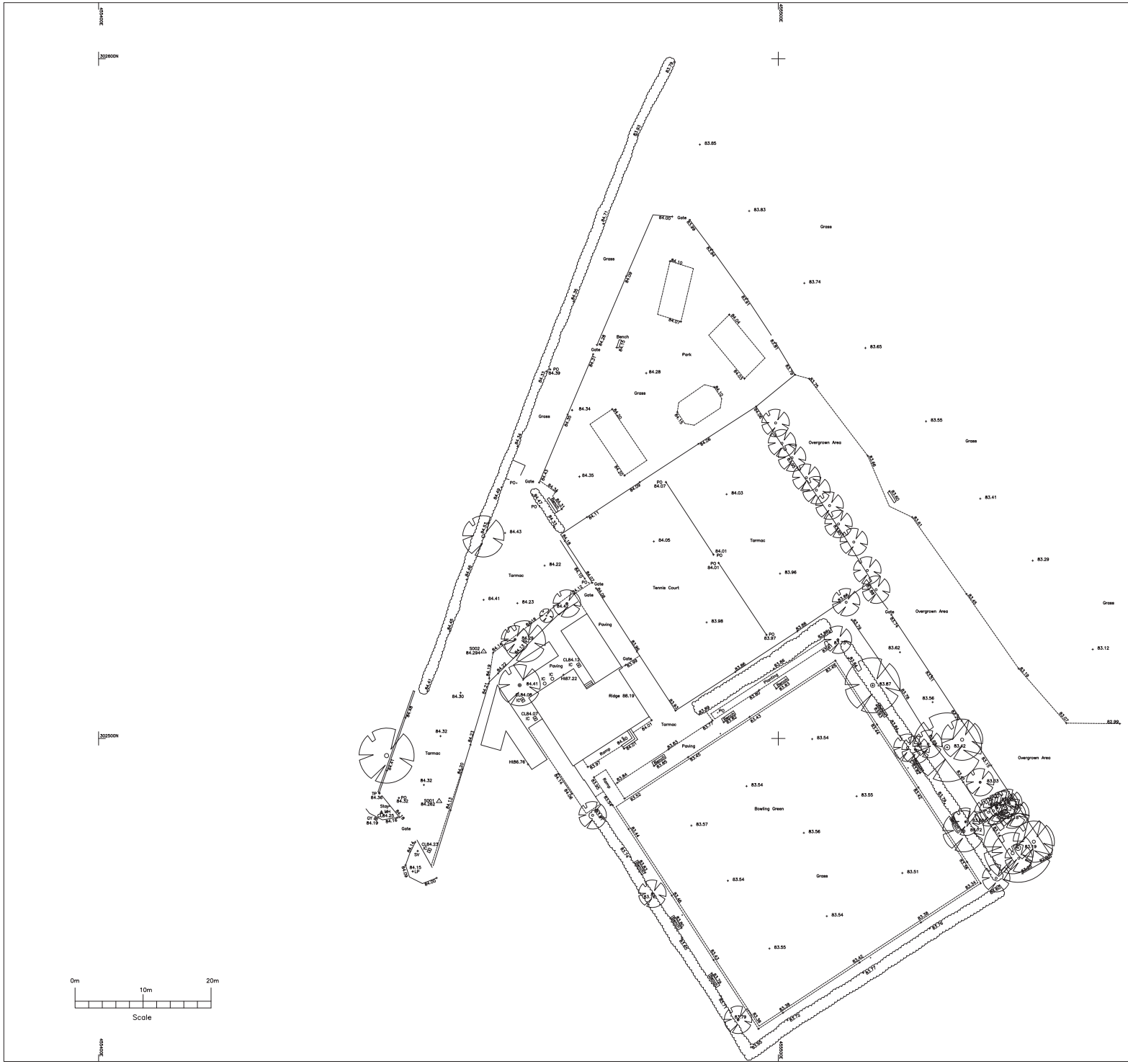

Ratio Moisture Content (W)/Liquid Limit (Wl)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
Onsent of Significant Desiccation (W<0.4Wl)
Depth (m begl)
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Ratio W/Wl
GeoDyne


Liquidity Index (Il)
-0.60
-0.50
-0.40
-0.30
-0.20
-0.10
0.00
0.10
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
Depth (m begl)
Soil is Drier Than Plastic Limit
Soil is Wetter Than Plastic Limit
GeoDyne
Liquidity Index (Il)

GeoDyne

APPENDIX IX

Topographical Survey



ABBREVIATIONS

A/C	AIR CONDITIONING
AH	ARCH HEIGHT
BT	BRITISH TELECOMMUNICATIONS
C	WINDOW CILL HEIGHT
Cab	CABINET
CBF	CLOSE BOARDED FENCE
CL	COVER LEVEL
DP	DISCHARGE PIPE
DC	DIAMOND CHECK COVER
DK	DROP KERB
FP	FOOTPATH
G	GULLY
GV	GAS VALVE
IC	INSPECTION CHAMBER
K	KERB
LP	LAMP POST
MH	MANHOLE
PCL	POST & CHAIN LINK FENCE
RWP	RAIN WATER PIPE
SA	SECURITY ALARM
SBM	SITE BENCH MARK
SH	SPRING HEIGHT
TP	TELEGRAPH POLE
WP	WASTE PIPE

LEGEND

DRAWING ISSUE STATUS

Issue	Details	By	Date
A	Original Survey	ATR	12/02/16

SHEET LAYOUT

THIS SURVEY HAS BEEN CARRIED OUT TO AN ACCURACY CONSISTENT WITH A PRESENTATION SCALE OF 1:200. INTERROGATED DIMENSIONS WILL BE WITHIN THE TOLERANCE ASSOCIATED WITH THIS AND SMALLER SCALES ONLY.

ALL LEVELS RELATE TO OS DATUM USING GPS

ALL CRITICAL DIMENSIONS SHOULD BE VERIFIED ON SITE PRIOR TO ANY DESIGN OR CONSTRUCTION WORKS.

HSSP Architects

44 Ashfordby Road
Melton Mowbray
Leicestershire
LE13 OHR

Shakespeare Park
Braunstone
Leicestershire

Topographical Survey

SURVEYED AND DRAWN BY
RAMOWSKI CLARKE LIMITED
6 Dovecote Drive
Wollaton
Nottingham
NG8 2NB
Tel: (0115) 9289091
Fax: (0115) 9280201
email: mail@ramowski-clarke.com

SCALE 1:200 @ A0

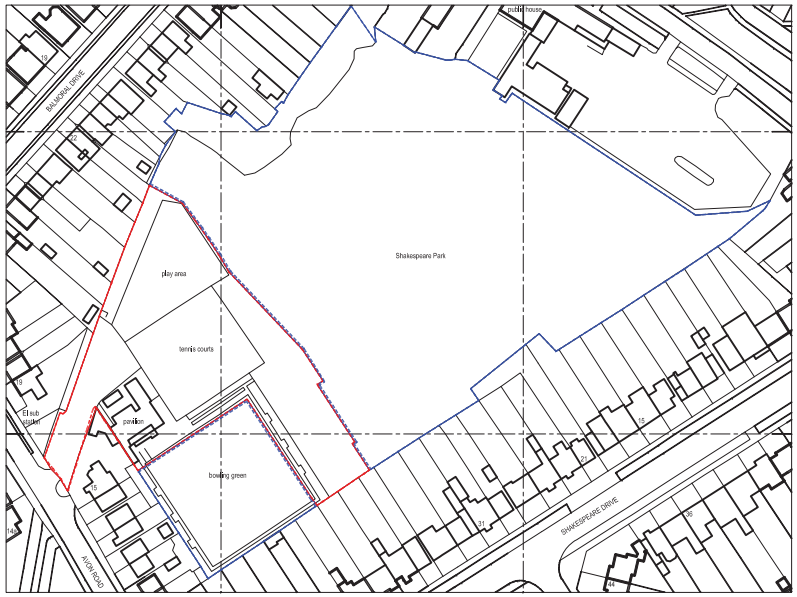
DATE OF ISSUE FEBRUARY 2016

RCL JOB No. 2473 | CHECKED ATR

DRAWING No. 2473-01-a | ISSUE A

APPENDIX X

Proposed Site Layout



SITE LOCATION PLAN Scale 1:1250

SITE BLOCK PLAN Scale 1:500

N

Rev.	Date.	Drawn.

hssp architects
Pera Innovation Park, Nottingham Road
Melton Mowbray, LE13 0PB
Telephone: 01664 563 288 Fax: 01664 503 380
E-Mail: info@hssparchitects.co.uk Web: www.hssparchitects.co.uk

Project.
Proposed New Pavilion
Shakespeare Road
Braunstone
For Braunstone Town Council

Title.
PLANNING

Scale.	Drawn.	Checked.	Date.
Varies	SG		October '16

Drawing No.: 7209-01-001
Revision.:

HSSP A2

GeoDyne

APPENDIX XI

Plates

Project No.	37327	Drawn By	HW
Client	Braunstone Town Council	Checked By	NC
		Approved By	JPH
Project	Shakespeare Park, Avon Road, Braunstone	Scale	NTS
		Date Drawn	23/11/2017
Title	Views of Arisings from Window Sample Boreholes WS1 & WS2	Revision	
		Plate No.	37327/P1

GeoDyne

Unit 2.2, Clarendon House, Clarendon Park, Clumber Avenue, Nottingham NG5 1AH
Tel: 0115 962 0001

9 Brunel Parkway, Pride Park, Derby DE24 8HR
Tel: 01332 290 798

info@geodyne.co.uk

Project No.	37327	Drawn By	HW
Client	Braunstone Town Council	Checked By	NC
		Approved By	JPH
Project	Shakespeare Park, Avon Road, Braunstone	Scale	NTS
		Date Drawn	23/11/2017
Title	Views of Arisings from Window Sample Boreholes WS3 & WS4	Revision	
		Plate No.	37327/P2

GeoDyne

Unit 2.2, Clarendon House, Clarendon Park, Clumber Avenue, Nottingham
NG5 1AH
Tel: 0115 962 0001

9 Brunel Parkway, Pride Park, Derby DE24 8HR
Tel: 01332 290 798

info@geodyne.co.uk

Project No.	37327	Drawn By	HW
Client	Braunstone Town Council	Checked By	NC
		Approved By	JPH
Project	Shakespeare Park, Avon Road, Braunstone	Scale	NTS
		Date Drawn	23/11/2017
Title	Views of Arisings from Window Sample Boreholes WS5 & WS6	Revision	
		Plate No.	37327/P3

GeoDyne

Unit 2.2, Clarendon House, Clarendon Park, Clumber Avenue, Nottingham NG5 1AH
Tel: 0115 962 0001

9 Brunel Parkway, Pride Park, Derby DE24 8HR
Tel: 01332 290 798

info@geodyne.co.uk

GeoDyne

APPENDIX XII

Conditions and Limitations

Conditions & Limitations

Phase I Desk Studies

1. Works undertaken to provide the basis of the Phase I Desk Study report comprise a review of information available from a number of sources/parties (potentially also including the Client) together with a walk over of the site (where applicable and included within the quotation). The opinions given in the Phase I Desk Study are based on the information available from third parties/sources that has been obtained within the available timeframe. GeoDyne Limited assumes all third party information to be true and correct and therefore cannot accept liability for the accuracy of such information supplied.

2. Should additional information become available that may affect the comments and opinions made within the Phase I Desk Study, GeoDyne Limited reserves the right to review such information and make modifications to comments/opinions as appropriate.

3. It should be borne in mind that a Phase I Desk Study collates available information to generate a conceptual model of the site. The actual geotechnical and environmental considerations can only be fully quantified by intrusive investigation works to confirm the accuracy of the conceptual site model.

Phase II Intrusive Investigations

1. Our quotation assumes that access to the site will be arranged by others at no cost to ourselves.

2. We have assumed that free access is available throughout to the entire site and that works can be undertaken during a single mobilisation. Where restricted access is encountered, or where additional unscheduled mobilisations are required, additional costs may be incurred to the client.

3. We have assumed that all available information relating to buried services will be supplied by the Client at no cost to ourselves. No responsibility will be accepted for damage to underground services that have not been brought to our prior attention by the Client.

4. All excavations/boreholes will be backfilled with compacted arisings upon completion, with any excess arisings left proud of ground levels. Excess arisings will not be removed from the site unless specifically requested by the Client. Where we are requested to remove excess arisings, all associated costs will be passed to the Client.

5. We will attempt to leave the site in a clean and tidy state, however, it must be understood that some disturbance of the site is unavoidable during intrusive works.

6. Exploratory holes are positioned approximately on site by GeoDyne Limited. Should the client require precise locations of all exploratory points, additional fees will be incurred. It must be borne in mind that backfilled trial pits can create 'soft spots', therefore, should the Client wish to designate 'no dig' zones, for example under the footprint of proposed structures, these must be brought to our attention prior to commencement of works.

7. Groundwater observations relate to conditions encountered at the time of investigation. It must be understood that groundwater levels may vary as a result of recent climatic conditions or seasonal variation.

8. Trial pits and boreholes examine only a small proportion of the total site area. No liability can be accepted for conditions not revealed in exploratory holes, particularly between positions. All extrapolations of available data are given in good faith.

Payment

1 Payment terms are strictly 28 days from the invoice date.

2 Prior to commencement of works, we require receipt of formal written instruction from the party accepting full financial responsibility for the work. In the absence of such an instruction, we would expect the instructing Consulting Engineers/Architects to accept full financial responsibility for the works.

3 Receipt of instruction to commence work shall be taken as acceptance and compliance of the foregoing conditions.

Liability

1. GeoDyne Limited offer £5,000,000.00 Professional Indemnity Insurance (in aggregate over the year). This shall be the limit of our liability for works undertaken. No individual liability shall be implied to, or accepted by, any employee for works undertaken for and on the behalf of GeoDyne Limited.