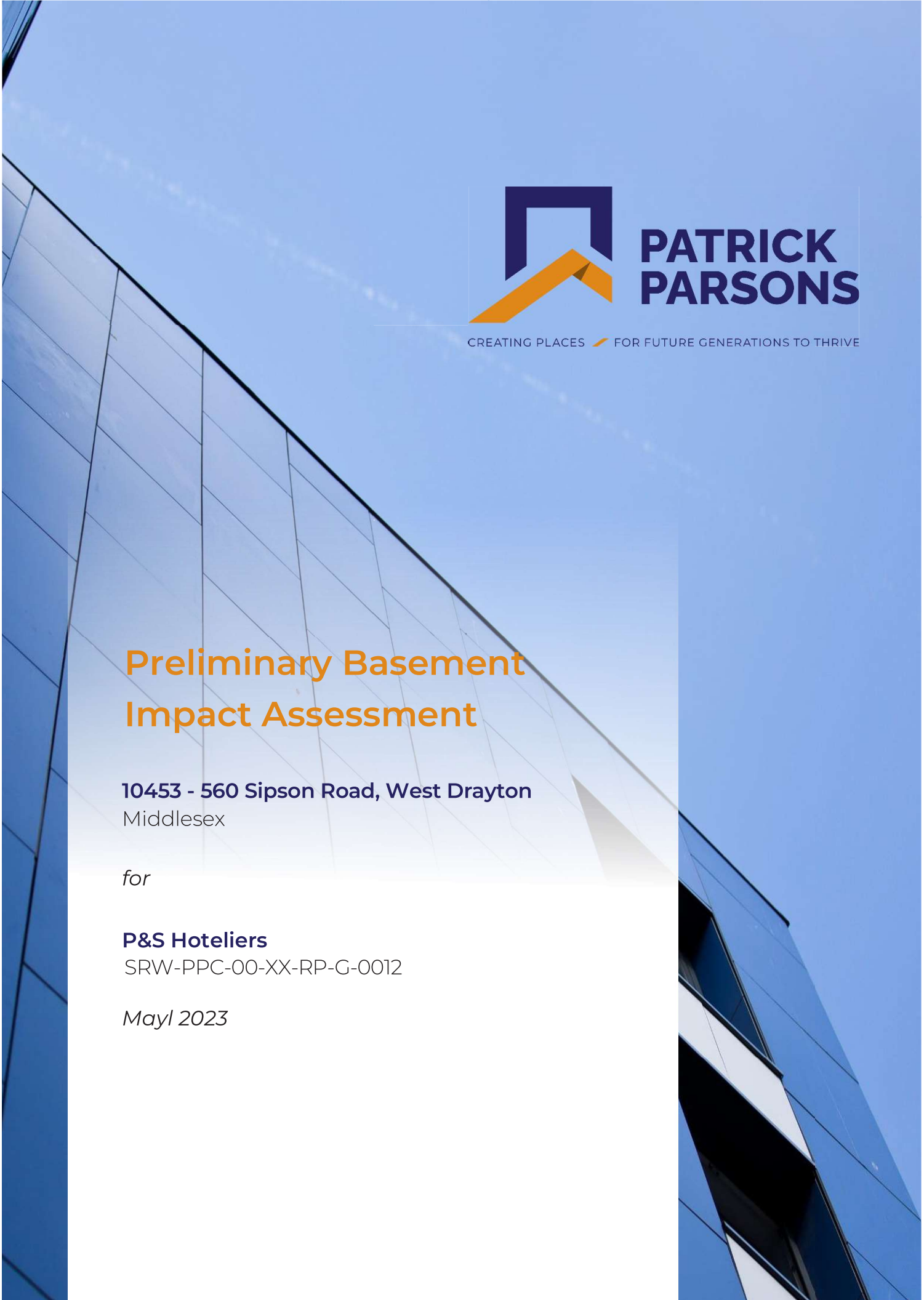

PATRICK PARSONS

CREATING PLACES / FOR FUTURE GENERATIONS TO THRIVE

Preliminary Basement Impact Assessment

10453 - 560 Sipson Road, West Drayton
Middlesex

for

P&S Hoteliers
SRW-PPC-00-XX-RP-G-0012

Mayl 2023

Preliminary Basement Impact Assessment

10453 - 560 Sipson Road, West Drayton

for

P&S Hoteliers

Revision	Date of issue	Comments	Prepared By	Checked By
0	19/05/23	1st Issue	JP	CRS

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PATRICK PARSONS

Contents

1.0 Introduction

1.1 Commission

Patrick Parsons (PP) has been appointed by P&S Hoteliers (client) to produce a Preliminary Basement Impact Assessment (PBIA) to support a planning application for their site know as 560 Sipson Road, West Drayton, Middlesex.

1.2 Proposed Development

It is understood that the site is to be developed as a seven-storey hotel with a basement. A proposed development plan is included in Appendix A.

1.3 Limitations

This report has been prepared for the client and their appointed agents only and should not be relied upon by any third party without the written permission of Patrick Parsons. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors do not owe them any Duty of Care or Skill. It is based on and limited to an assessment of the information and ground conditions identified here.

1.4 Aim of Preliminary Basement Impact Assessment

The client's specific requirements were to provide a PBIA for the Site in order to satisfy local planning policies relating to the proposed new basement development.

The Site lies within the London Borough of Hillingdon which has published a document 'Local Plan Part 2 Development Management Policies' dated 16 January 2020. The policy includes a section on basement development which outlines the potential adverse impacts that should be avoided, however it doesn't include a methodology as to how these potential impacts should be assessed. As a result, the methodology of this assessment has been based on guidance provided within the London Borough of Camden document 'Camden Planning Guidance Basements' (CPBG) dated January 2021.

This assessment also takes into consideration the Campbell Reith Hill LLP pro forma BIA, published by the London Borough of Camden, as this provides guidance on all the required information for the preliminary Basement Impact Assessment.

Basement Impact assessments include the following stages:

- Stage 1 – Screening;
- Stage 2 – Scoping;
- Stage 3 – Site Investigation and study; and
- Stage 4 – Impact assessment.

This report covers Stages 1 to 4 above and aims to provide an assessment as to whether the proposed development is likely to cause harm to the built and natural environment and local amenity, including to the local water environment and ground conditions.

1.5 Information Sources

This PBIA is based on published geological and environmental information supplemented by a Ground Investigation Report undertaken by Simon Quarrell in September 2016 (Appendix B).

Opinions and recommendations presented in this report are based partly upon the documents provided by third party sources as outlined above. PP has not been able to verify independently all third-party information and for the purposes of this assessment has assumed that such information is accurate and complete and has therefore been used in good faith.

Therefore, whilst this report and the opinions contained herein are accurate to the best of PPs knowledge and belief, PP cannot accept liability for any acts or omissions within the data or assessments or guarantee the completeness or accuracy of any descriptions or conclusions based on supplied third party information.

2.0 Summary of Previous Ground Investigation

2.1 Previous Phases of Ground Investigation

The previous phase of ground investigation was completed by Simon Quarrell and comprised three cable percussive boreholes to a maximum depth of 40.00m below ground level (bgl).

2.2 Ground Conditions

Ground conditions at the site identified reinforced concrete hard standing overlying Made Ground comprising stiff grey-brown clay with gravel, pockets of sand and brick fragments to a maximum depth of 0.70m bgl.

Langley Silt Member (Brickearth Clay) was encountered beneath the Made Ground and comprised stiff to very stiff pale brown silty sandy CLAY to a maximum depth of 1.30m bgl. The Langley Silt Member had a liquid limit of 45%, a plastic limit of 19% and consequently a plasticity index of 26% (medium volume change potential).

Gravel was encountered beneath the Langley Silt Member and comprised initially very dense SAND with gravel, however below 3.00m bgl there was a reduction in sand content and an increase in gravel content. The granular deposits were encountered to depths of between 4.30m bgl and 5.70m bgl.

London Clay Formation was encountered beneath the gravel and comprised weathered brown becoming grey silty CLAY with fissures and claystones throughout. London Clay Formation was encountered to the base of all exploratory hole locations.

2.3 Hydrogeology

Groundwater was not identified during the ground investigation or during subsequent monitoring visits, however it should be noted that groundwater can fluctuate throughout the year.

2.4 Foundation Design

Proposals at the time of the Simon Quarell report suggested that the basement would be 3.00m bgl and used for car parking with access by car lifts. The basement excavation would extend through Made Ground and Langley Silt Member (Brickearth Clay) up to 2.00m into the underlying River Terrace Deposits. The excavation would need to be supported during construction. A thick raft foundation or piled foundation solution was recommended.

2.5 Ground Gas Risk

The likelihood of gas migrating from external sources onto the site was assessed as ‘most unlikely’ and Radon was not expected to be present at the site.

3.0 Screening and Scoping Assessment

3.1 Screening Assessment

The screening stage of a PBIA includes the identification of matters relating to local flooding and / or neighbour amenity and structural risks, and this PP assessment utilises the Campbell Reith pro forma to identify the issues relevant to the Site. Each question within the pro forma is completed by answering 'Yes', 'No' or 'Unknown', and any answers answered with 'Yes' or 'Unknown' is carried forward to the scoping phase of the assessment.

The results of the screening process are provided in the table below:

Subterranean Flow - Groundwater		
Question	**Response**	**Details**
1a. Is the site located directly above an aquifer?	No	Langley Silt Member (Brickearth Clay) – Unproductive Strata London Clay Formation - Unproductive Strata
1b. Will the proposed basement extend beneath the water table surface?	No	Previous phase of investigation did not identify groundwater during the investigation or subsequent monitoring.
2. Is the site within 100m of a watercourse, well (used / disused) or potential spring line?	No	Drainage ditch present 10m northeast, however no significant surface water receptors within 100m of the site. It is assumed that the drainage ditch is not in hydraulic continuity with the site and is instead influenced by surface run-off or direct discharge of surface water from nearby developments.
3. Is the site within the catchment of any surface water features?	Yes	The Site is located within the Crane Rivers and Lakes Operational Catchment area.
4. Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No	Current development plans indicate that the proportion of hard surfaced / paved areas will remain broadly similar.
5. As part of site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	No	Given the nature of the development infiltration drainage will not be adopted.
6. Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond or spring line?	No	Drainage ditch present 10m northeast, however no significant surface water receptors within 100m of the site. It is assumed that the drainage ditch is not in hydraulic continuity with the site and is instead influenced by surface run-off or direct discharge of surface water from nearby developments.
Land Stability		
Question	**Response**	**Details**
1. Does the existing site include slopes, natural or man-made greater than 7 degrees (approximately 1 in 8)?	No	The site and surroundings are generally flat.

2. Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7 degrees (approximately 1 in 8)?	No	Re-profiling of the site is not anticipated
3. Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7 degrees (approximately 1 in 8)?	No	The site and surroundings are generally flat.
4. Is the site within a wider hillside setting in which the general slope is greater than 7 degrees (approximately1 in 8)?	No	The surroundings are generally flat.
5. Is the London Clay the shallowest strata at the site?	No	The site is underlain by superficial deposits of the Langley Silt Member (Brickearth Clay) and gravel deposits.
6. Will any trees be felled as part of the development and/or are any works proposed within any tree protection zones where trees are to be retained?	No	No trees are present within the site boundary.
7. Is there a history of seasonal shrink-swell subsidence in the local area and/or evidence of such effects at the site?	No	The cohesive superficial soils beneath the site are classified as having a medium to low volume change potential. The London Clay Formation soils have an assumed high-volume change potential. No evidence of subsidence in the local area or on site.
8. Is the site within 100m of a watercourse or a potential spring line?	No	Drainage ditch present 10m northeast, however no significant surface water receptors within 100m of the site. It is assumed that the drainage ditch is not in hydraulic continuity with the site and is instead influenced by surface run-off or direct discharge of surface water from nearby developments.
9. Is the site within an area of previously worked ground?	No	No evidence of the presence of 'Worked Ground' i.e. lowering of the ground as a result of man-made excavations is present, however Made Ground of up to 0.70m thickness was identified during the previous ground investigation.
10. Is the site within an aquifer. If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?	No	Previous phase of investigation did not identify groundwater during the investigation or subsequent monitoring.
11. Is the site within 50m of a surface water body?	No	Drainage ditch present 10m northeast, however no significant surface water receptors within 100m of the site. It is assumed that the drainage ditch is not in hydraulic continuity with the site and is instead influenced by surface run-off or direct discharge of surface water from nearby developments.
12. Is the site within 5m of a highway or pedestrian right of way?	Yes	The site is bound to the northwest by a pavement and Sipson Road.

13. Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Unknown	Foundations of the neighbouring structures are unknown.
14. Is the site over (or within the exclusion zone of) any tunnels, e.g. railway lines?	No	The nearest tunnel is located 20m east of the site
Surface Flow and Flooding		
Question	**Response**	**Details**
1. Is the site within the catchment of the pond chains on Hampstead Heath?	No	
2. As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run-off) be materially changed from the existing route?	No	Based on the current development plans, surface water flow is not likely to be impacted by the proposed site redevelopment.
3. Will the proposed basement development result in a change in the proportion of hard surfaced / paved external areas?	No	Current development plans indicate that the proportion of hard surfaced / paved areas will remain broadly similar.
4. Will the proposed basement result in changes to the profile of the inflows (instantaneous and long-term) of surface water being received by adjacent properties or downstream watercourses?	No	
5. Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	
6. Is the site in an area identified to have surface water flood risk according to either the Local Flood Risk Management Strategy or the Strategic Flood Risk Assessment or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water feature.	No	The site is not situated within an EA designated flood plain and has a low probability of flooding from rivers and the sea.

3.2 Scoping Assessment

'Yes' or 'Unknown' responses from the screening phase of the assessment have been carried forward to the scoping phase of the assessment which defines the necessary investigation to determine the nature and significance of potential impacts identified during screening.

3.2.1 Subterranean Groundwater Flow

The Site is located within the westernmost extent of the Crane Rivers and Lakes Operational Catchment area, however it is considered highly unlikely that the Site will have a negative impact on water quality in the area.

3.2.2 Land Stability

The site and surrounding area are generally flat and as such slope instability problems are not likely to occur.

It is anticipated that shallow soils at the Site will comprise a thin layer (generally 0.50m) of clay with a medium to low volume change potential overlying non-plastic / granular River Terrace Deposits. As such, it is considered that there is a low risk for the proposed basement

with respect to shrink swell clays and there was no evidence of impact to existing structures at the Site or in the surrounding area from shrink / swell susceptible soils. Should the formation level for the proposed basement be at depths consistent with the depth to London Clay, it should be assumed at this stage that these soils will have a high-volume change potential.

3.2.3 Surface Flow and Flooding

It is not anticipated that the proposed redevelopment will increase the volume or rate of surface water flow, nor will it increase the risk of flooding at the Site as the proportion of hard surfaced / paved areas will remain broadly similar.

4.0 Preliminary Basement Impact Assessment

4.1 Subterranean Groundwater Flow

The site is underlain by a thin layer (generally 0.50m) of clay (Langley Silt Member) overlying up to 5.00m granular River Terrace Deposits, which in turn are underlain by cohesive deposits of the London Clay Formation. Groundwater was not identified during the previous phase of ground investigation or subsequent monitoring, however it should be noted that groundwater can fluctuate throughout the year.

Based on the identified ground conditions, the absence of groundwater and the depth of the proposed basement, it is considered unlikely that the proposed basement will impact on the groundwater regime beneath the site.

Groundwater seepage / inflows may be encountered during basement excavation, however dewatering via sump pumping techniques, or similar should be sufficient to control any ingress.

At this stage, it would be prudent to assume that the proposed basement will need to be fully waterproofed to provide adequate long-term control of moisture ingress from groundwater and the system should be designed to resist hydrostatic pressures in accordance with the requirements of BS 8102.

4.2 Slope and Ground Stability

The site and surrounding area are generally flat and there is no evidence of ground stability issues in the surrounding area, and as a result slope instability problems are not likely to occur.

4.2.1 Shrinking / Swelling Clays

The formation level for the proposed basement is unknown, however if London Clay is present at depths consistent with the proposed basement depth, representative samples should be obtained and geotechnical analysis including Atterberg limits should be caried out to provide an assessment of the shrink / swell potential of the soils. At this stage is should be assumed that the London Clay soils have a high-volume change potential.

The proposed development plans indicate that trees are to be retained or incorporated into the scheme and consideration should be given to the potential impact of expansion and contraction of clay soils due to water extraction by vegetation.

4.2.2 Heave of Underlying Soils

The main phase of heave from the cohesive soils will come immediately following basement excavation is this is when the greatest elastic rebound of cohesive soil tends to occur. To reduce potential heave of the underlying soils, the excavation of the basement should be completed in stages. There is also potential for minor heave below the basement slab if cohesive soils are present, and as such it should be assumed that the basement slab will need to be reinforced.

4.2.3 Impact to Adjacent Properties and Pavement

The proposed basement construction is likely to be within influencing distance of the public pavement alongside Sipson Road and neighbouring properties to the west, however the

basement will not undermine them. The basement construction methodology must ensure adequate controls, primarily in the form of temporary support designed using best practice methodology, are in place to prevent lateral and vertical ground movements during temporary and permanent construction. It is also recommended that regular monitoring is completed throughout the construction phase of the project.

Where the basement excavation advances through granular superficial soils, it should be assumed that full support will be required, however where cohesive soils are present within the basement excavation, temporary support is only likely to be required where the clays are heavily fissured and in corners of the excavation.

To achieve the above, the engineering and design of the development should be completed by competent persons and all works should be carried out in accordance with the Construction Design and Management Regulations, 2015.

4.3 Surface Flow and Flooding

The Environment Agency flood map shows that the property is not situated within an EA designated flood plain and has a low probability of flooding from rivers and the sea.

The closest surface water feature is a drainage ditch approximately 10m north of the site, however this feature is assumed not to be in hydraulic continuity with the Site. As such, the Site is not considered likely to impact on the hydrology of the surrounding area.

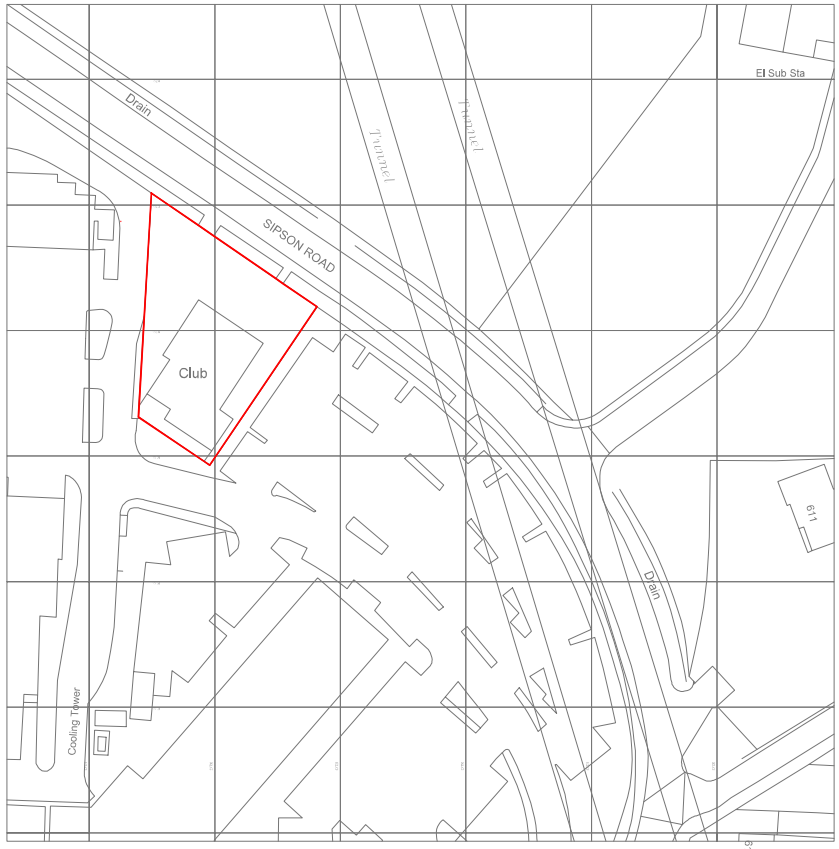
It is not anticipated that the proposed redevelopment will increase the volume or rate of surface water flow, nor will it increase the risk of flooding at the Site as the proportion of hard surfaced / paved areas will remain broadly similar. Should SuDS be incorporated within the future site redevelopment, the future risk of sewer water flooding would be reduced as the rate of peak flow into sewers would be reduced.

5.0 Recommendations

Based on the findings of this Basement Impact Assessment, no significant risks have been identified and it is considered unlikely that the construction will have a negative impact on nearby receptors. Therefore, it is considered that no further assessment of potential basement impacts is required.

Following review of this report a copy of it should be submitted to the Local Authority planning department prior to any development works.

Appendix A
Figures



1 Block Plan
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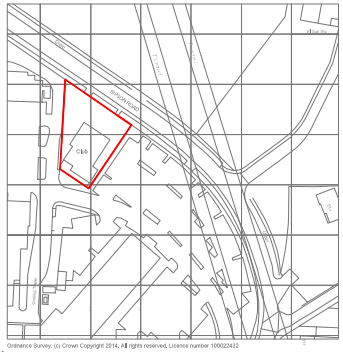

2 Location Plan
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Rev	DATE	DESCRIPTION	APPR

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SCALE 1:500 @ A1

0m 25m 50m 75m 100m 125m
SCALE 1:1250 @ A1

PROJECT NAME
560 Sipson Road, UB7 0JF

PROJECT NO.
19040-GAA-ZZ-00-DR-T-0101

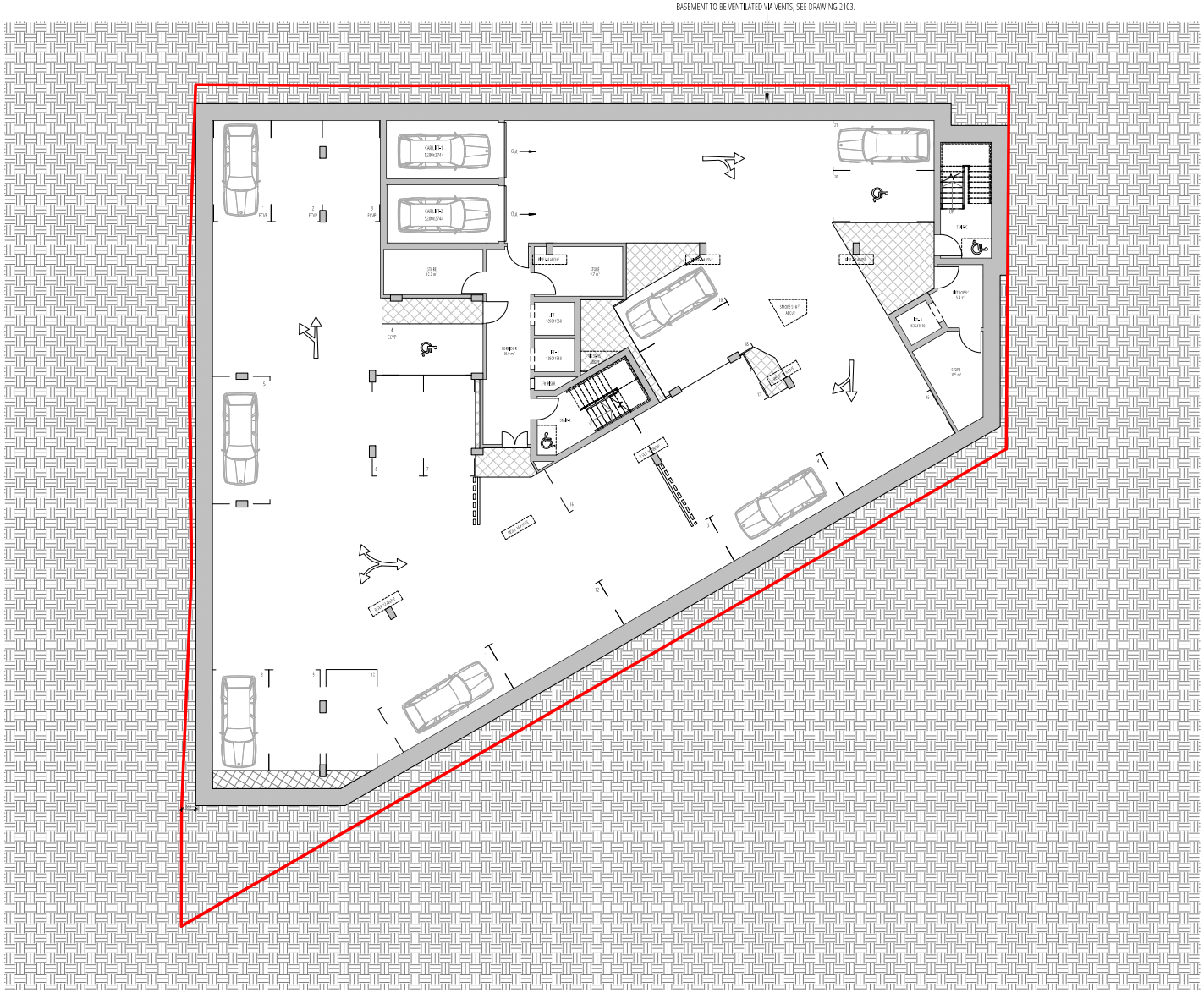
DRAWING TITLE
Location & Block Plan

DATE 28/06/22 | DRAWN AS | CHECK DA

PROJECT NUMBER 19040 | SCALE As Indicated | PURPOSE For Stage Approval | STATUS S4 | REV NO P02 | REVIEWED RS | APPROVED RS

GAA design

© GAA DESIGN A1
A1



1 Proposed Basement GA Plan
1 : 100

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Rev	DATE	DESCRIPTION	APPR.

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SCALE 1:100 @ A1

PROJECT NAME
560 Sipson Road, UB7 0JF

DRAWING TITLE
Proposed Basement GA Plan

PROJECT NUMBER
19040

SCALE
1:100

PURPOSE
For Stage Approval

PROJECT NO.
19040-GA-ZZ-B1-DR-T-2001

DATE	DRAWN	CHECK
22/08/22	AS	AS

STATUS	REV NO.	REVIEWED	APPROVED
S4	P06	RS	RS

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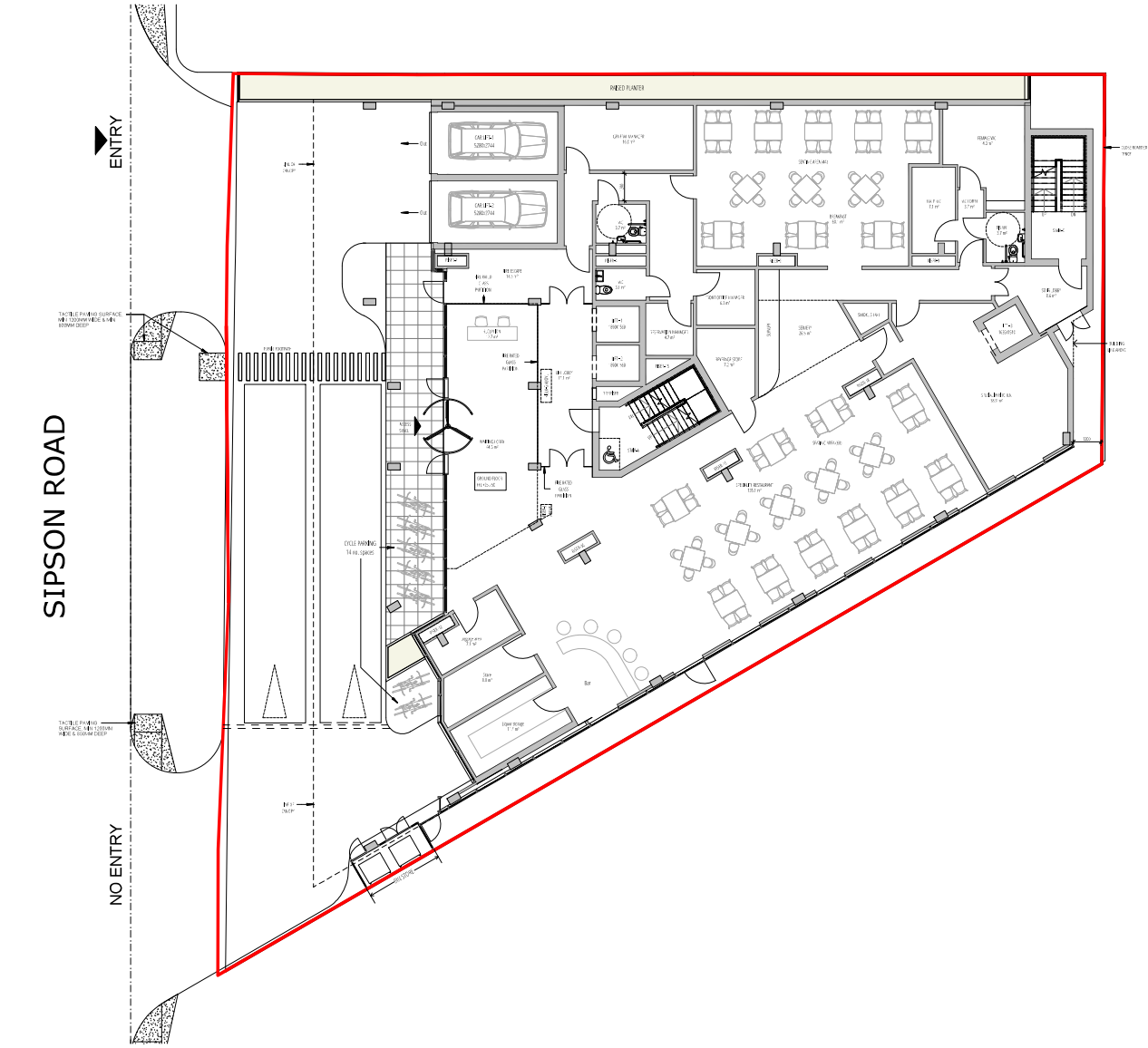
ISSUED FOR PLANNING A1



1 Proposed Ground Floor GA Plan
1 : 100

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Rev	DATE	DESCRIPTION	APPR

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SCALE 1:100 @ A1

PROJECT NAME
560 Sipson Road, UB7 0JF

DRAWING TITLE
Proposed Ground Floor GA Plan

PROJECT NUMBER
19040

SCALE
1:100

PURPOSE
For Stage Approval

PROJECT NO.
19040-GA-ZZ-GF-DR-T-2002

	DATE	DRAWN	CHECK
	22/08/22	AS	AS

STATUS	REV NO.	REVIEWED	APPROVED
S4	P05	RS	RS

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ISSUED FOR PLANNING A1

Appendix B
Previous Reports

Simon Quarrell
Eur Ing, BSc, MSc(Soils), CEng, MICE, FGS

Geotechnical Consultant

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Amersham Road
High Wycombe
Buckinghamshire
HP15 7JH

GROUND INVESTIGATION REPORT

for development at

560, SIPSON ROAD, WEST DRAYTON, MIDDX, UB7 0JD

Client : **HAYRE GROUP**

Architects : **GA & A DESIGN Ltd**

September 2016

Tel: +44 (0) 1494 718121 **Fax:** +44 (0) 1494 718129
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1.0 Introduction

This site is to be redeveloped with a seven storey building incorporating a basement. This Report presents the information from ground investigation work and then gives recommendations for the design of foundations.

2.0 Investigation Strategy

A Phase 1 Desk Study was carried out in March 2013 by a company called Land Science Brighton Ltd. Their Report was based on a site inspection and a study of historical maps and Database provided by Envirocheck. The Report concludes that there are two sources of potential contaminants - on-site, if made ground is present, and off-site from a historical "Tank" situated on the adjacent land about 20m distant to the south. The Report suggests that shallow boreholes are carried out to check for the presence of metals, oil and gas.

The Report, section 4.2 states "land gases from natural sources and historic landfill sites have been identified as not being significant at this site. "

The Data within this Report shows on the 1961 OS map that there was a "Tank" by the side of the neighbouring building (a Bakery) . This Tank was about 2m by 2.5m in plan and 15m distant from the south boundary of this Site. The 1988 OS map shows that the Bakery building has been demolished, and on the map of 1990 this area is a car park for a new Hotel built on the Bakery site.

It is evident that the former presence of this small tank is of no significance to the proposed development. It is very unlikely that spillage from this tank would have polluted the Site. In any case, the proposed development will involve excavation of the upper 3m zone of soil to create the basement. The possibility of ground gas migrating from landfill sites that are situated 400m to the northeast has been discounted by Land Science.

Consequently, this ground investigation work will be primarily geotechnical to provide information for the construction of the basement and for the design of foundations. The "made ground" on the site will be analysed in order to classify this material for Waste Disposal purposes.

3.0 Site Description

The site lies at the southern end of Sipson Road close to the A4 Bath Road. The plot is approximately triangular in shape with a 40m frontage to Sipson Road. The topography of this area is flat and level. The British Legion Club building , built in about 1960, is still present and the surrounding ground is surfaced with concrete. There are some Conifer & Maple trees within the neighbouring land at the northeast corner. This adjoining land is an open car park for the adjacent Hotel (built in 1974 and extended in 1990). The Hotel is now the Park Inn - Radisson. To the west of the hotel buildings is the M4 spur set within Cutting.

The land on the north side of Sipson Road is undeveloped. The two single-bore tunnels of the Heathrow Express railway line, built in 1998, traverse north-south at a distance of about 20m to the east of the site boundary. Just to the south of the A4 main road is Heathrow Airport.

These features are shown on the enclosed current map of this area and on the Topographical survey of the Site carried out in June 2013. This Survey shows that the site is flat at a general level of around 19.5m Site Datum. The Ordnance Datum level of the site is about 26m OD.

4.0 Exploratory Work

Following the Site Inspection and study of the Phase 1 Report, three boreholes were constructed near each corner of this triangular shaped site. The boreholes were advanced to depths of 30m to 40m, with insitu SPT tests and Undisturbed samples being taken at intervals. Upon completion, an observation pipe was installed in each borehole to enable the ground water level to be measured over a period of time.

Laboratory tests were carried out to measure the strength and Plasticity of the clay soils. The soluble sulphate within the clay was also determined. Three samples of the made ground were analysed for Waste Acceptance Criteria.

5.0 Ground Conditions

The Geological Survey map shows that Langley Silt (Brickearth Clay) is present resting on Taplow Gravel. London Clay is then present and extends for a considerable depth. The boreholes confirmed this sequence :

- **Made ground** - the whole of the site is surfaced with reinforced concrete. There is then a layer of Clay-fill, consisting of stiff grey-brown clay containing some gravel, pockets of sand and pieces of brick.

- **Brickearth Clay** - this pale brown silty sandy clay was met at depths of 0.5m to 0.7m, and is generally about 500mm in thickness. The clay is in a stiff condition, but very stiff in the northeast corner due to the presence of nearby trees. The clay has a Liquid Limit of 45% and a Plastic Limit of 19%. Hence the Plasticity Index value of 26% shows the clay is of Medium to Low Shrinkage/Swelling potential.

- **Gravel** - met at depths of 0.7m, 1.3m and 0.8m, initially as very dense Sand with gravel. Below a level of around 3m, it would appear that there is less Sand and much more Gravel. The SPT values are generally of the order of N=35.

- **London Clay** - the clay was met at 4.3m depth on the western side of the site, and at 5.7m depth in the northeast corner. The upper half-metre is weathered to a brown colour and thereafter the clay is the typical grey colour. A fissured structure is evident. In the deepest borehole, below a depth of 37m, the clay has an overall slightly silty nature. Claystones were encountered at random depths and required a short period of chiseling to break-up or dislodge these concretions.

  The Laboratory measured strength is illustrated on the enclosed Graph of Cohesion in relation to depth.

- **Ground Water** - water was not encountered whilst boring. It was necessary to add water to enable boring through the granular soil. Upon completion, and withdrawl of the temporary casing, water was not present. Observation pipes were installed in each borehole. After several days, there was no water in any of the pipes. At other times of the year, there may be some ground water within the lower zone of the Gravel.

6.0 Foundation Design

The development covers all of the site, except for a 1m wide strip of land along the east boundary. The basement will be about 3m deep for use as car parking, with access by Car Lifts. The ground floor will overlay the basement footprint, but set back along the road frontage. There will then be six further floors. The structural layout is not uniform with columns at various locations.

Excavation for the basement will pass through the made-ground and the Brickearth Clay, and then extend about 2m into the Sand & Gravel. The sides of the excavation will need to be supported and this may be achieved using steel sheet piles or contiguous-bored concrete piles. Concrete piles are preferable since the piles can also be used to support the building. Ground water was not present at this time. It is anticipated that ground water is unlikely to be present at other times of the year, at the envisaged 3m deep excavation depth.

Consideration has been given to using a Raft foundation at basement level. However, the structural loads and layout create non-uniform pressures and a thick raft would be necessary. A more satisfactory foundation system would be to use Piles. Rotary augered piles could be used and would require the installation of a length of 5m to 6m of temporary casing. Alternatively, continuous flight auger concrete-injected piles are suitable.

The load capacity of both types of Pile is calculated from the measured soil strength. The relationship of Strength with Depth is illustrated on the enclosed graph. It should be noted that the cohesion of the clay was determined in the Laboratory using 100mm diameter test specimens.

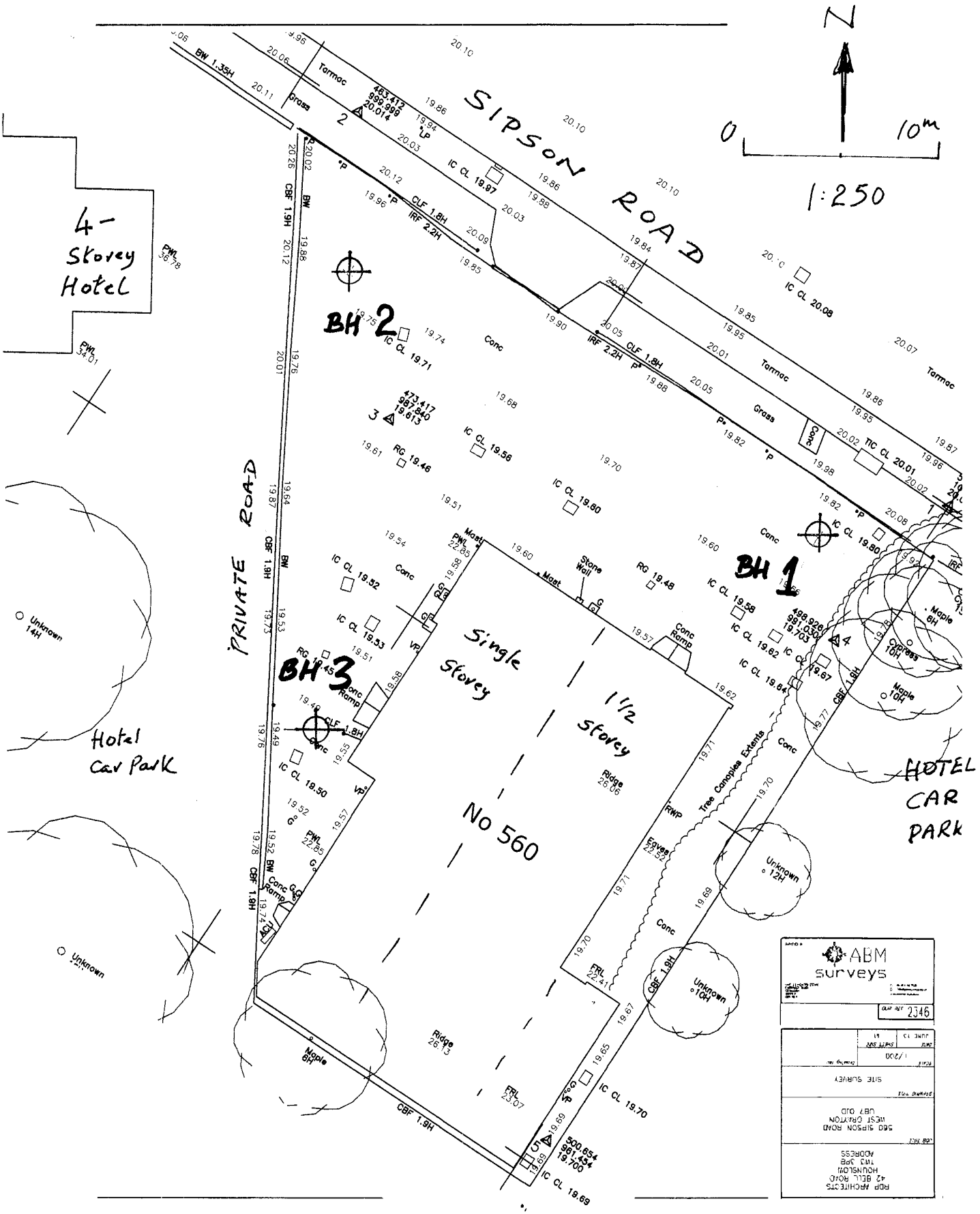
7.0 Ground Gas

The likelihood of gas migrating from external sources into the site has been assessed as most unlikely. According to the BRE Radon guide, Radon Gas is not expected to be present in this Geographical area.

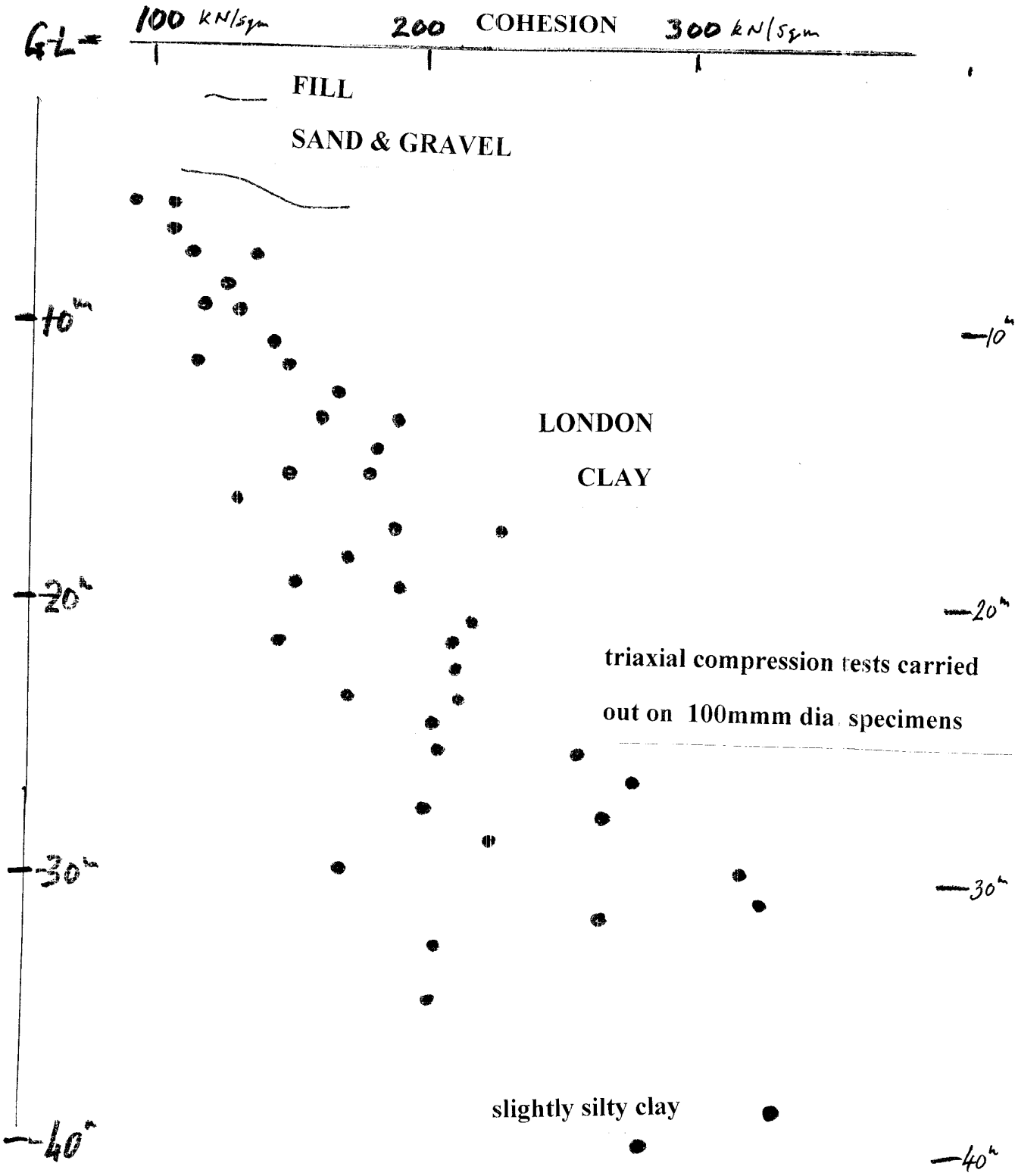
8.0 Excavation and Spoil Disposal

Waste Acceptance Criteria tests were carried out and will be reported later.

GROUND INVESTIGATION REPORT for development at 560, SIPSON ROAD, WEST DRAYTON, MIDDX, UB7 0JD



STRENGTH of SOIL in relation to DEPTH



Client	Project	Borehole No.
HAYRE GROUP	560, SIPSON ROAD	1
Engineer	WEST DRAYTON, UB7 0JD	**Elevation**
		19.7m site datum
Borehole Type		**Date**
Cable percussive		22 & 23 -sep-16

Legend	Depth (m)	Description	Samples/ Tests			
		200mm reinf. Concrete over stiff clay fill				
	0.40		B	0.3		
		"very stiff" pale brown silty sandy clay - desiccated	J	0.6		
	0.70		CPT/B	1.0	12,28, 36 for 50mm casing at 1.0 - dry	N=100+
		dense Sand and gravel				
			CPT/B	2.0	2,4, 6,7,10,12 casing at 2.0m wl=1.7	N=35
		...becoming Gravel and sand	CPT/B	3.0	3,5, 7,8,10,11 casing at 3.0 wl=2.6	N=36
			CPT/B	4.0	2,3, 3,5,8,9 casing at 4.0 wl=3.2	N=25
	5.70		CPT/B	5.0	3,4, 6,7,7,8 casing at 5.0 wl=4.8	N=28
		stiff brown clay	U	6.3		Cu=109
	6.30		U	8.0		Cu=129
		stiff grey fissured clay	U	10.0		Cu=144
			U	12.0		Cu=170
	13.00		U	14.0		Cu=184
		very stiff grey fissured clay	U	16.0		Cu=131
			U	18.0		Cu=173
		...claystone at 19,4m, chiselling for 30 minutes	U	20.4		Cu=220
			U	22.0		Cu=213
			U	24.0		Cu=205
			U	26.0		Cu=280
			U	28.0		Cu=228
		...claystone at 30.1m, chiseling for 30 minutes	U	30.5		Cu=328
			U	32.0		Cu=208
		....claystone at 33.5m, chiseling for 20 minutes	U	34.0		Cu=205
			U	36.0		Cu=190
	37.00					
		hard grey slightly silty clay	U	38.0		Cu=334
	40.00	...end of borehole	U	39.5		Cu=282

Remarks

Borehole located near northeast corner of site, medium-sized Conifer trees in adjacent site.
water was necessarily added to assist boring from 0.7m to 5.7m

ground water was not encountered

150mm diameter temporary casing inserted in stages to support sides of borehole

Observation pipe installed to 6.0m depth - subsequent readings - no water in pipe

Client	Project	Borehole No.
HAYRE GROUP	560, SIPSON ROAD	2
Engineer	WEST DRAYTON. UB7 0JD	**Elevation**
		19.5m site datum
Borehole Type		**Date**
Cable percussive		08 & 09-sep-16

Legend	Depth (m)	Description	Samples/ Tests			
		200mm reinf. Concrete over stiff clay fill				
	0.70	stiff pale brown silty sandy clay	B	0.3		
			J	0.8		
			CPT/B	1.0	3,6, 9,12, 14,15 casing at 1.0 - dry	N=60+
	1.30	dense Sand and gravel				
			CPT/B	2.0	4,7, 9,10,11,11 casing at 2.0m wl=1.7	N=41
		...becoming Gravel and sand	CPT/B	3.0	2,3, 5.6.7.9 casing at 3.0m wl=2.3	N=27
			CPT/B	4.0	4,5, 7,7, 6,4 casing at 4.0m wl=3.7	N=28+
	4.40	stiff brown clay				
	4.90	stiff grey fissured clay	U	5.2		Cu=93
			U	7.0		Cu=116
			U	9.0		Cu=120
			U	11.0		Cu=118
	13.00	very stiff grey fissured clay	U	13.0		Cu=191
			U	15.0		Cu=152
			U	17.0		Cu=191
			U	19.0		Cu=156
			U	21.0		Cu=214
			U	23.0		Cu=176
			U	25.1		Cu=260
			U	27.5		Cu=201
		....small claystones from 30.0 to 33.5m	U	29.5		Cu=172
			U	31.0		Cu=270
	33.50	....end of borehole	U	33.0		Cu=118

Remarks

Borehole located near southwest corner of site
water was necessarily added to assist boring from 1.0m to 4.3m
ground water was not encountered
150mm diameter temporary casing inserted in stages to support sides of borehole
Observation pipe installed to 4.5m depth. Subsequent readings - no water in pipe

Client	Project	Borehole No.
HAYRE GROUP	560, SIPSON ROAD	3
Engineer	WEST DRAYTON, UB7 0JD	**Elevation**
		19.5m site datum
Borehole Type		**Date**
Cable percussive		07-Sep-16

Legend	Depth (m)	Description	Samples/ Tests			
		200mm reinf. Concrete over stiff clay fill				
	0.50		B	0.3		
		stiff pale brown silty sandy clay				
	0.80		CPT/B	1.0	1,5, 7,8,9.9 casing at 1.0 - dry	N=33
		dense Sand and gravel				
			CPT/B	2.0	3,5, 8,10,11,13 casing at 2.0m wl=1.7	N=42
		...becoming Gravel and sand	CPT/B	3.0	3,3, 6,8,10,11 casing at 3.0m wl=2.3	N=35
			CPT/B	4.0	3,4, 7,9, 6,4 casing at 4.0m wl=3.7	N=32+
	4.30					
		stiff brown clay				
	4.80		U	5.2		Cu=109
		stiff grey fissured clay	U	7.0		Cu=139
		....claystone at 7.8m, chiseling for 30 minutes	U	9.0		Cu=132
			U	11.0		Cu=152
	13.00		U	13.0		Cu=164
		very stiff grey fissured clay	U	15.0		Cu=182
			U	17.0		Cu=231
			U	19.0		Cu=194
			U	21.0		Cu=149
			U	23.0		Cu=215
			U	25.0		Cu=207
			U	27.5		Cu=270
		....claystone at 26.7m, chiselling for 30 minutes	U	29.5		Cu=322
		....claystone at 29.8m				
	30.00	..end of borehole				

Remarks

Borehole located near southwest corner of site
water was necessarily added to assist boring from 1.0m to 4.3m
ground water was not encountered
150mm diameter temporary casing inserted in stages to support sides of borehole
Observation pipe installed to 4.5m depth. Subsequent readings - no water in pipe

Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure
Summary of Results

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test

Job No.	Project Name	Programme	
21557	Sipson Road, West Drayton	Samples received	08/09/2016
		Schedule received	07/09/2016
Project No.	Client	Project started	09/09/2016
-	Simon Quarrell	Testing Started	19/09/2016

Hole No.	Sample Ref	Top	Base	Type	Soil Description	Test Type	Density bulk Mg/m3	Density dry Mg/m3	w %	Length mm	Diameter mm	σ3 kPa	At failure: Axial strain %	σ1 - σ3 kPa	cu kPa	Mode	Remarks
BH1	-	6.30	-	U	High strength fissured dark grey silty CLAY	UU	2.01	1.58	27	198	102	125	9.1	219	109	C	
BH1	-	8.00	-	U	High strength fissured dark grey silty CLAY with light grey fine sand pockets	UU	2.03	1.61	26	198	102	140	7.6	259	129	B	
BH1	-	10.00	-	U	High strength fissurec dark grey silty CLAY with light grey fine sand pockets	UU	2.02	1.60	26	198	102	200	8.6	289	144	B	
BH1	-	12.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.07	1.64	26	198	102	240	6.6	341	170	B	
BH1	-	14.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.07	1.67	24	198	102	280	7.6	369	184	B	
BH1	-	16.00	-	U	High strength fissured dark grey silty CLAY	UU	2.03	1.63	25	198	102	320	4.5	262	131	B	
BH1	-	18.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.05	1.63	26	198	102	360	4.5	346	173	B	
BH1	-	20.40	-	U	Very high strength fissured dark grey silty CLAY	UU	2.03	1.60	27	198	102	408	4.5	441	220	B	
BH1	-	22.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.05	1.62	27	198	102	440	7.6	426	213	B	
BH1	-	24.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.06	1.64	25	198	102	480	3.5	410	205	B	
BH1	-	26.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.04	1.65	24	198	102	520	5.6	559	280	B	
BH1	-	28.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.03	1.62	25	198	102	560	7.1	455	228	B	
BH1	-	30.50	-	U	Extremely high strength fissured dark grey silty CLAY	UU	2.08	1.67	25	198	102	610	6.6	656	328	B	Disturbed

Legend
UU - single stage test (single and multiple specimens)
UUM - Multistage test on a single specimen
suffix R - remoulded or recompacted

σ3 Cell pressure
σ1 - σ3 Maximum corrected deviator stress
cu Undrained shear strength, ½ (σ1 - σ3)

Mode of failure ; B - Brittle, P - Plastic, C - Compound

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: james@k4soils.com

Checked and Approved
Initials: J.P
Date: 30/09/2016

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure
Summary of Results

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test

Job No.	Project Name	Programme	
21557	Sipson Road, West Drayton	Samples received	08/09/2016
		Schedule received	07/09/2016
Project No.	Client	Project started	09/09/2016
-	Simon Quarrell	Testing Started	19/09/2016

Hole No.	Sample Ref	Top	Base	Type	Soil Description	Test Type	Density bulk Mg/m3	Density dry Mg/m3	w %	Length mm	Diameter mm	σ3 kPa	At failure: Axial strain %	σ1 - σ3 kPa	cu kPa	Mode	Remarks
BH1	-	32.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.07	1.65	26	198	102	640	5.1	416	208	B	
BH1	-	34.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.07	1.65	25	198	102	680	3.5	411	205	B	
BH1	-	36.00	-	U	Very high strength fissured dark grey silty CLAY	UU	1.94	1.54	26	198	102	720	4.0	380	190	B	Very disturbed
BH1	-	38.00	-	U	Extremely high strength fissured dark grey silty CLAY with light grey fine sand partings	UU	2.05	1.67	23	198	102	760	5.6	668	334	B	Very disturbed
BH1	-	39.50	-	U	Very high strength fissured dark grey silty CLAY	UU	1.98	1.62	22	198	102	790	5.6	564	282	B	
BH2	-	5.20	-	U	High strength fissured dark grey silty CLAY	UU	2.00	1.57	28	198	102	104	10	186	93	C	
BH2	-	7.00	-	U	High strength fissured dark grey silty CLAY	UU	1.96	1.54	28	198	102	140	9.6	232	116	B	
BH2	-	9.00	-	U	High strength fissured dark grey silty CLAY	UU	1.95	1.54	27	198	102	180	12	240	120	B	Slightly disturbed
BH2	-	11.00	-	U	High strength fissured dark grey silty CLAY	UU	2.02	1.60	26	198	102	220	4.5	236	118	B	Slightly disturbed
BH2	-	13.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.08	1.67	25	198	102	260	5.6	381	191	B	
BH2	-	15.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.04	1.64	25	198	102	300	4.0	304	152	B	Disturbed
BH2	-	17.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.03	1.61	26	198	102	340	5.1	382	191	B	
BH2	-	19.00	-	U	Very high strength fissured dark grey silty CLAY	UU	1.98	1.57	26	198	102	380	8.6	312	156	B	

Legend
UU - single stage test (single and multiple specimens)
UUM - Multistage test on a single specimen
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σ3 Cell pressure
σ1 - σ3 Maximum corrected deviator stress
cu Undrained shear strength, ½ (σ1 - σ3)

Mode of failure ; B - Brittle, P - Plastic, C - Compound

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
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Date: 30/09/2016

Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure
Summary of Results

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test

Job No.	Project Name	Programme	
21557	Sipson Road, West Drayton	Samples received	08/09/2016
		Schedule received	07/09/2016
Project No.	Client	Project started	09/09/2016
-	Simon Quarrell	Testing Started	19/09/2016

Hole No.	Sample				Soil Description	Test Type	Density		w	Length	Diameter	σ3	At failure				Remarks
	Ref	Top	Base	Type			bulk	dry					Axial strain	σ1 - σ3	cu	Mode	
							Mg/m3		%	mm	mm	kPa	%	kPa	kPa		
BH2	-	21.00	-	U	Very high strength fissured dark grey silty CLAY with rare scattered shell deposits	UU	2.02	1.59	27	198	102	420	8.6	428	214	B	
BH2	-	23.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.07	1.62	27	198	102	460	3.0	351	176	B	
BH2	-	25.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.02	1.60	27	198	102	300	5.1	520	260	B	
BH2	-	27.50	-	U	Very high strength fissured dark grey silty CLAY	UU	1.96	1.57	25	198	102	540	5.6	402	201	B	Very disturbed
BH2	-	29.50	-	U	High strength fissured dark grey silty CLAY	UU	1.84	1.47	25	198	102	590	9.1	344	172	C	Very disturbed
BH2	-	31.00	-	U	Very high strength slightly fissured dark grey silty CLAY	UU	2.03	1.63	25	160	102	620	7.5	540	270	B	
BH2	-	33.00	-	U	High strength dark grey silty CLAY	UU	2.00	1.60	25	198	102	660	6.1	236	118	B	Disturbed
BH3	-	5.20	-	U	High strength fissured dark grey silty CLAY	UU	2.00	1.58	27	198	102	104	9.1	219	109	C	
BH3	-	7.00	-	U	High strength fissured dark grey silty CLAY	UU	2.02	1.58	28	198	102	140	7.6	277	139	B	
BH3	-	9.00	-	U	High strength fissured dark grey silty CLAY	UU	2.04	1.60	27	198	102	180	6.6	263	132	B	
BH3	-	11.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.05	1.64	26	198	102	220	3.5	303	152	B	
BH3	-	13.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.08	1.67	24	198	102	260	9.1	327	164	B	
BH3	-	15.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.06	1.67	24	198	102	300	7.1	364	182	B	

Legend
UU - single stage test (single and multiple specimens)
UUM - Multistage test on a single specimen
suffix R - remoulded or recompacted
σ3 Cell pressure
σ1 - σ3 Maximum corrected deviator stress
cu Undrained shear strength, ½ (σ1 - σ3)
Mode of failure ; B - Brittle, P - Plastic, C - Compound

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
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Checked and Approved
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Date: 30/09/2016

Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure
Summary of Results

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test

Job No.	Project Name	Programme	
21557	Sipson Road, West Drayton	Samples received	08/09/2016
		Schedule received	07/09/2016
Project No.	Client	Project started	09/09/2016
-	Simon Quarrell	Testing Started	19/09/2016

Hole No.	Sample Ref	Sample Top	Sample Base	Sample Type	Soil Description	Test Type	Density bulk Mg/m3	Density dry Mg/m3	w %	Length mm	Diameter mm	σ3 kPa	At failure: Axial strain %	At failure: σ1 - σ3 kPa	At failure: cu kPa	At failure: Mode	Remarks
BH3	-	17.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.04	1.62	26	198	102	340	9.1	462	231	B	
BH3	-	19.00	-	U	High strength fissured dark grey silty CLAY	UU	2.01	1.60	26	198	102	380	5.1	389	194	B	
BH3	-	21.00	-	U	High strength fissured dark grey silty CLAY	UU	2.01	1.59	26	198	102	420	4.0	297	149	B	Disturbed
BH3	-	23.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.04	1.61	26	198	102	460	4.5	431	215	B	Slightly disturbed
BH3	-	25.00	-	U	Very high strength fissured dark grey silty CLAY	UU	2.02	1.62	25	198	102	500	5.1	414	207	B	
BH3	-	27.50	-	U	Very high strength fissured dark grey silty CLAY	UU	2.05	1.63	26	198	102	550	7.1	539	270	B	
BH3	-	29.50	-	U	Extremely high strength slightly fissured dark grey silty CLAY	UU	2.04	1.63	25	198	102	590	9.1	643	322	B	

Legend
UU - single stage test (single and multiple specimens)
UUM - Multistage test on a single specimen
suffix R - remoulded or recompacted
σ3 Cell pressure
σ1 - σ3 Maximum corrected deviator stress
cu Undrained shear strength, ½ (σ1 - σ3)
Mode of failure ; B - Brittle, P - Plastic, C - Compound

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
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UKAS

Checked and Approved
Initials: J.P
Date: 30/09/2016

Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No.	Project Name	Programme	
21557	Sipson Road, West Drayton	Samples received	08/09/2016
		Schedule received	07/09/2016
Project No.	Client	Project started	09/09/2016
-	Simon Quarrell	Testing Started	29/09/2016

Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top	Base	Type		%	%	%	%	%	
BH1	2	0.60	-	D	Brown and light brown slightly fine sandy slightly gravelly silty CLAY with occasional black flecks (gravel is fm and sub-angular)	12	80	45	19	26	Desiccated

UKAS TESTING 2519

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3 and 5.0

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
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Initials J.P
Date: 30/09/2016

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results

Tested in accordance with BS1377 : Part 3 : 1990, clause 5.3 and clause 9

Job No.	Project Name	Programme	
21557	Sipson Road, West Drayton	Samples received	08/09/2016
		Schedule received	07/09/2016
Project No.	Client	Project started	09/09/2016
-	Simon Quarrell	Testing Started	22/09/2016

Hole No.	Sample				Soil description	Dry Mass passing 2mm	SO3 Content	SO4 Content	pH	Remarks
	Ref	Top	Base	Type		%	g/l	g/l		
BH1	-	6.30	-	U	High strength fissured dark grey silty CLAY	100	0.51	0.62	7.80	
BH1	-	8.00	-	U	High strength fissured dark grey silty CLAY with light grey fine sand pockets	100	0.45	0.54	7.79	
BH2	-	5.20	-	U	High strength fissured dark grey silty CLAY	100	0.43	0.51	8.02	
BH2	-	7.00	-	U	High strength fissured dark grey silty CLAY	100	0.45	0.54	8.03	
BH3	-	5.20	-	U	High strength fissured dark grey silty CLAY	100	0.71	0.85	8.00	
BH3	-	7.00	-	U	High strength fissured dark grey silty CLAY	100	0.78	0.94	8.02	

Test Report by K4 SOILS LABORATORY
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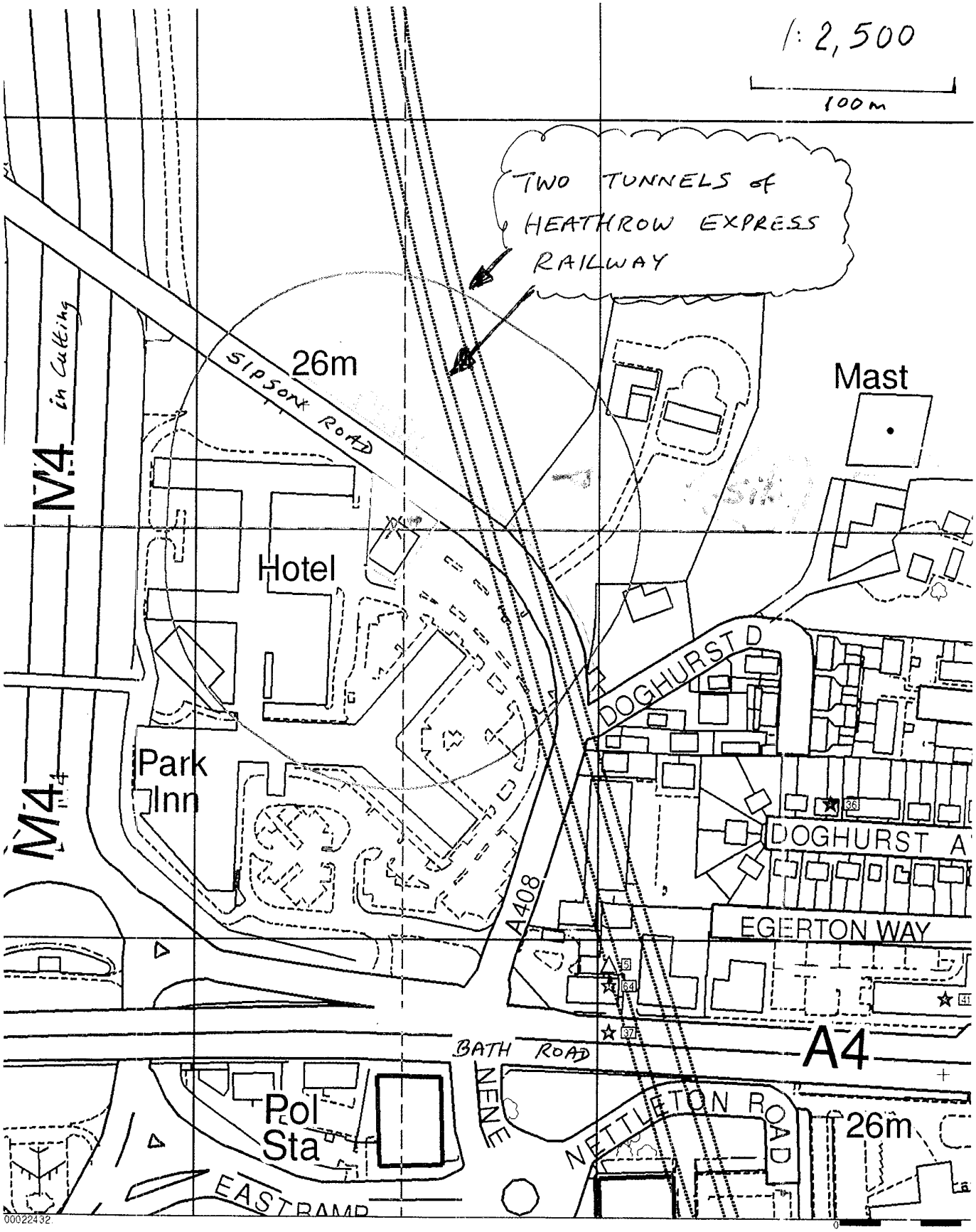
Initials J.P
Date: 30/09/2016

UKAS TESTING 2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

GROUND INVESTIGATION REPORT for development at
560, SIPSON ROAD, WEST DRAYTON, MIDDX, UB7 0JD

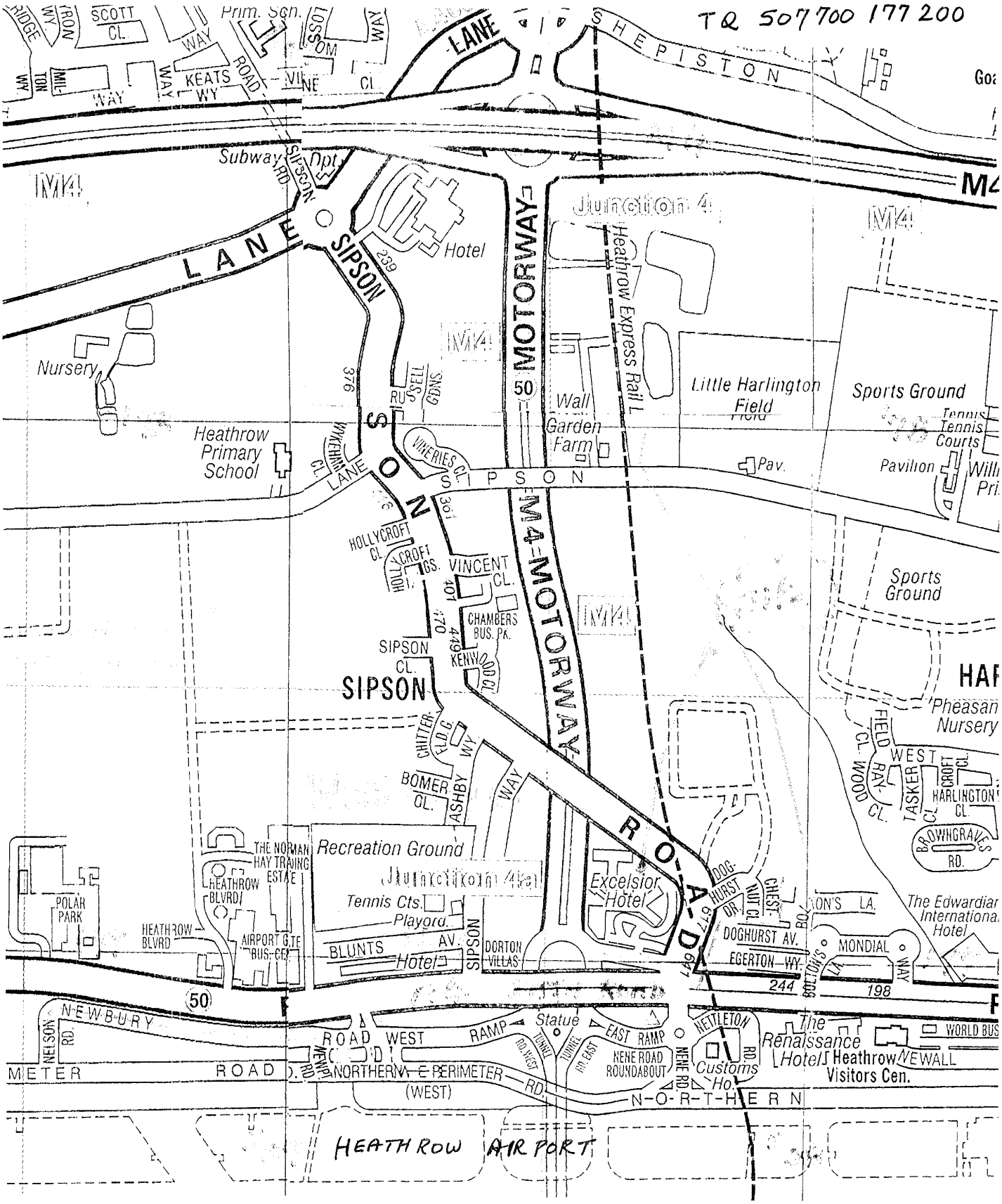


Simon Quarrell Geotechnical Engineer

September 2016

GROUND INVESTIGATION REPORT for development at 560, SIPSON ROAD, WEST DRAYTON, MIDDX, UB7 0JD

National Grid Reference
TQ 507700 177200



Simon Quarrell Geotechnical Engineer

September 2016

PATRICK PARSONS

CREATING PLACES FOR FUTURE GENERATIONS TO THRIVE

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