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Email: gasiltd@btinternet.com

GA Site Investigation Limited

GA1027.20

19th February 2020

Mr M Siddall
9 Tarn Moor Crescent
Skipton
BD23 1LT

Dear Sir,

SITE INVESTIGATION: 9 TARN MOOR CRESCENT, SKIPTON, BD23 1LT

Further to your instructions we have attended the above site and undertaken a series of four (4no) dynamic sampling boreholes and associated in-situ soil testing in the area of the existing building which is to be demolished, ground level reduced and a new detached dwelling constructed with 'street level' access.

The existing building is located on an elevated position above Tran Moor Crescent, with access to it being via a sloping concrete driveway to the south side of the plot, or via pedestrian access steps roughly central to the front elevation and off Tarn Moor Crescent.

The dwelling, based on the topographical survey plan provided in the original tender enquiry, rises by c.3-4m from road level to the front elevation of the building, and by another 1-2m to the rear garden area. It is intended to construct a new detached dwelling over the general footprint area of the existing building, but with the frontage being formed at the lower road level, c.3-4m below exiting front of building ground level.

Limitations of Investigation:

All comments, opinions and recommendations contained in this report are solely based on the information obtained from the intrusive investigation, in-situ and laboratory testing of soils undertaken as part of this investigation. There may however be areas of site where differing substrata conditions are present which have not been identified in this investigation and which may have a bearing on the ground conditions. Should such items be brought to light during any subsequent investigatory or construction operations, we reserve the right to review our report to include the as yet unidentified site conditions accordingly.

This investigation was undertaken to provide information for foundation design use only and is not a contaminated land assessment for the site as this is beyond the brief of the works undertaken.

Full limitations contained in Appendix D.

Site Work:

The boreholes were excavated using a track mounted dynamic drilling rig with in-situ standard penetration tests being taken through the length of the excavation. Boreholes were lined with steel casing to prevent their collapse during drilling.

The indicative locations of the boreholes are contained in Appendix A.

The standard penetration test (SPT) comprises recording the number of blows required from a falling drive mass of 63.5-kilogram weight, falling through a constant drop of 0.76m, to drive an "open spoon sampler" 0.30m into the deposits under test, after an initial penetration of 0.15m has been achieved. The recorded resistance to penetration, number of blows for 0.30m penetration, known as the N_{300} value, allows determination of the compactness of the deposits to be undertaken.

The super heavy dynamic probe test [SHDP] comprises recording the number of blows required from a falling drive mass of 63.5-kilogram weight, falling through a constant drop of 0.76m, to drive a solid 50mm diameter steel probe

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tip, of 90-degree angle, 0.10m into the deposits under test. The recorded resistance to penetration, number of blows, allows determination of the compactness of the deposits to be undertaken.

Borehole Findings:

The boreholes, referenced BH1 to BH4 inclusive, were to the front left (SE) and both rear (NW and SW) corners of the building, with the fourth being located approximately mid-way along the front elevation due to access restriction to the NE corner.

The boreholes encountered similar strata, with 0.30m of Topsoil (BH2-BH4) and 0.50m of Made Ground (BH1) overlying natural sandy gravelly Clay (Glacial Till).

The Till deposits were formed up to 2 million years ago during the Quaternary Period when the local environment was dominated by ice age conditions. These are sedimentary deposits of glacial origin comprising detrital created by the action of ice and meltwater, and can for a wide range of geomorphologies associated with glacial and inter-glacial periods.

The natural Clay deposits extend to in excess of 5.00m below ground level, and are considered to be a Boulder Clay.

In-situ Testing:

Standard Penetration Tests (SPT):

Standard penetration tests were undertaken in the boreholes with SPT N_{300} values ranging from 12 to 22 being recorded. These give the Clay deposits an allowable bearing capacity of 125kN/m^2 for foundation design purposes

Groundwater:

No groundwater was encountered during the drilling operations.

Borehole Records:

Details of the strata encountered, their thickness, depth and description, together with the depth and results of sampling and testing, are contained in Appendix B.

LABORATORY ANALYSIS:

Geotechnical laboratory testing was carried out on selected samples in accordance with techniques and procedures outlined in BS 1377:1990.

Atterberg Limit Determination:

Selected samples of the deposits recovered from the holes excavated were subjected to Atterberg limit and 425um sieve analysis to establish their soil classifications and stone content. The results of the tests were as follows:

BOREHOLE NUMBER	DEPTH m	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT %	% PASSING 425um	PLASTICITY INDEX	CASAGRANDE CLASSIFICATION
1	1.00	53	26	29[31]	90	27(24)	CH
2	3.00	43	20	15[17]	89	23(21)	CI
3	3.50	40	18	15[16]	90	22(20)	CI
4	3.00	38	16	14[17]	84	22(19)	CI

CI = Inorganic Clays of medium plasticity

CH = Inorganic Clays of high plasticity

The Atterberg Limit test was carried out in accordance with BS 1377: Part 2: 1990 - Test 4.4 [One-point cone penetrometer method], with the Plastic Limit test being carried out in accordance with Test 5 of BS 1377: Part 2: 1990.

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The results in brackets [] indicate the corrected equivalent moisture content values, as in accordance with BS 1377: Part 2: 1990, section 3.2.4., and allows for the percentage of the test specimen retained on the 425um test sieve during sample preparation. The retained material being assumed to be non-shrinkable in nature with insignificant individual moisture content, when compared with the whole sample.

The results in () are the Modified Plasticity Index (I_p) in accordance with NHBC Chapter 4.2 'building near trees' and are related to the volume change potential for cohesive soils taking into account the percentage of test specimen retained on the 425um test sieve during sample preparation.

Chemical Analysis:

Samples of the recovered stratum were forwarded to i2 Analytical, a UKAS Accredited laboratory, where they were subjected to chemical analysis to determine potential harmful sulphate levels. The results of the tests are presented in Appendix C and are summarised in the following table:

Water Soluble Sulphate as SO ₄ mg/l	Total Sulphate as SO ₄ %	pH	BRE SD1 Design Class (DS)	BRE SD1 ACEC Class
19.2-185	0.030-0.067	7.2-8.2	DS-1	AC1

The above results indicate insufficient sulphate present to cause sulphate attack on concrete or mortar containing ordinary Portland cement.

Conclusions and Comment:

From the evidence of the intrusive excavations undertaken, the site is underlain by natural cohesive deposits to in excess of 5.00m bgl. For foundations formed in the natural Clay deposits an allowable ground bearing capacity of 125kN/m² should be adopted for foundation design.

The cohesive deposits contain fine tree roots to circa 1.00m to 1.50m bgl. The mass excavation of substrata deposits to create the building with street side access will remove the upper apparently desiccated cohesive deposits, with potential ground swelling heave beneath the proposed building being then considered negligible in new foundation design.

Excavation depths of 4.0m, or more, are likely beneath the area of the existing building, and possibly greater depths to the rear of it depending on the final building shape to the rear. Whilst the Clay deposits should remain stable in open excavation over short time periods, the mass excavation of the substrata will lead to a significant increase in the risk of localised landslip both on site and to the immediate adjacent sloping sites. Provision of suitable permanent embankment support will be required to prevent their collapse and reduce the risk of landslip caused by the mass excavation of the embankment.

Sheet or contiguous piled walls would be one method for dealing with the potential for trench collapse and or landslip, and such piles could be incorporated into the retaining walls and building walls, removing the need for the construction of large reinforced retaining walls long these elevations. The suitability of such piling methods would need to be discussed with a piling contractor as to access, depths, the effects these would have on adjacent properties during installation, etc.

Alternatively, the use of conventional retaining walls could be considered, with walls being formed in sections to reduce the length of exposed vertical Clay/embankment and risk of landslip. Any retaining wall would need to be designed to withstand overturning and be capable of supporting the newly formed vertical Clay embankment faces. They will also need to take into account the potential risk open, initially unsupported mass excavation would have on the adjacent properties with regards removal or reduction in existing lateral ground support they provide to buildings.

Potential swelling of the Clay deposits in the 1.50m to 2.00m of strata is present and any proposed retaining walls to the high sides of the proposed building remains to these depths. Anti-heave protection will be required between the exposed vertical Clay faces and rear elevation of the building/retaining walls, to accommodate any potential heave

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forces. The thickness of anti-heave protection should be based on NHBC Chapter 4.2 guideline, using a modified plasticity index medium volume change potential. This requires the use of at least 100mm thickness of anti-heave protection.

Yours faithfully,

G M Anderson
GA Site Investigation Limited

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APPENDIX A BOREHOLE LOCATIONS

Director: G.M. ANDERSON

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Company Registration Number: 6998509 Vat Registration Number: 977 9732 42

SITE ADDRESS	9 Tarn Moor Crescent, Skipton, BD23 1LT	CONTRACT No.	GA1027.20
CLIENT	Mr M Siddall	TITLE	Indicative Borehole Locations



DRAWN BY		DATE	
GMA		24 th January 2020	
SCALE	Not to scale	SHEET	1/1
GA Site Investigation Limited 76 Thames Avenue Guisborough North Yorkshire TS14 8LR Tel: 07875 761 729			

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APPENDIX B BOREHOLE RECORDS

Director: G.M. ANDERSON

Registered Office: 76 Thames Avenue, Guisborough, North Yorkshire, TS14 8AR
Company Registration Number: 6998509 Vat Registration Number: 977 9732 42

GA Site Investigation Ltd

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Site
9 Tarn Moor Crescent, Skipton, BD23 1LT

Number
BH1

Excavation Method
Dynamic windowless
sampling borehole

Dimensions
116mm to 2.00m
102mm to 5.00m

Ground Level (mOD)

Client
Mark Siddall
















































































































































Job Number
GA1027.20

Location

Dates
24/01/2020

Project Contractor
GA Site Investigation Limited

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50-0.60	D1 m/c=33%				(0.10) 0.10 (0.20) 0.30 (0.20) 0.50	CONCRETE Loose to medium dense brown fine to coarse gravel of concrete, sandstone and broken concrete paving: (MADE GROUND) Loose brown silty gravelly fine sand with rare coal fragments: (MADE GROUND) Firm brown and grey mottled silty sandy slightly gravelly CLAY with roots to 1.50m	   	
1.00-1.45 1.00-1.10	SPT N=15 D2 m/c=17%		2,2/3,3,5,4		(1.10)		                          	
1.60-1.70	D3 m/c=18%				1.60	Stiff dark grey silty sandy gravelly BOULDER CLAY	                      	
2.00-2.45 2.00-2.10	SPT N=22 D4 m/c=18%		3,4/4,5,6,7				                     	
2.50-2.60	D5 m/c=14%						                  	
3.00-3.45 3.00-3.10	SPT N=16 D6 m/c=14%		2,3/3,4,4,5		(3.40)		               	
3.50-3.60	D7 m/c=15%						            	
4.00-4.45 4.00-4.10	SPT N=17 D8 m/c=14%		2,3/3,4,5,5				          	
4.50-4.60	D9 m/c=14%				5.00		       	

Remarks

Scale (approx)
1:25

Logged By
SH

Figure No.
GA1027.20.BH1

GA Site Investigation Ltd

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Guisborough
TS14 8AR
Tel: 07875 761 729

Site
9 Tarn Moor Crescent, Skipton, BD23 1LT

Number
BH2

Excavation Method
Dynamic windowless
sampling borehole

Dimensions
116mm to 2.00m
102mm to 5.00m

Ground Level (mOD)

Client
Mark Siddall

Job Number
GA1027.20

Location

Dates
24/01/2020

Project Contractor
GA Site Investigation Limited

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.40	D1 mc=35%				(0.30)	Loose dark brown sandy gravelly TOPSOIL with roots		
					0.30	Firm brown and grey mottled silty sandy slightly gravelly CLAY with roots		
0.90-1.00	D2 m/c=23%		2,2/2,3,3,4		(0.60)			
1.00-1.45	SPT N=12				0.90	Stiff brown and grey silty sandy gravelly CLAY with fine roots to 1.50m		
					(0.60)			
1.50-1.60	D3 m/c=19%				1.50	Stiff dark grey silty sandy gravelly CLAY		
					(0.50)			
2.00-2.45	SPT N=20		28,14/5,4,5,6		2.00	Stiff dark grey silty sandy gravelly BOULDER CLAY		
2.00-2.10	D4 m/c=17%							
2.10-2.20	D5 m/c=20%							
2.50-2.60	D6 m/c=21%							
3.00-3.45	SPT N=14		2,2/3,3,4,4					
3.00-3.10	D7 m/c=15%							
3.50-3.60	D8 m/c=15%				(3.00)			
4.00-4.45	SPT N=17		2,3/3,4,4,6					
4.00-4.10	D9 m/c=15%							
4.50-4.60	D10 m/c=17%							
					5.00			

Remarks

Scale (approx)

1:25

Logged By

SH

Figure No.

GA1027.20.BH2

GA Site Investigation Ltd				76 Thames Avenue Guisborough TS14 8AR Tel: 07875 761 729		Site 9 Tarn Moor Crescent, Skipton, BD23 1LT		Number BH3	
Excavation Method Dynamic windowless sampling borehole		Dimensions 116mm to 2.00m 102mm to 5.00m		Ground Level (mOD)		Client Mark Siddall		Job Number GA1027.20	
		Location		Dates 24/01/2020		Project Contractor GA Site Investigation Limited		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.10-0.20	D1 m/c=40%		2,2/3,3,4,5		(0.30)	Loose dark brown sandy gravelly TOPSOIL with roots			
0.30-0.40	D2 m/c=38%				0.30	Firm brown and grey mottled silty sandy slightly gravelly CLAY with roots to 1.00m			
0.50-0.60	D3 m/c=31%				(0.80)				
1.00-1.45	SPT N=15				1.10				
1.10-1.20	D4 m/c=18%				(0.60)	Stiff brown and grey silty sandy gravelly CLAY			
1.70-1.80	D5 m/c=17%				1.70	Stiff dark grey silty sandy gravelly BOULDER CLAY			
2.00-2.45	SPT N=18	4,4/4,4,5,5							
2.00-2.10	D6 m/c=17%								
2.50-2.60	D7 m/c=14%								
3.00-3.45	SPT N=18	3,4/4,4,5,5							
3.00-3.10	D8 m/c=14%								
3.50-3.60	D9 m/c=15%								
4.00-4.45	SPT N=17	3,3/3,4,4,6							
4.00-4.10	D10 m/c=15%								
4.50-4.60	D11 m/c=15%								
Remarks							Scale (approx) 1:25		Logged By SH
							Figure No. GA1027.20.BH3		

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Site 9 Tarn Moor Crescent, Skipton, BD23 1LT	Number BH4
Client Mark Siddall	Job Number GA1027.20
Project Contractor GA Site Investigation Limited	Sheet 1/1

Excavation Method Dynamic windowless sampling borehole	Dimensions 116mm to 2.00m 102mm to 5.00m	Ground Level (mOD)
	Location	Dates 24/01/2020

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30-0.40	D1 m/c=35%				(0.30)	Loose dark brown sandy gravelly TOPSOIL with roots		
0.50-0.60	D2 m/c=31%				0.30	Firm brown and grey mottled silty sandy slightly gravelly CLAY with roots to 1.40m		
1.00-1.45	SPT N=15		3,3/3,4,4,4		(1.20)			
1.00-1.10	D3 m/c=26%							
1.50-1.60	D4 m/c=17%				1.50	Stiff brown and grey silty sandy gravelly CLAY		
2.00-2.45	SPT N=17		3,3/4,4,4,5		(0.60)			
2.10-2.20	D5 m/c=15%				2.10	Stiff dark grey silty sandy gravelly BOULDER CLAY		
2.50-2.60	D6 m/c=14%							
3.00-3.45	SPT N=18		4,4/4,4,5,5					
3.00-3.10	D7 m/c=14%							
3.50-3.60	D8 m/c=15%				(2.90)			
4.00-4.45	SPT N=19		3,4/4,4,5,6					
4.00-4.10	D9 m/c=15%							
4.50-4.60	D10 m/c=15%							
					5.00			

Remarks	Scale (approx)	Logged By
	1:25	SH
	Figure No. GA1027.20.BH4	

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APPENDIX C CHEMICAL ANALYSIS RESULTS



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Analytical Report Number : 20-84867

Project / Site name:	9 Tarn Moor Cres, Skipton	Samples received on:	05/02/2020
Your job number:	GA-TARN	Samples instructed on:	05/02/2020
Your order number:	GMA	Analysis completed by:	13/02/2020
Report Issue Number:	1	Report issued on:	13/02/2020
Samples Analysed:	3 soil samples		


Signed:

Rachel Bradley

Deputy Quality Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-84867

Project / Site name: 9 Tarn Moor Cres, Skipton

Your Order No: GMA

Lab Sample Number				1432009	1432010	1432011		
Sample Reference				BH1	BH2	BH3		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.50-0.60	0.90-1.00	2.50-2.60		
Date Sampled				24/01/2020	24/01/2020	24/01/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	21	17	9.7		
Total mass of sample received	kg	0.001	NONE	0.56	0.58	0.71		

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.2	8.2	8.2		
Total Sulphate as SO ₄	%	0.005	MCERTS	0.067	0.030	0.090		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.11	0.019	0.18		
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	113	19.2	185		
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	20	1.5	11		
Total Sulphur	%	0.005	MCERTS	0.034	0.027	0.988		
Ammonium as NH ₄	mg/kg	0.5	MCERTS	< 0.5	< 0.5	< 0.5		
Ammonium as NH ₄ (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0		

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	12	7.1	20		
Magnesium (leachate equivalent)	mg/l	2.5	NONE	6.2	3.6	9.8		

Analytical Report Number : 20-84867

Project / Site name: 9 Tarn Moor Cres, Skipton

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1432009	BH1	None Supplied	0.50-0.60	Light brown loam and clay with gravel.
1432010	BH2	None Supplied	0.90-1.00	Brown clay and sand with gravel.
1432011	BH3	None Supplied	2.50-2.60	Brown clay and sand with gravel.

Analytical Report Number : 20-84867

Project / Site name: 9 Tarn Moor Cres, Skipton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonium as NH ₄ in soil	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 °C)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

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GA Site Investigation Limited

APPENDIX D LIMITATIONS OF INVESTIGATION

NOTES ON LIMITATIONS

This report has been prepared by GA Site Investigation Limited with all reasonable skill, care and diligence. This report is confidential and has been prepared solely for the benefit of the client as stated at the front of the report in relation to a specific development or scheme; and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from GA Site Investigation Limited; a charge may be levied against such approval. We accept no responsibility or liability for the consequences of this document being used for any purpose or project other than for which it was commissioned, and: this document to any third party with whom an agreement has not been executed.

Any comments given are based on the understanding that the proposed development will be as detailed. GA Site Investigation Ltd warrants the accuracy of this report up to and including the published date. Additional information, improved practice or changes in legislation may necessitate this report having to be reviewed in whole or in part after that date.

This report is only valid when used in its entirety. Any information or advice included in the report should not be relied upon until considered in the context of the whole report. Whilst this report and the opinion made herein are correct to the best of our belief we cannot guarantee the accuracy or completeness of any information provided by third parties.

The opinions and recommendations expressed in this report are based on statute, guidance, and appropriate practice current at the date of its preparation. GA Site Investigation Limited does not accept any liability whatsoever for the consequences of any future legislative changes or the release of subsequent guidance documentation, etc. Such changes may render some of the opinions and advice in this report inappropriate or incorrect and we will be pleased to advise if any report requires revision due to changing circumstances. Following delivery of a report we have no obligation to advise the Client or any other party of such changes or their repercussions.

Phase 1 Reports

The work undertaken to provide the basis of a Phase I report comprised a study of available documented information from a variety of sources, together with (where appropriate) a brief walk over inspection of the site. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Historical maps and aerial photographs provide a “snap shot” in time about conditions or activities at the site and cannot be relied upon as indicators of any events or activities that may have taken place at other times.

GA Site Investigation Limited

Phase II Intrusive Investigations

The investigation of the site has been carried out to provide sufficient information concerning the potential types of foundations suitable for the proposed development and, where specifically undertaken, the degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made.

The conclusions and recommendations made in this site appraisal report and the opinions expressed are based on the information reviewed and/or the ground conditions encountered in exploratory holes and the results of any field or laboratory testing undertaken. There may be ground conditions at the site that have not been disclosed by the information reviewed or by the investigative work undertaken. Such undisclosed conditions cannot be taken into account in any analysis and reporting.

Some of the conclusions in this site appraisal report may be based on third party data. No guarantee can be given for the accuracy or completeness of any of the third party data used.

The evaluation and conclusions do not preclude the existence of variable ground conditions or ground contamination, which could not reasonably have been revealed by the current work. Given the discrete nature of sampling, no investigation technique is capable of identifying all conditions present in all areas. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised 'poor ground' or "hotspots" of contamination where concentrations may be significantly higher than those actually encountered. Hence this report should be used for information purposes only and should not be construed as a comprehensive characterisation of all site conditions.

It should be noted for potentially 'Brownfield' sites that groundwater levels, groundwater chemistry, surface water levels, surface water chemistry, soil gas concentrations and soil gas flow rates can vary due to seasonal, climatic, tidal and man-made effects.

The interpretation carried out in this report is based on scientific and engineering appraisal carried out by suitably experienced and qualified technical consultants based on the scope of our engagement. We have not taken into account the perceptions of, for example, banks, insurers, other funders, lay people, etc., unless the report has been prepared specifically for that purpose. Advice from other specialists may be required such as the legal, planning and architecture professions, whether specifically recommended in our report or not.

The objectives of the investigation have been linked to establishing the likely foundations requirements for the development or the risks associated with potential human targets, building materials, the environment (including adjacent land), and to surface and ground water. The amount of exploratory work and geotechnical soil and or chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to areas unoccupied by the building(s) on the site and by buried services.