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Additional Geo-Environmental Investigation and Groundwater Monitoring - 102 Camley Street, Camden, NW1 0NF

1. Introduction

REC Ltd has been commissioned to undertake a Phase II Geo-Environmental Intrusive Investigation at 102 Camley Street, Camden, NW1 0NF. It is understood that the proposed development comprises the construction of an 8 to 12 storey residential tower.

REC previously completed the report ref. 20698P1R0 and it is understood that additional intrusive works are required in order to provide information about the depth of the London Clay Formation across the site and to provide supplementary information on groundwater levels.

2. Scope of work

REC attended site in October 2014 to undertake a single day of window sampling across the site. These were located in the areas that were previously inaccessible due to concrete obstructions. A JCB 3CX was utilised in order to break through any concrete obstructions.

Upon completion three of the holes were installed for groundwater monitoring purposes and the remaining hole was backfilled with arisings. A single return monitoring visit was then conducted on the 16th October 2014 in order to verify the groundwater level across the site.

3. Limitations

The limitations to this report are presented in Appendix I.

4. Ground and Groundwater Conditions

4.1. Summary of Ground Conditions

The ground investigation generally confirmed the published geology and identified the strata set out in the table below:

Strata	Min depth to the top of the strata (mbgl)	Max depth to the top of the strata (mbgl)	Max thickness (m)
Made Ground	0.00	0.00	4.70
London Clay Formation (Bedrock Geology)	3.40	4.70	Unproven

Please refer to Attachment 2 for the Engineering Logs.

4.1.1 Made Ground

Made Ground was encountered within all intrusive locations to a maximum proven depth of 4.70mbgl (WS203). This unit was generally variable in composition comprising both gravel and sand with cobble content. Sand was fine to coarse grained. Gravel and cobbles comprised flint, brick, clinker, chalk and concrete.

4.1.2 London Clay Formation

London Clay Formation was encountered in three of the intrusive locations to a maximum unproven depth of 5.20mbgl. This unit was consistent in composition comprising a soft to firm grey or brown clay.

4.1.3 Obstructions Encountered

Two obstructions were encountered within WS202 and TP201. It is believed that a brick / concrete wall structure was situated along the northern boundary of the site. As such WS202 was abandoned due to the depth of the wall. However, TP201 was relocated and referenced as WS201.

4.2 Groundwater Conditions

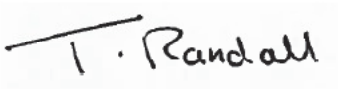
Groundwater was encountered during the intrusive works within the Made Ground in WS201 only at a depth of 2.40mbgl. Groundwater was monitored on a single return visit at 2.34mbgl as presented in the table below:

Hole Location	Groundwater depth (mbgl)	Depth to base (mbgl)
WS201	2.34	2.75
WS202	Dry	3.05
WS204	Dry	4.98

I trust this letter and its enclosures are clear; should you have any further queries please contact the undersigned.

Yours sincerely,

For and on behalf of REC



Troy Randall
Graduate Geo-environmental Consultant
REC
Resource & Environmental Consultants Ltd

Stuart Phillips
Regional Director

Attachment 1
Limitations

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between REC Ltd and the Client as indicated.

2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.

3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.

4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not be made known or accessible.

5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.

6. In addition to the above REC Ltd note that when investigating, or developing, potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and also with time. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas. Additional contamination may be identified following the removal of the buildings or hard standing.

7. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

8. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.

9. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

10. This report presents an interpretation of the geotechnical information established by excavation, observation and testing. Whilst every effort is made in interpretative reporting to assess the soil conditions over the Site it should be noted that natural strata vary from point to point and that man made deposits are subject to an even greater diversity. Groundwater conditions are dependent on seasonal and other factors. Consequently there may be conditions present not revealed by this investigation.

11. REC can not be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by REC is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by REC in this connection without their explicit written agreement there to by REC.

12. Rather, this investigation has been undertaken to provide a preliminary characterisation of the existing sub-surface geotechnical characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

13. This investigation has been undertaken to reasonably characterise existing sub-surface conditions and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

Attachment 2
Geological Logs

Trial Pit Log

REC Resource & Environmental Consultants Ltd

Trialpit No **TP201**

Sheet 1 of 1

Project Name: 102 Camley Street	Project No. 20698	Co-ords: - Level: 0.00	Date 10/10/2014
Location: Camden	Dimensions (m): Depth 1.50	3.00 / 1.25	Scale 1:20
			Logged Dave Hull

Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
Depth	Type	Results				
						Concrete cover of reinforced concrete with rebar and occasional plastic material. (MADE GROUND)
			0.50	-0.50		Pale brown slightly gravelly SAND with cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, brick and occasional concrete fragments. Cobbles content of subangular brick and concrete fragments. (MADE GROUND) *Red and yellow brick wall encountered.* *Occasional rootlets.*
			1.40	-1.40		Pale brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is subangular to subrounded fine to medium flint with occasional red brick fragments. (MADE GROUND)
			1.50	-1.50		End of pit at 1.50 m

Remarks: Prior to intrusive ground investigation a GPR and EM Survey was conducted. No groundwater was encountered. Hole terminated at 1.50mbgl and moved to WS201 due to brick wall encountered.

Stability: Stable

Borehole Log

REC Resource & Environmental Consultants Ltd

Borehole No. **WS201** Sheet 1 of 1

Project Name: 102 Camley Street	Project No. 20698	Co-ords: -	Hole Type WS
Location: Camden		Level: 0.00	Scale 1:25
		Dates: 14/10/2014 - 14/10/2014	Logged By Troy Randall

Back fill / Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Concrete cover of subangular fine to coarse flint with rebar. (MADE GROUND)
					0.40	-0.40		Brown clayey silty GRAVEL and SAND with cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, clinker, brick, chalk and occasional sandstone. Cobbles of angular brick (MADE GROUND)
		0.90	ES		0.80	-0.80		Black slightly gravelly CLAY. Gravel is angular fine to coarse flint and brick. (MADE GROUND)
					1.20	-1.20		No recovery.
					1.70	-1.70		Brown clayey silty GRAVEL and SAND with cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, clinker, brick, chalk and occasional sandstone. Cobbles of angular brick (MADE GROUND)
					1.90	-1.90		Light brown slightly gravelly clayey SAND with relic rootlets. Sand is fine to coarse. Gravel is angular fine flint. (MADE GROUND)
					2.10	-2.10		Red SAND and GRAVEL. Sand is fine to coarse. Gravel is angular fine to coarse brick, chalk and flint. (MADE GROUND)
					2.20	-2.20		No recovery.
					2.40	-2.40		Red very silty SAND and GRAVEL. Sand is fine. Gravel is angular to subrounded fine to coarse brick, flint, chalk and occasional sandstone. (MADE GROUND)
					3.40	-3.40		Soft to firm brown mottled grey CLAY. (LONDON CLAY FORMATION)
					4.20	-4.20		End of borehole at 4.20 m

1 2 3 4 5

Remarks

Prior to intrusive ground investigation a GPR and EM Survey was conducted. Groundwater was encountered at approximately 2.4mbgl. Please note due to underlying concrete and brick structures a JCB Excavator was utilised to a depth of 1.20mbgl.

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Borehole Log

Borehole No. **WS202**

Sheet 1 of 1

Project Name: 102 Camley Street	Project No. 20698	Co-ords: -	Hole Type WS
Location: Camden		Level: 0.00	Scale 1:20
		Dates: 10/10/2014 - 14/10/2014	Logged By Troy Randall

Back fill / Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Concrete cover of angular to rounded fine to coarse flint with rebar. (MADE GROUND)
					0.35	-0.35		Brick fill.
		0.60	ES		0.55	-0.55		Dry and friable greyish brown sandy gravelly CLAY with cobble content. Sand is fine to coarse. Gravel is angular to rounded fine to coarse flint, concrete, brick, flint and chalk. Cobbles of angular flint and brick. (MADE GROUND)
					1.00	-1.00		No recovery.
					1.30	-1.30		Light brown slightly silty SAND and GRAVEL with cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint, brick and chalk. Cobbles of subangular brick. (MADE GROUND)
		1.60	ES		1.50	-1.50		Soft dark brown slightly silty sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, brick and chalk. (MADE GROUND)
					1.90	-1.90		Firm light brown slightly gravelly CLAY. Gravel is subangular fine to medium flint and brick. (MADE GROUND)
					2.00	-2.00		No recovery.
					2.30	-2.30		Firm light brown slightly gravelly CLAY. Gravel is subangular fine to medium flint and brick. (MADE GROUND)
		2.60	ES		2.80	-2.80		Yellow sandstone layer and red brick. (MADE GROUND)
					3.00	-3.00		End of borehole at 3.00 m

Remarks

Prior to intrusive ground investigation a GPR and EM Survey was conducted. Groundwater was not encountered. Please note due to underlying concrete and brick structures a JCB Excavator was utilised to a depth of 1.20mbgl. Hole terminated at 3.0mbgl due to encountering a brick wall.

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Borehole Log

Borehole No. **WS203**

Sheet 1 of 2

Project Name: 102 Camley Street	Project No. 20698	Co-ords: -	Hole Type WS
Location: Camden		Level: 0.00	Scale 1:20
		Dates: 10/10/2014 - 10/10/2014	Logged By Troy Randall

Back fill / Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		1.00	ES					Soft very dry brown slightly sandy slightly gravelly CLAY with cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse brick, brick, flint, glass and chalk. Cobbles of subrounded flint. (MADE GROUND)	1
								Cobbles of subangular brick and flint.	
								Layer of coal.	
								Layer of red brick.	
					1.65	-1.65		Soft light brown greyish slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to medium flint, brick and chalk. (MADE GROUND)	
		2.00		N=8 (1,1/2,2,2,2)	2.00				2
					2.40	-2.40		Soft black slightly sandy slightly gravelly silty CLAY. Sand is fine. Gravel is angular to rounded fine to medium flint and brick. (MADE GROUND)	
		2.50	ES						
					2.90	-2.90		Firm light brown CLAY with roots. (MADE GROUND)	
		3.00		N=10 (1,2/2,2,3,3)	3.00				3
					3.10	-3.10		Soft black slightly gravelly silty CLAY. Gravel is angular to subrounded fine flint and brick. (MADE GROUND)	
					3.20	-3.20		No recovery.	
		4.00		N=12 (2,3/3,2,3,4)	4.00			Continued on next sheet	4

Remarks

Prior to intrusive ground investigation a GPR and EM Survey was conducted. Groundwater was not encountered.

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Borehole Log

Borehole No.
WS203
Sheet 2 of 2

Project Name: 102 Camley Street	Project No. 20698	Co-ords: -	Hole Type WS
Location: Camden		Level: 0.00	Scale 1:20
		Dates: 10/10/2014 - 10/10/2014	Logged By Troy Randall

Back fill / Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					4.10	-4.10		Soft black greyish slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to well rounded fine to medium flint and brick. (MADE GROUND)
					4.40	-4.40		Soft light brown slightly gravelly CLAY. Gravel is subangular brick and flint. (MADE GROUND)
					4.70	-4.70		Soft to firm light brown CLAY. (LONDON CLAY FORMATION)
		4.90	ES					
		5.00		N=14 (2,2/3,3,4,4)	5.00			
					5.20	-5.20		End of borehole at 5.20 m

5
6
7
8

Remarks
Prior to intrusive ground investigation a GPR and EM Survey was conducted. Groundwater was not encountered.

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Borehole Log

Borehole No. **WS204**

Sheet 1 of 2

Project Name: 102 Camley Street	Project No. 20698	Co-ords: -	Hole Type WS
Location: Camden		Level: 0.00	Scale 1:20
		Dates: 10/10/2014 - 14/10/2014	Logged By Troy Randall

Back fill / Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Dry and friable brown slighty sandy gravelly CLAY with rootlets and cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, chalk, brick and coal. Cobbles of subangular brick and flint. (MADE GROUND)
								Becomes greyish brown.
					1.20	-1.20		No recovery.
		2.00		N=8 (1,1/1,2,2,3)	2.00	-2.00		Dry and friable brown slighty sandy gravelly CLAY with rootlets and cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, chalk, brick and coal. Cobbles of subangular brick and flint. (MADE GROUND)
					2.00			
					2.30	-2.30		Soft to firm light brown orangish slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is subangular to subrounded fine to medium flint and brick. (MADE GROUND)
		3.00		N=11 (2,3/4,3,2,2)	3.00			
					3.10	-3.10		Greyish brown very soft to soft slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is angular to subrounded fine to medium flint, brick, clinker, chalk, charcoal and shell. (MADE GROUND)
								Sandstone layer.
					3.80	-3.80		Firm light brown mottled grey CLAY with relic rootlets. (MADE GROUND)
		4.00		N=11 (1,1/2,3,3,3)	4.00	-4.00		
								Continued on next sheet

Remarks

Prior to intrusive ground investigation a GPR and EM Survey was conducted. Groundwater was not encountered.

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Borehole Log

Borehole No.
WS204
Sheet 2 of 2

Project Name: 102 Camley Street	Project No. 20698	Co-ords: -	Hole Type WS
Location: Camden		Level: 0.00	Scale 1:20
		Dates: 10/10/2014 - 14/10/2014	Logged By Troy Randall

Back fill / Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					4.00			Soft brown slightly gravelly CLAY. Gravel is subangular fine brick, flint, clinker and chalk. (MADE GROUND)
					4.30	-4.30		Firm light brown mottled grey CLAY. (LONDON CLAY FORMATION)
		5.00		N=15 (2,2/2,3,4,6)	5.00	-5.00		End of borehole at 5.00 m
					5.00			

Remarks
Prior to intrusive ground investigation a GPR and EM Survey was conducted. Groundwater was not encountered.