GeoAssist Limited

Civil, Environmental & Geotechnical

Client:
JDA-Architects
The Warehouse
Saxon Street
Denton
Manchester
M34 3DS

Architect/Consultant
Brennan Consult Ltd
Oak House
2 Gatley Road
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Ground Gas Risk Assessment

Hologic, Crewe Road, Wythenshawe

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May 2020 Site Ref: 6041/HOO-GRA v1.00

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Ground Gas Risk Assessment

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A3. Exploratory Hole Logs

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Ground Gas Risk Assessment

1. Introduction

This report forms the gas risk assessment following the completion of a Phase II intrusive investigation at Hologic, Crewe Road, Wythenshawe. Further background details are provided within the previously issued Phase II report referenced 6041 HOO and dated February 2020 respectively. The work was commissioned following acceptance of the quotation and an instruction to proceed issued on behalf of JDA-Architects on 11th February 2020.

The approximate grid reference for the centre of the site is 380225, 389920. The particular area of the site scheduled for investigation is outlined with a solid red line on the site plan in Appendix A1. The positions of exploratory holes are also indicated on the plan.

2. Description of the Site

2.1 Present

The site is accessed off Crewe Road, Wythenshawe and currently incorporates warehouse/offices with associated hard standing and soft landscaping. The site to be developed forms an irregular shape and is relatively level with the surrounding area. The vast majority of the area for the proposed development is surfaced with grass.

The site is bounded by Wythenshawe Road to the west and north, a wooded area to the north along with residential properties on Wythenshawe Road, existing warehouse and offices to the east, and Crewe Road and commercial premises to the south.

At present the proposed plan for the Site is to construct a warehouse to the west of the existing building together with an extensive hard standing area to the west of the new structure. A water tank is to be placed to the rear of the existing warehouse building.

3. Ground Gas

A preliminary risk assessment undertaken by others indicated a low potential for the presence of ground gas on this site. Findings from the site investigation and ground gas risk assessment confirm that made ground with the potential of producing quantities of ground gas has not been identified on the site. The presence of a fibrous Peat band within the monitoring zones has not resulted in any adverse impact on the ground gas readings over the period of monitoring.

Gas monitoring has been carried out over a period of 2 months and has incorporated periods of low and falling pressure in accordance with best practice guidance.

Analysis of the gas monitoring data collected from the installations show that Carbon Dioxide has been detected at levels between 0.2 and 2.7 % v/v within the exploratory holes. Peak CO2 levels were detected in WS4 during the monitoring readings undertaken on the 09/03/2020. Methane, Hydrogen Sulphide and Carbon Monoxide have not been detected during the monitoring period. No positive gas flow rates from the installations have been recorded during the monitoring period. Consequently, the combined worst-case Gas Screening Values (GSVs) in accordance with Ciria C665 are calculated at less than 0.003 across the site. The risks based upon the completed monitoring data demonstrate that the site is defined as a Ciria C665 characteristic situation 1 (CS1) low risk site.

The monitoring results indicate that the worst observed gas production rates are low risk at the site and a pressure driving mechanism has not been identified. Consequently, special measures to protect the proposed commercial development from the ingress of ground gas would not normally be required. However, the presence of an organic peat layer at relatively shallow depth, whilst not currently producing adverse ground gas impacts may start degrading if the future groundwater level lowers sufficiently to allow aerobic environment in the peat. Consequently, it is recommended that characteristic situation 2 (CS2) measures are adopted for the foundations on this development. The measures required to reduce the risk of ground gas ingress are shown in Box 8.6 below.

4. Conceptual Model

The conceptual model updated from the Phase II report and based on the information presented in this report including contamination sources, pathways and receptors is presented below.

Table 4.0 Amended Conceptual Site Model based on information as presented within this report.

Potential Source /Hazard	Nature of Hazard (Risk Level to site given a commercial end use)	Contaminants Associated with Source	Potential Pathway	Potential Receptor
		Previous ON SITE Land uses:		
1. Previous: Greenfield Site Possible infilled pond features	Ground contamination Low Risk Given proposed development	None Identified	~~Dermal Contact~~ ~~Ingestion~~ ~~Inhalation~~	Site Users Construction workers
	Gas from in-filled ground Low Risk CS2	Low CO_2	See Gas Risk Assessment	Site Users Future Buildings & Services
2. Current: Factory warehouse and Yard	Ground contamination Low Risk Given proposed development	None Identified	~~Dermal Contact~~ ~~Ingestion~~ ~~Inhalation~~	Site Users Construction workers
	Gas from in-filled ground Low Risk CS2	Low CO_2	See Gas Risk Assessment	Site Users Future Buildings & Services
		Previous OFF SITE land uses within 250m as indicated by Historical Plans Including:		
3. Infilled Pond	Ground contamination Low Risk	None Identified	Dermal Contact Inhalation	Site Users Construction workers
	Gas from in-filled ground Low Risk CS2	None	Vertical and Lateral Migration	Site Users Future Buildings & Services
4. Coal Workings & Mineral Extraction	Geotechnical Hazard Low Risk	None	Ground Collapse Subsidence	Humans (site users) Future Buildings & Services
	Ground contamination Low Risk	None	None	Site Users Services
	Mine Gas Low Risk	None	None	Humans (site users) Future Buildings & Services

Only sources that have not been present on site in the past or currently are considered within the off site category. Unless the information is deemed to be pertinent to the analysis.

Table 8.6 *Typical scope of protective measures (risk management)*

Characteristic situation	Residential building (Not low-rise traditional housing)[1]		Office/commercial/industrial development	
(From Table 8.5)	Number of levels of protection	Typical scope of protective measures	Number of levels of protection	Typical scope of protective measures
1	None	No special precautions	None	No special precautions
2	2	a) Reinforced concrete cast *in situ* floor slab (suspended, non-suspended or raft) with at least 1200 g DPM[9] and underfloor venting b) Beam and block or pre-cast concrete and 2000 g DPM/ reinforced gas membrane and underfloor venting All joints and penetrations sealed.	1 to 2	a) Reinforced concrete cast *in situ* floor slab (suspended, non-suspended or raft) with at least 1200 g DPM[9] b) Beam and block or pre cast concrete slab and minimum 2000 g DPM/reinforced gas membrane c) Possibly underfloor venting or pressurisation in combination with a) and b) depending on use All joints and penetrations sealed.
3	2	All types of floor slab as above. All joints and penetrations sealed. Proprietary gas resistant membrane and passively ventilated or positively pressurised underfloor sub-space.	1 to 2	All types of floor slab as above. All joints and penetrations sealed. Minimum 2000 g/reinforced gas proof membrane and passively ventilated underfloor sub-space or positively pressurised underfloor sub-space

The complete gas risk assessment forms appendix A2 to this report.

Matthew Benson MSc GMICE
Geotechnical/Environmental Engineer

Mark Richardson MSc CEng MICE
Technical Director

Field investigations have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions are, and can be, variable and have only been tested at isolated locations across the site. Therefore, the potential exists for ground conditions to be encountered which are different to those considered in this report.

Ground gas measurements were undertaken for a range of typical gases based on a professional understanding of the historical and operational data available at the time and it should not be inferred or otherwise, that other ground gases are not present.

This report has been prepared by GeoAssist Limited with all reasonable professional skill, care and diligence within the terms of the contract with JDA-Architects. The report is confidential to JDA-Architects, their/the named persons, advisors and bankers, and GeoAssist Limited accepts no responsibility of whatever nature to third parties to whom this report may be divulged. GeoAssist Limited owns the copyright in this report. All rights are reserved, and unauthorised use is prohibited. JDA-Architects may use the report for their/her/his own purposes.

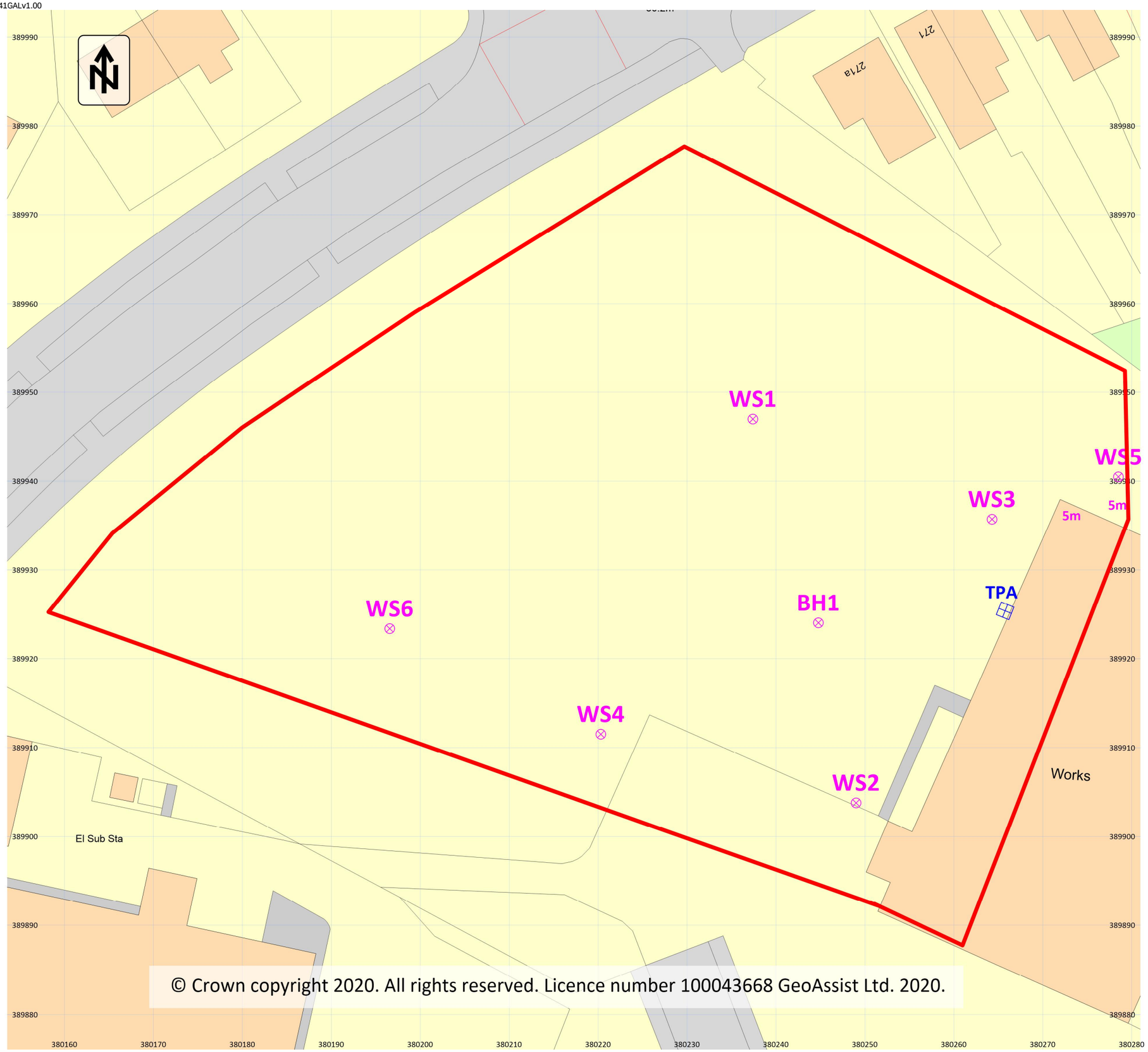
Appendix A

A1 Site Plan & Exploratory Hole Locations

A2 Gas Monitoring Results & Risk Assessment

A3 Exploratory Hole Logs

6041GALv1.00



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GeoAssist Limited
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A1 Site Plan

Site Name	Hologic
Location	Crewe Road, Wythenshawe
GeoAssist Ref	6041HOO
Client	JDA-Architects
	The Warehouse Saxon Street Denton Manchester M34 3DS
Planning Consultant	Brennan Consult Ltd
NGR (centre of site)	380225,389920
Production Date	April 2020
Survey Method	
Surveyor	Others
Status	Final v1.00
Base Survey	OSGB36

ace
consultancy engineering business environment

Site Reference:	**6041 HOO**
Project Site:	**Hologic**
Project Location:	**Crewe Road, Wythenshawe**
Client:	**JDA-Architects**

Ground Gas Readings

Date - Time	BH	CH4 (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	LEL (%)	aP (mb)	Flw (l/h)	H2O (m)	State
28/02/2020	WS1									1.25	
28/02/2020	WS2		Water level reading only							1.25	
28/02/2020	WS4									1.50	
09/03/2020	WS1	0.0	1.5	17.1	0.0	0.0	0.0	1001	0.0	1.50	
09/03/2020	WS2	0.0	0.2	19.5	0.0	0.0	0.0	1000	0.0	1.45	
09/03/2020	WS4	0.0	2.7	16.5	0.0	0.0	0.0	1001	0.0	1.60	
13/03/2020	WS1	0.0	1.9	16.1	0.0	0.0	0.0	1011	0.0	1.40	
13/03/2020	WS2	0.0	0.3	19.1	0.0	0.0	0.0	1011	0.0	1.40	
13/03/2020	WS4	0.0	1.8	16.7	0.0	0.0	0.0	1007	0.0	1.45	
17/04/2020	WS1	0.0	0.8	19.6	0.0	0.0	0.0	1013	0.0	1.85	
17/04/2020	WS2	0.0	0.5	20.2	0.0	0.0	0.0	1014	0.0	1.80	
17/04/2020	WS4	0.0	1.0	19.3	0.0	0.0	0.0	1014	0.0	1.95	
01/05/2020	WS1	0.0	1.3	18.8	0.0	0.0	0.0	992	0.0	1.85	
01/05/2020	WS2	0.0	0.5	19.7	0.0	0.0	0.0	992	0.0	1.75	
01/05/2020	WS4	0.0	2.6	17.0	0.0	0.0	0.0	991	0.0	2.00	

Site Reference:	**6041 HOO**
Project Site:	**Hologic**
Project Location:	**Crewe Road, Wythenshawe**
Client:	**JDA-Architects**

Factual Data Summary										Interpretation& Risk Assessment				
BH Ref.	**Response zone/strata**	**Evidence of Gas contamination**	**No of Monitoring occasions**	**Max. Recorded Methane**	**Max. Recorded Carbon Dioxide (%)**	**Min. Oxygen (%)**	**Max. Recorded Flow (l/hr)**	**Water Level (mbgl)**	**Atmospheric Pressure Range (mb)**	**Is Water Level within top 10% of the response zone?**	**Are readings considered representative**	**Explanation / Justification**	**Gas Screening Value (GSV) ***	**Risk Classification & Characteristic Situation ** **
WS1	1.00 - 4.00m Sand with Peat band over Gravel	No	4	0	1.9	16.1	0	1.4	992-1013	No	Yes		0.002	Low Risk Characteristic Situation 1
WS2	1.00 - 4.00m Sand with Peat band over Gravel	No	4	0	0.5	19.1	0	1.4	992-1014	No	Yes		0.001	Low Risk Characteristic Situation 1
WS4	1.00 - 4.00m Sand with Peat band over Gravel	No	4	0	2.7	16.5	0	1.45	991-1014	No	Yes		0.003	Low Risk Characteristic Situation 1
Worst Case	1.00 - 4.00m Sand with Peat band over Gravel	No	12	0	2.7	16.1	0	1.4	991-1014	No	Yes		0.003	Low Risk Characteristic Situation 2

*** Where no flow measured, GSV value is determined with an instrument minimum value of 0.1 l/hr**

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Exploratory Hole Record Sheet

Ref: BH1

Sheet: 1

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Project: Hologic

Location: Crewe Road, Wythenshawe

Equipment: Light Cable Percussive Rig

Ground Level: 30.17 m.AOD

Co-ordinates: Easting: 380244.8(m) Northing: 389924(m)

Dates: 24/02/2020 to 24/02/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION

Stratum Description	Depth (Thick) (m)	Reduced Level (mAOD)	Samples/Tests Depth (m) from	to	Sample Type/No	Blow Count N/(U)	Field Records
Grey/dark brown gravel - MADE GROUND	0.20	29.97					
Brown silty fine to medium sand with brick and sandstone fragments - MADE GROUND	(0.50) 0.70	29.47	0.30	0.40	C1		
			0.70	0.80	C2		Standing water in insepction pit at 0.80m depth
Medium dense brown with dark grey bands silty fine to medium SAND	(1.00) 1.70	28.47	1.00	1.45	P1	15	P1 at 1.00m - 2,4/3,4,4,4
			1.50	1.60	D1		
			1.70	1.80	D2		
Dark grey/black sandy clayey fine fibrous PEAT	2.00	28.17					
Loose grey silty fine to medium SAND	(1.00) 3.00	27.17	2.00	2.45	P2	5	P2 at 2.00m - 1,2/1,2,1,1
			2.50	2.60	D3		
			3.00	3.45	CP1	17	CP1 at 3.00m - 3,3/3,4,4,6
Medium dense grey slightly silty very sandy rounded to subrounded GRAVEL	(1.10) 4.10	26.07	3.00	3.10	D4		
			3.50	3.60	D5		
			4.00	4.45	P3	9	P3 at 4.00m - 1,1/2,2,2,3
Firm brown medium strength silty CLAY with silt partings	(1.40) 5.50	24.67	4.50	4.60	D6		
			5.00	5.45	U1	17	Hand vane at 5.00m - 79kPa
			5.50	5.60	D7		Hand vane at 5.40m - 71kPa Hand vane at 5.50m - 69kPa
Firm to stiff medium to high strength brown very silty CLAY	(4.30) 9.80	20.37	6.00	6.10	D8		
			6.50	6.95	P4	13	P4 at 6.50m 2,2/3,3,3,4
			7.00	7.10	D9		
			8.00	8.45	U2	22	Hand vane at 8.00m - 63kPa
			8.50	8.60	D10		Hand vane at 8.40m - 81kPa
Stiff to very stiff high to very high strength brown very silty CLAY			9.80	10.25	P5	28	P5 at 9.80m - 2,2/4,6,8,10

Remarks: 24/01/2020: Inspection pit excavated to 1.00m depth to avoid services.
Hard Boring form 11.10m to 11.70m - 30 minutes

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 26/02/2020
Checked: M Richardson
Date: 28/02/2020
Site Ref: 6041/HOO
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: **BH1**

Sheet: 2

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Project: Hologic

Location: Crewe Road, Wythenshawe

Equipment: Light Cable Percussive Rig

Ground Level: 30.17 m.AOD

Co-ordinates: Easting: 380244.8(m) Northing: 389924(m)

Dates: 24/02/2020 to 24/02/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION	Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests Depth (m) from	to	Sample Type/No	Blow Count N/(U)	Field Records
10								
	(1.00)			10.50	10.60	D11		Hand penetrometer at 10.50m - 172kPa
	10.80	19.37						
Stiff to very stiff high to very high strength brown and redbrown gravelly sandy silty CLAY	11.10	19.07		11.00	11.45	P6	68	P6 at 11.00m - 4,7/12,15,16,25
11 Brown/grey clayey SILTSTONE and MUDSTONE with sandstone								
	(1.05)			11.70	12.15	P7	88	P7 at 11.70m - 7,11/21,15,19,33
12	12.15	18.02						

Exploratory Hole termineted at 12.15m

24/02/2020: On completion of exploratory hole at 12.15m. Casing at 4.50m. Standing water level Nil. On withdrawal of casing exploratory hole backfilled and reinstated.

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Remarks: 24/01/2020: Inspection pit excavated to 1.00m depth to avoid services.
Hard Boring form 11.10m to 11.70m - 30 minutes

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 26/02/2020
Checked: M Richardson
Date: 28/02/2020
Site Ref: **6041/HOO**
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: **WS1**

Sheet: 1

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Project: Hologic

Location: Crewe Road, Wythenshawe

Equipment: Archway Dart Rig and Dynamic Probing

Ground Level: 30.08 m.AOD

Co-ordinates: Easting: 380237.4(m) Northing: 389947(m)

Dates: 25/02/2020 to 25/02/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION

Stratum Description	Depth (Thick) (m)	Reduced Level (mAOD)	Samples/Tests Depth (m) from	to	Sample Type/No	Blow Count N/(U)	Field Records
0 Grass over dark grey sandy TOPSOIL	0.20	29.88					
Dark grey gravelly silty sandy clay - MADE GROUND	(0.40) 0.60	29.48					
Loose to medium dense brown ironstained slightly silty fine to medium SAND			0.70	0.80	D1		Damp at 0.60m depth
			0.90	1.00	D2		
1	(1.00)		1.00		CP1	10	
	1.60	28.48	1.60	1.80	U1		
Brown clayey fine fibrous PEAT	1.80	28.28					
Grey gravelly silty SAND	2.00	28.08					Wet from 1.90m depth
2 Loose to medium dense grey/brown silty SAND and GRAVEL			2.00		CP2	10	
	(1.00)						
	3.00	27.08	3.00		CP3	11	
3 Medium dense grey slightly silty SAND and GRAVEL							
	(1.00)		3.50	3.60	D3		
	4.00	26.08	4.00		CP4	10	
4 Medium dense brown silty SAND							
	(0.60)						
	4.60	25.48					
Firm brown very silty CLAY - Interpreted Stratum			4.80	4.90	D4		Hand vane at 4.80m - 55kPa
5 **Dynamic Probing from 5.00m depth**			5.00		CP5	8	
Interpreted Strata from from 5.00m depth							
	(2.60)						
6			6.00		CP6	14	
7	7.20	22.88	7.00		CP7	23	
Firm to stiff very silty CLAY - Interpreted Stratum							
8			8.00		CP8	26	
	(2.00)						
9	9.20	20.88	9.00		CP9	52	
Stiff to very stiff very silty CLAY - Interpreted Stratum							
	(0.80)						
10	10.00	20.08					

Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 26/02/2020
Checked: M Richardson
Date: 28/02/2020
Site Ref: **6041/HOO**
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: **WS1**

Sheet: 2

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Project: Hologic

Location: Crewe Road, Wythenshawe

Equipment: Archway Dart Rig and Dynamic Probing

Ground Level: 30.08 m.AOD

Co-ordinates: Easting: 380237.4(m) Northing: 389947(m)

Dates: 25/02/2020 to 25/02/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION	Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests Depth (m) from to	Sample Type/No	Blow Count N/(U)	Field Records
10 Clayey SILTSTONE and MUDSTONE - Interpreted Stratum	(0.40) 10.40	19.68		10.10	CP10	94	25/02/2020: On completion of exploratory hole at 10.40m. Casing at 4.00m. Standing water level at 1.70m depth. On withdrawal of casing groundwater/gas monitoring standpipe installed to 4.00m depth with response zone from 1.00m to 4.00m.
Exploratory Hole complete at 10.40m							

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Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 26/02/2020
Checked: M Richardson
Date: 28/02/2020
Site Ref: **6041/HOO**
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: WS2

Sheet: 1

Project: Hologic

Location: Crewe Road, Wythenshawe

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Equipment: Archway Dart Rig and Dynamic Probing

Ground Level: 30.14 m.AOD

Co-ordinates: Easting: 380249(m) Northing: 389903.8(m)

Dates: 25/02/2020 to 25/02/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION	Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests Depth (m) from	to	Sample Type/No	Blow Count N/(U)	Field Records
Grey/brown sandy gravel and brick - MADE GROUND	(0.70) 0.70	29.44		0.70	0.80	D1		Damp at 0.70m depth
Medium dense brown ironstained slightly silty fine to medium SAND	(0.70) 1.40	28.74		0.90 1.00	1.00	D2 CP1	14	
Brown clayey fine fibrous PEAT	1.60	28.54		1.50	1.60	D3		Wet from 1.60m depth
Grey gravelly silty SAND	(0.40) 2.00	28.14		2.00		CP2	21	
Medium dense grey/brown silty SAND and GRAVEL	(1.80) 3.80	26.34		2.50 3.00	2.60	D4 CP3	23	
Firm to stiff brown very silty CLAY	(2.20) 6.00	24.14		3.90 4.00 5.00	4.00	D5 CP4 CP5	10 14	Hand vane at 3.90m - 98kPa
Dynamic Probing from 5.00m depth **Interpreted Strata from from 5.00m depth**								
Stiff brown very silty CLAY - Interpreted Stratum	(2.50) 8.50	21.64		6.00 7.00 8.00		CP6 CP7 CP8	26 32 36	
Stiff to very stiff brown very silty CLAY - Interpreted Stratum	(1.50) 10.00	20.14		9.00		CP9	43	

Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 26/02/2020
Checked: M Richardson
Date: 28/02/2020
Site Ref: 6041/HOO
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: **WS2**

Sheet: 2

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Project: Hologic

Location: Crewe Road, Wythenshawe

Equipment: Archway Dart Rig and Dynamic Probing

Ground Level: 30.14 m.AOD

Co-ordinates: Easting: 380249(m) Northing: 389903.8(m)

Dates: 25/02/2020 to 25/02/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION	Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests Depth (m) from to	Sample Type/No	Blow Count N/(U)	Field Records
10 Clayey SILTSTONE and MUDSTONE - Interpreted Stratum	(0.35) 10.35	19.79		10.00	CP10	79	
Exploratory Hole complete at 10.35m							25/02/2020: On completion of exploratory hole at 10.35m. Casing at 4.00m. Standing water level at 2.20m depth. On withdrawal of casing groundwater/gas monitoring standpipe installed to 4.00m depth with response zone from 1.00m to 4.00m.

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Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 26/02/2020
Checked: M Richardson
Date: 28/02/2020
Site Ref: **6041/HOO**
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: WS3

Sheet: 1

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Project: Hologic

Location: Crewe Road, Wythenshawe

Equipment: Archway Dart Rig and Dynamic Probing

Ground Level: 30.21 m.AOD

Co-ordinates: Easting: 380264.3(m) Northing: 389935.7(m)

Dates: 25/02/2020 to 25/02/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION	Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests Depth (m) from	to	Sample Type/No	Blow Count N/(U)	Field Records
0 Grey/brown sandy gravel with brick fragments - MADE GROUND	0.30	29.91						
Brown silty sand and brick fragments - MADE GROUND	(0.40) 0.70	29.51		0.70	0.80	D1		Damp at 0.70m depth
Medium dense brown ironstained silty fine to medium SAND	(0.90) 1.60	28.61						
Brown clayey fine fibrous PEAT	1.80	28.41		1.70	1.80	D2		Wet from 1.80m depth
Grey gravelly silty SAND	2.00	28.21						
Medum dense grey/brown silty SAND and GRAVEL	(1.00) 3.00	27.21						
Medium dense grey slightly silty SAND and GRAVEL	(1.00) 4.00	26.21						
Grey gravelly slightly silty SAND	(0.60) 4.60	25.61						
Firm brown very silty CLAY - Interpreted Stratum **Dynamic Probing from 5.00m depth** **Interpreted Strata from from 5.00m depth**	(1.40) 6.00	24.21						Hand vane at 4.80m - 55kPa
				6.00		CP1	7	
Firm to stiff very silty CLAY - Interpreted Stratum	(1.20) 7.20	23.01		7.00		CP2	21	
Stiff to very stiff very silty CLAY - Interpreted Stratum	(2.50) 9.70	20.51		8.00		CP3	40	25/02/2020: On completion of exploratory hole at 9.97m. Casing at 4.00m depth. Standing water level at 1.10m depth. On withdrawal of casing exploratory hole backfilled and reinstated.
				9.00		CP4	50	
				9.70		CP5	112	
Clayey SILTSTONE and MUDSTONE - Interpreted Stratum **Exploratory Hole complete at 9.97m**	9.97	20.24						

Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 26/02/2020
Checked: M Richardson
Date: 28/02/2020
Site Ref: 6041/HOO
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: WS4

Sheet: 1

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Project: Hologic

Location: Crewe Road, Wythenshawe

Equipment: Archway Dart Rig and Dynamic Probing

Ground Level: 30.12 m.AOD

Co-ordinates: Easting: 380220.3(m) Northing: 389911.5(m)

Dates: 25/02/2020 to 25/02/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION

Stratum Description	Depth (Thick) (m)	Reduced Level (mAOD)	Samples/Tests Depth (m) from	to	Sample Type/No	Blow Count N/(U)	Field Records
Grass over grey brown sandy TOPSOIL	0.20	29.92					
Grey/brown silty sand - POSSIBLE MADE GROUND	(0.40) 0.60	29.52					
Loose to medium dense brown/dark brown ironstained slightly silty fine to medium SAND	(0.70) 1.30	28.82	0.70	0.80	D1		Damp at 0.60m depth
			1.30	1.40	U1		
Brown clayey fine fibrous PEAT	1.50	28.62					
Medium dense brown gravelly silty fine to medium SAND	(0.90) 2.40	27.72					Wet from 1.60m depth
Medium dense grey slightly silty SAND and GRAVEL	(2.20) 4.60	25.52					
Firm brown very silty CLAY - Interpreted Stratum **Dynamic Probing from 5.00m depth** **Interpreted Strata from from 5.00m depth**	(3.40) 8.00	22.12	6.00		CP1	6	Hand vane at 4.70m - 59kPa
			7.00		CP2	10	
			8.00		CP3	17	
Firm to stiff very silty CLAY - Interpreted Stratum	(1.00) 9.00	21.12	9.00		CP4	33	
Stiff to very stiff very silty CLAY - Interpreted Stratum	(1.00) 10.00	20.12					

Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 26/02/2020
Checked: M Richardson
Date: 28/02/2020
Site Ref: 6041/HOO
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: WS4

Sheet: 2

Project: Hologic

Location: Crewe Road, Wythenshawe

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Equipment: Archway Dart Rig and Dynamic Probing

Ground Level: 30.12 m.AOD

Co-ordinates: Easting: 380220.3(m) Northing: 389911.5(m)

Dates: 25/02/2020 to 25/02/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION	Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests Depth (m) from to	Sample Type/No	Blow Count N/(U)	Field Records
Clayey SILTSTONE and MUDSTONE - Interpreted Stratum	(0.56) 10.56	19.56		10.10	CP5	85	25/02/2020: On completion of exploratory hole at 10.56m. Casing at 4.00m. Standing water level at 1.80m depth. On withdrawal of casing groundwater/gas monitoring standpipe installed to 5.00m depth with response zone from 1.00m to 5.00m.

Exploratory Hole complete at 10.56m

10 11 12 13 14 15 16 17 18 19 20

Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 26/02/2020
Checked: M Richardson
Date: 28/02/2020
Site Ref: 6041/HOO
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: WS5

Sheet: 1

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Project: Hologic

Location: Crewe Road, Wythenshawe

Equipment: Archway Dart Rig and Dynamic Probing

Ground Level: 30.27 m.AOD

Co-ordinates: Easting: 380278.5(m) Northing: 389940.5(m)

Dates: 17/04/2020 to 17/04/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION

Stratum Description	Depth (Thick) (m)	Reduced Level (mAOD)	Samples/Tests Depth (m) from	to	Sample Type/No	Blow Count N/(U)	Field Records
Grass over dark grey sandy TOPSOIL	0.30	29.97					
Dark brown silty fine to medium SAND	(0.70) 1.00	29.27	0.50	0.60	D1		
			1.00		CP1	12	
Loose to medium dense brown silty fine to medium SAND	(0.60) 1.60	28.67	1.30	1.40	D2		
Dark brown clayey fine fibrous PEAT	(0.40) 2.00	28.27	1.80	1.90	D3		
			2.00		CP2	10	Wet from 2.00m depth
Loose to medium dense grey/brown silty SAND and GRAVEL	(1.80) 3.80	26.47	3.00		CP3	9	
							Hand vane at 3.80m - 65kPa
Firm to stiff brown very silty CLAY	(0.70) 4.50	25.77	4.00		CP4	6	
							Hand vane at 4.50m - 86kPa
Firm to stiff brown very silty CLAY - Interpreted Stratum							Hand vane at 4.80m - 97kPa
Dynamic Probing from 5.00m depth **Interpreted Strata from from 5.00m depth**			5.00		CP5	11	
	(3.00) 7.50	22.77	6.00		CP6	17	
			7.00		CP7	27	
Stiff very silty CLAY - Interpreted Stratum	(1.70) 9.20	21.07	8.00		CP8	36	
			9.00		CP9	53	
Stiff to very stiff very silty CLAY - Interpreted Stratum	(0.80) 10.00	20.27					

Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 20/04/2020
Checked: M Richardson
Date: 20/04/2020
Site Ref: 6041/HOO
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: WS5

Sheet: 2

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Project: Hologic

Location: Crewe Road, Wythenshawe

Equipment: Archway Dart Rig and Dynamic Probing

Ground Level: 30.27 m.AOD

Co-ordinates: Easting: 380278.5(m) Northing: 389940.5(m)

Dates: 17/04/2020 to 17/04/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION	Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests Depth (m) from to	Sample Type/No	Blow Count N/(U)	Field Records
Clayey SILTSTONE and MUDSTONE - Interpreted Stratum	10.33	19.94		10.30	CP10		CP10 at 10.30m - 50 blows for 30mm 17/04/2020: On completion of exploratory hole at 11.00m. Casing at 4.00m depth. Standing water level at 2.50m depth. On withdrawal of casing exploratory hole backfilled and reinstated.
Exploratory Hole complete at 10.33m							

10 11 12 13 14 15 16 17 18 19 20

Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 20/04/2020
Checked: M Richardson
Date: 20/04/2020
Site Ref: 6041/HOO
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: WS6

Sheet: 1

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Project: Hologic

Location: Crewe Road, Wythenshawe

Equipment: Archway Dart Rig and Dynamic Probing

Ground Level: 29.71 m.AOD

Co-ordinates: Easting: 380196.6(m) Northing: 389923.4(m)

Dates: 17/04/2020 to 17/04/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION	Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests Depth (m) from	to	Sample Type/No	Blow Count N/(U)	Field Records
0 Grass over dark grey sandy TOPSOIL	0.30	29.41						
Medium dense dark brown/light brown silty fine to medium SAND	(1.20)			0.50	0.60	D1		
1				1.00		CP1	11	
	1.50	28.21						
Dark brown clayey fine fibrous PEAT	1.70	28.01		1.60	1.70	D2		Wet from 1.70m depth
Medium dense grey/brown silty SAND and GRAVEL	(2.70)							
2				2.00		CP2	14	
3				3.00		CP3	10	
4				4.00		CP4	28	
	4.40	25.31						
Firm to stiff brown very silty CLAY	(0.60)							Hand vane at 4.50m - 102kPa Hand vane at 4.80m - 110kPa
	5.00	24.71						
5 Stiff very silty CLAY - Interpreted Stratum **Dynamic Probing from 5.00m depth** **Interpreted Strata from from 5.00m depth**	(2.00)			5.00		CP5	8	
6				6.00		CP6	14	
	7.00	22.71						
7 Stiff to very stiff very silty CLAY - Interpreted Stratum	(3.00)			7.00		CP7	19	
8				8.00		CP8	31	
9				9.00		CP9	38	
10	10.00	19.71						

Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 20/04/2020
Checked: M Richardson
Date: 20/04/2020
Site Ref: 6041/HOO
Scale 1:50

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: WS6

Sheet: 2

Consultant: Brennan Consult Ltd

Client: JDA-Architects

Project: Hologic

Location: Crewe Road, Wythenshawe

Equipment: Archway Dart Rig and Dynamic Probing

Ground Level: 29.71 m.AOD

Co-ordinates: Easting: 380196.6(m) Northing: 389923.4(m)

Dates: 17/04/2020 to 17/04/2020

Drilling Foreman: M Walton

Engineer/Geologist: M Benson

STRATUM DESCRIPTION	Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests Depth (m) from to	Sample Type/No	Blow Count N/(U)	Field Records
Very stiff very silty CLAY - Interpreted Stratum	(0.50) 10.50	19.21		10.10	CP10	50	
Clayey SILTSTONE and MUDSTONE - Interpreted Stratum	(0.66) 11.16	18.55		11.10	CP11		CP11 at 11.10m - 50 blows for 60mm 17/04/2020: On completion of exploratory hole at 11.16m. Casing at 4.00m depth. Standing water level at 2.50m depth. On withdrawal of casing exploratory hole backfilled and reinstated.

Exploratory Hole complete at 11.16m

Remarks:

The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.
Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

Logged: M Benson
Date: 20/04/2020
Checked: M Richardson
Date: 20/04/2020
Site Ref: 6041/HOO
Scale 1:50