

Bouygues UK
Beckett House
1 Lambeth palace Road
London
SE1 7EU

5 December 2023
MES/2312/TER284

FAO: Simon Saul

Ref: Rosedale College, Hayes – Addendum Flood Risk Assessment (Groundwater)

Dear Mr Saul

Further to your instruction, we have reviewed the HSP Flood Risk Assessment (FRA) (ref: HSP2022-C3886-C&S-FRAS1-536, 11 April 2022, Revision A, Final) with regard to Rosedale College, Hayes, UB3 2EL (the site, Figure 1) and the following query raised by the Lead Local Flood Authority (LLFA) as part of a Planning Consultation with the London Borough (LB) of Hillingdon for the proposed development of additional educational facilities at the site:

Query - Flood Risk Outside of Development

- *Is the development likely to impact upon local groundwater flood risk?*
 - *According to the researched mapping from the SFRA, the site is located in an area which is considered to be susceptible to groundwater emergence, with the potential for an elevated water table across the site. Given that there have been recorded incidents of groundwater flooding across the site, the risk of groundwater / clearwater flooding may be significant and it is possible that mitigation / management will be required. Notwithstanding the above, site specific groundwater investigation is recommended to further assess the potential for groundwater to impact the site (FRA page 27/48).*
 - *MORE INFORMATION REQUIRED – The FRA indicates that further investigation is required into the risk of groundwater flooding on the site.*

This should be undertaken to determine the level of risk and any mitigation measure required.

In response, please find enclosed our commentary on the potential flood risk in relation to groundwater.

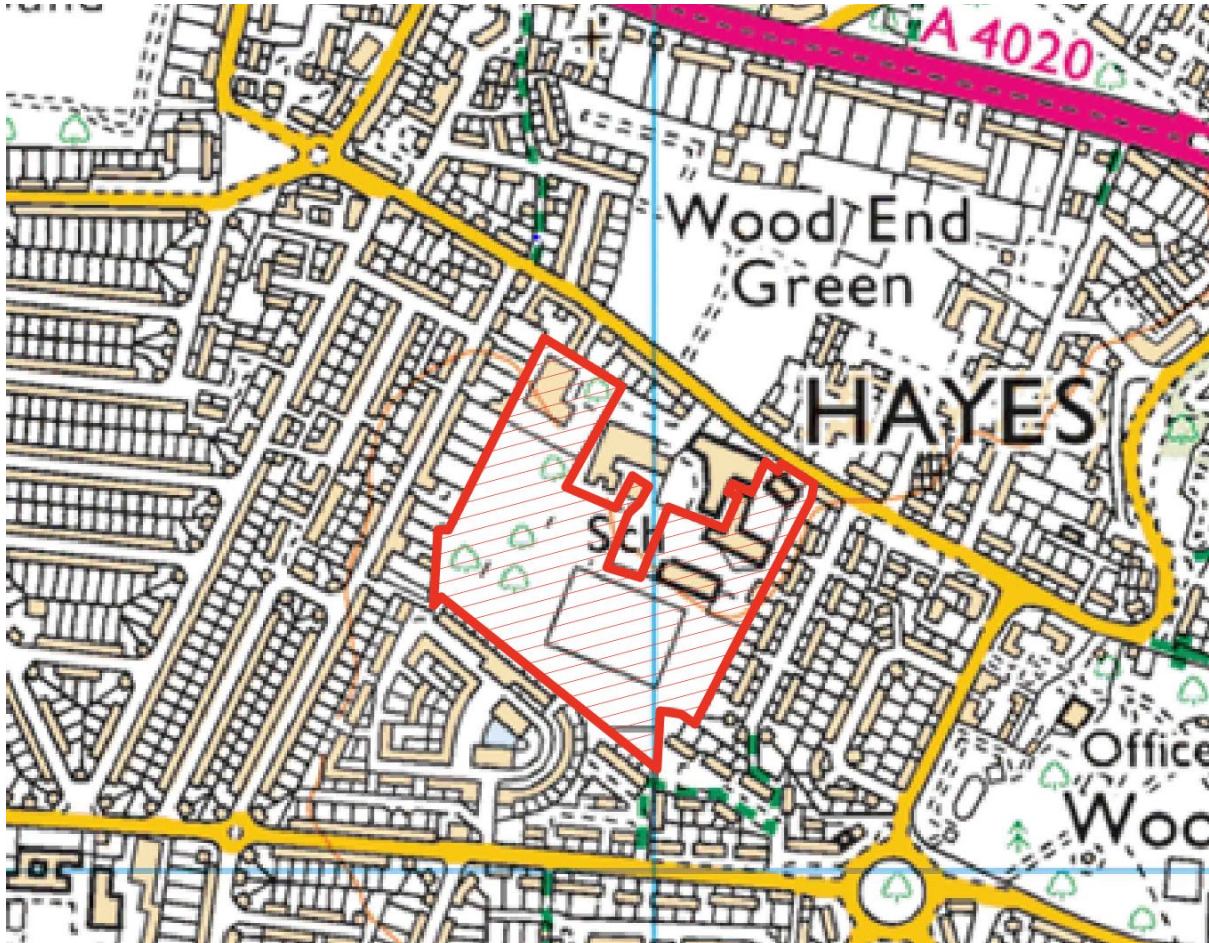


Figure 1: Site Location Plan

Review of HSP FRA

With reference to the HSP FRA:

a) Section 12.3.1 (page 27 of the digital pdf report, as referenced in the LLFA query) states: 'According to the researched mapping from the SFRA, the site is located in an area which is considered to be susceptible to groundwater emergence (Figure 2), with the potential for an elevated water table across the site (Figure 3).'



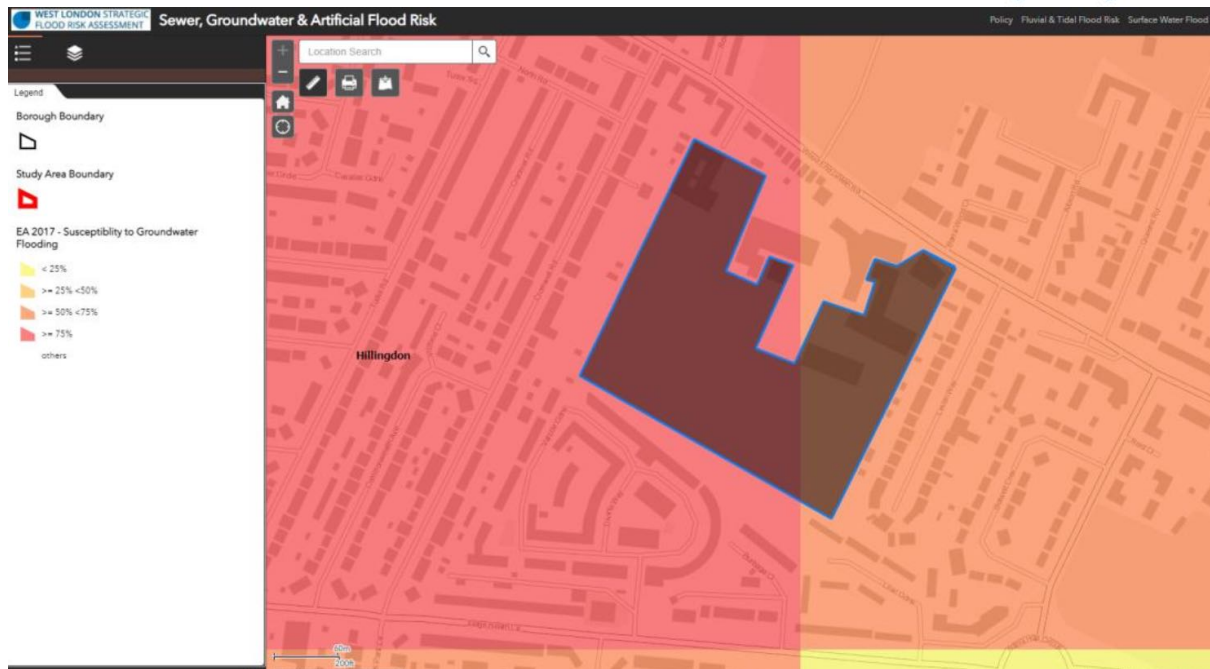


Figure 2: LB Hillingdon SFRA, Susceptibility to Groundwater Flooding

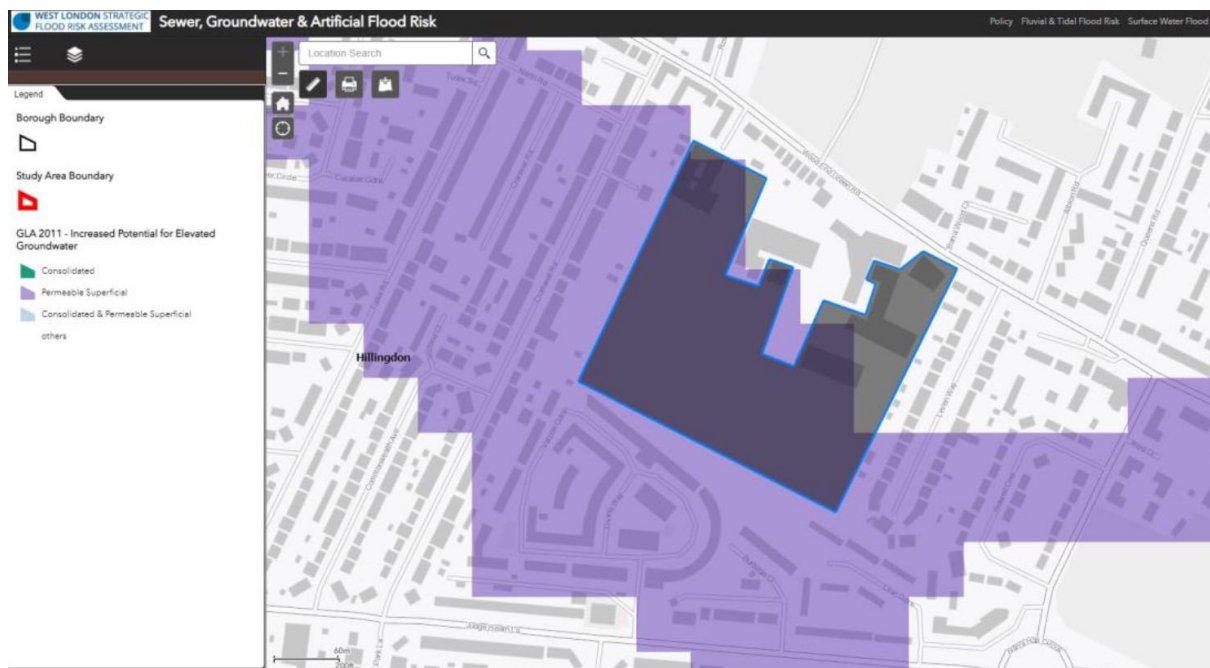


Figure 3: LB Hillingdon SFRA, Increased Potential for Elevated Groundwater

b) Section 12.3.2 states: 'Given that there have been recorded incidents of groundwater flooding across the site, the risk of groundwater/clearwater flooding may be significant and it is possible that mitigation/management will be required.'

c) However, section 5.2.4.1 advises that: 'There have been no groundwater flooding incidents between December 2011 to June 2017'.

d) There are no other references to groundwater flooding incidents in the FRA and the LB Hillingdon Surface Water Management Plan (SWMP) (Figure 4) does not show flood incidents at the site location.

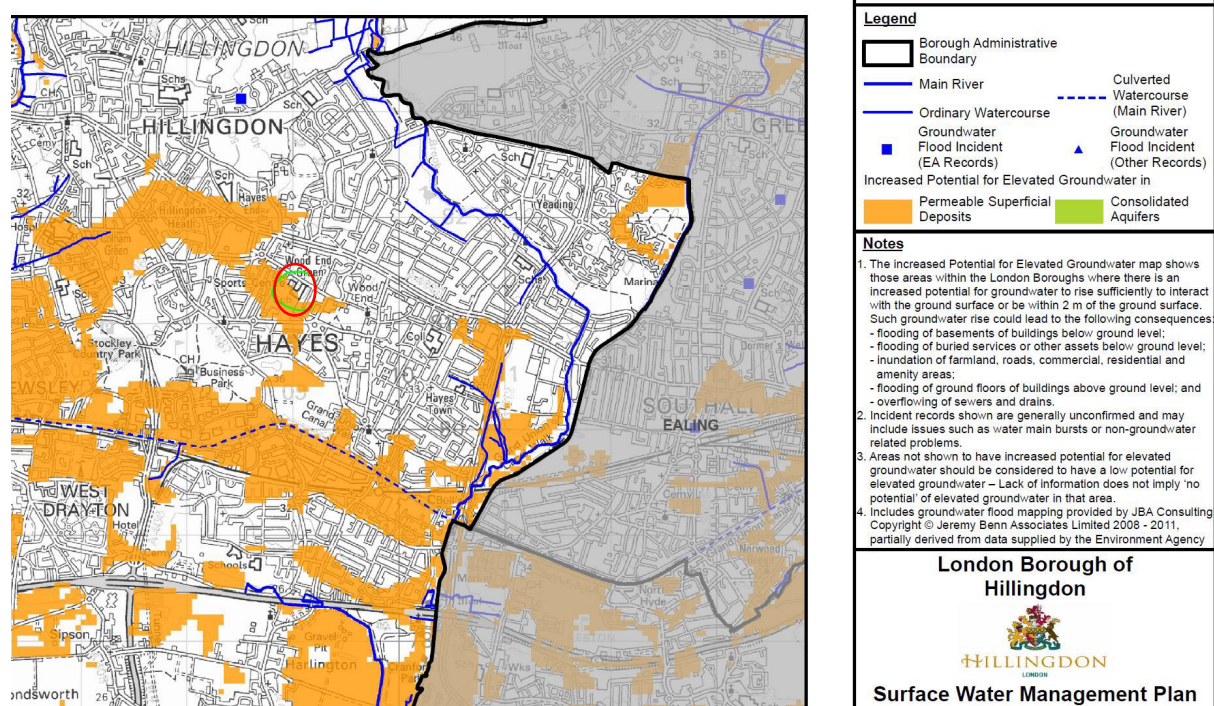


Figure 4: LB Hillingdon SWMP of Groundwater Flood Incidents

e) It seems likely that the statement in 12.3.2 has been made in error and that the statement in 5.2.4.1 is correct (as there is no evidence in the FRA or SWMP to support 12.3.2).

f) The recommended site investigation would therefore appear to be reasonable in order to address the SFRA mapping (as 12.3.1).

Site Investigation Data

Two phases of ground investigation have been undertaken at the site, in April 2022 (by HSP) and August 2023 (by Milvum):

a) HSP undertook an investigation 2022 (ref: HSP2022-C3886-G-GPII-64, Revision Final, 13 June 2022). Section 3.4.2 indicates that Made Ground (<1.00m in thickness) was encountered overlying Boyn Hill Gravel Member (comprising units of gravelly clay and sandy gravel to



approximately 6.00m below ground level (bgl) overlying the London Clay Formation. Ground conditions are summarised in Figure 5 and borehole logs are appended for reference.

Strata		Depth (m bgl)	Thickness (m)	Description
Anthropogenic	MADE GROUND	G.L – 0.04	0.04m	MADE GROUND asphalt concrete. (WS01 and WS02)
		0.04 – 0.10	0.06m	MADE GROUND concrete (WS01 and WS02)
		G.L – 0.50	0.50m	Grass over topsoil consisting of; Brown gravelly silt. Gravel is subangular to subrounded, fine to coarse of flint and occasional brick fragments
		0.65-0.75	0.10	Possibly MADE GROUND Brown very clayey, slightly sandy fine to coarse, angular to subrounded gravel of flint (WS07 ONLY)
		0.75-0.9	0.15*	Possibly MADE GROUND Brown sandy fine to coarse angular to subrounded gravels of flint (considered potentially a drainage channel or infilled ground). (WS07 ONLY)
Superficial	BOYN HILL GRAVEL MEMBER	0.50-1.00	0.50	Stiff dark brown sandy very gravelly CLAY, gravel is angular to subrounded, fine to coarse of flint and mudstone.
		1.00-6.00	5.00	Very dense becoming dense brown slightly sandy fine to coarse, angular to subrounded GRAVEL of flint
Bedrock	LONDON CLAY FORMATION	6.00 -7.00	1.00	Stiff light brown CLAY
		7.00-20.0	13.00*	Stiff becoming very stiff grey CLAY

*base not reached

Figure 5: Summarised Ground Conditions from 2022 Site Investigation.

b) Section 3.5 states: ‘Groundwater was not encountered during the advancement of the boreholes’. It then goes on to indicate that groundwater was encountered in 1no monitoring visit at between 1.95m and 3.03m bgl and states that a further 3no monitoring visits are to be undertaken.

c) Section 3.5 is in error, since in the Appendix VII of the report a further 3no rounds of monitoring had been undertaken (3no of ground gas, 2no of groundwater) but not assessed. Therefore 3no rounds of monitoring were undertaken by HSP between February and April 2022 (over an approximately 6 week period); a supplementary monitoring round was undertaken by Milvum on 5 December 2023. Results are summarised in Figure 6.

d) Monitoring results indicate that the shallowest groundwater level encountered was 1.01m bgl. The monitoring has been undertaken over winter / spring seasons, which are periods likely to reflect peak groundwater levels.



Date	24/02/2022		31/03/2022		06/04/2022		14/04/2022		05/12/2023	
	Depth of standpipe mbgl	Water level mbgl	Depth of standpipe mbgl	Water level mbgl	Depth of standpipe mbgl	Water level mbgl	Depth of standpipe mbgl	Water level mbgl	Depth of standpipe mbgl	Water level mbgl
BH1	10.35	1.99	10.36	2.03	10.25	2.50	10.25	no data	10.00	1.80
BH3	10.41	3.03	10.28	3.08	10.28	3.10	10.28	no data	Backfilled	-
WS01	1.07	Dry	1.08	Dry	1.08	Dry	1.07	no data	1.00	Dry
WS02	1.10	Dry	1.10	Dry	1.10	Dry	1.10	no data	1.00	Dry
WS07a	4.06	1.95	4.04	1.25	4.02	1.01	4.02	no data	Backfilled	-

Figure 6: Groundwater Monitoring Data.

e) Milvum undertook trial pits in August 2023 with the intention of undertaking Infiltration Tests (in accordance with BRE365) to inform the potential for soakaway drainage. The following summarises the investigation:

- 6no Trial pits were undertaken at the following locations (exploratory hole plan appended for reference).

Location	Elevation mOD	Easting	Northing
S1	38.81	508899.114	181283.936
S2	39.34	508990.866	181256.003
S3	41.06	509121.128	181309.321
S4	39.65	508917.594	181345.850
S5	39.79	508939.165	181316.900
S6	40.35	509066.670	181240.378

- S1 - Target depth was 2.50m bgl. Gravelly clay was encountered to 0.60m bgl with sandy gravel to 2.20m bgl (36.61mOD) where groundwater was encountered and the excavation was terminated. Groundwater then rose to 1.50m bgl (37.31mOD) over 25 minutes. The test location was abandoned.

- S2 - Target depth was 0.75m bgl. Trial pit was excavated; at target depth soils appeared to be likely Made Ground with high fines content and the pit was deepened to 1.00m bgl, into natural clayey gravelly sand. 3no Tests undertaken between 0.70m and 1.00m bgl. The representative infiltration rate is 6×10^{-6} m/s. Note that standing water level overnight between tests was 0.97m bgl (38.37mOD).

- S3 -Target depth was 0.75m bgl. Trial pit was excavated; at target depth soils were Made Ground with high fines content and the pit was deepened to 1.20m bgl, into



natural clayey gravelly sand. 3no Tests were undertaken between 0.90m and 1.20m bgl. The representative infiltration rate is 6×10^{-6} m/s. The pit drained dry overnight i.e. standing water level is deeper than 1.20m bgl (39.86mOD).

- S4 - Target depth was 2.50m bgl. Trial pit was excavated to target depth through natural gravelly sand. 1no test was undertaken between 2.00m and 2.50m bgl. The water level remained unchanged (2.00m bgl, 37.65mOD) over a 4 hour period (did not drain). The test location was abandoned.

- S5 - Target depth was 2.50m bgl. Trial pit was excavated to target depth through natural clayey gravelly sand; groundwater was encountered at base (37.29mOD). Groundwater then rose to 1.40m bgl (38.39mOD) over 4 hours. The test location was abandoned. The standing water level prior to backfilling (the following day) was 1.30m bgl (38.49mOD).

- S6 - Target depth was 2.50m bgl. Trial pit was excavated through natural clayey gravelly sand; at 2.20m bgl (38.15mOD) groundwater was encountered and the excavation was terminated. 1no test was undertaken between 1.70m and 2.20m bgl. The water level remained unchanged (1.70m bgl, 38.65mOD) over a 4 hour period (did not drain). The test location was abandoned.

f) In summary, the groundwater data from the trial pit excavations / infiltration testing broadly supports the monitoring data, with groundwater within the superficial deposits at generally >1.00m bgl.

Summary and Conclusions

a) LB Hillingdon data indicates no incidents of groundwater flooding at the site.

b) Site investigation and groundwater monitoring has been undertaken at the site. The investigation data has been used to appraise the groundwater flood risk, as recommended by HSP and the LLFA.

c) Monitoring data and observations from trial pits indicates water levels are generally >1.00m bgl (and in all cases >0.97m bgl).



d) The bedrock geology is the London Clay Formation and is an 'unproductive' aquifer, so would not be a source for rising groundwater. Given the superficial deposits of sand and gravel, it is far more likely that the source of groundwater will predominantly be from surface water infiltration and lateral flow in the near ground soils. As such, the risk of groundwater emergence is very low except where ground levels form a basin area.

e) The impact to the proposed buildings / structures within the site boundary is very low; they are very unlikely to be impacted.

f) The risk profile to properties outside of the site boundary from groundwater flooding remains unchanged as a result of the proposed development i.e. there is no impact due to the proposed development.

g) The effect of shallow groundwater on other subterranean aspects of the proposed development should be considered, primarily by the contractor via temporary works to facilitate excavations for foundations, drainage, services etc.

If you have further queries, please do not hesitate to contact the undersigned.

Yours sincerely,

A handwritten signature in black ink, appearing to read "G Kite", with stylized loops and a horizontal line.

Graham Kite

Director

Encs: HSP Site Investigation – Layout Plan and Borehole Logs
Milvum Site Investigation – Layout Plan





DO NOT SCALE	
NOTES:	
 - Approximate Red Line Boundary	
 - Foundation Exploratory Pit Location	
 - Cable Percussive Borehole Location	
 - Windowless Sample Borehole Location	
 <p>Lawrence House, Meadowbank Way, Eastwood, Nottingham, NG16 3SB Tel: 01773 535 555 Fax: 0870 600 6091 www.hspconsulting.com</p>	
CLIENT:	
MACE Group	
PROJECT:	
Rosedale College, Hayes, London	
TITLE:	
Exploratory Hole Location Plan	
SCALE@SIZE :	ISSUE:
NTS	FINAL
DESIGN/DRAWN :	DATE:
DRS/JB	March 2022
PROJECT No:	DRAWING No:
C3886	502
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Borehole Log

Borehole No.

BH01

Sheet 1 of 1

Project Name: Rosedale College

Project No.
C3886

Co-ords: -

Hole Type
CP

Location: Hayes

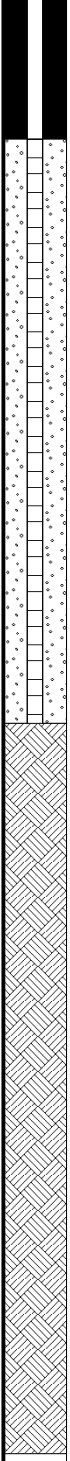



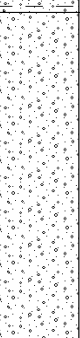


Level:

Scale
1:100

Client: Mace Group Ltd

Dates: 24/02/2022 - 24/02/2022

Logged By
JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40 - 1.10	B					MADE GROUND - Grass overlying brown gravelly silty topsoil. Gravel is sub angular to sub rounded of flint and occasional brick fragments.	
		1.20		50 (5,10/50 for 225mm)	1.10			Stiff dark brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded of flint and mudstone.	1
		1.20 - 1.57	D						
		1.20 - 2.00	B		2.10				2
		2.00		50 (5,11/50 for 150mm)				Very dense to dense brown slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub rounded of flint.	
		2.10 - 2.45	D						3
		3.00	D	N=46 (5,10/46 for 295mm)					
		4.00	D	N=30 (5,6/7,7,8,8)					4
		5.00	D	N=13 (3,6/4,3,3,3)					5
		5.20	D						
		6.00	D						6
		6.50	D	N=19 (3,3/4,4,5,6)	6.70				
		6.70	D		7.00				
		7.00 - 8.00	B					Stiff light brown CLAY.	7
								Stiff to very stiff grey CLAY.	
		8.00	D	N=15 (2,2/3,3,4,5)					8
		8.00 - 8.45	D						
		9.00	D						9
		9.50	D	N=16 (2,2/3,4,4,5)					
		10.00	D						10
		11.00	D	N=18 (2,3/4,4,5,5)					11
		11.00 - 11.45	D						
		12.00	D						12
		12.50	D	N=22 (2,3/4,5,6,7)					
		12.50 - 12.95	D						13
		13.50	D						
		14.00	D	N=24 (2,3/5,5,7,7)					14
		14.00 - 14.45	D						
		15.00	D						15
		15.50	D	N=27 (3,5/5,7,7,8)					
		15.50 - 15.95	D						16
		16.50	D						
		17.00	D	N=30 (4,5/6,7,8,9)					17
		17.00 - 17.45	D						
		18.00	D						18
		18.50	D	50 (25 for 135mm/50 for 50mm)					
		18.50 - 18.71	D						19
		20.00		N=16 (2,4/3,4,4,5)	20.00			End of borehole at 20.00 m	20

Remarks

- No groundwater was encountered during the drilling process.
- Borehole was terminated at 20.00m depth.
- Gas and water monitoring standpipe installed to 10.00m depth.

Borehole Log

Borehole No.

BH02

Sheet 1 of 2

Project Name: Rosedale College	Project No. C3886	Co-ords: -	Hole Type CP
Location: Hayes		Level:	Scale 1:100
Client: Mace Group Ltd		Dates: 21/02/2022 - 21/02/2022	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30 - 0.70	B		0.70			MADE GROUND - Grass overlying brown gravelly silty topsoil. Gravel is sub angular to sub rounded of flint and occasional brick fragments. Stiff dark brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded of flint and mudstone.	
		0.70 - 1.20	B						1
		1.20		N=8 (3,3/2,2,2,2)					
		1.20 - 2.00	B						2
		2.00		N=39 (6,7/7,6,12,14)					
		2.10	D						
		3.00		50 (8,15/50 for 150mm)					3
		3.00 - 4.00	B						
		4.00		N=49 (5,9/10,12,12,15)					4
		4.20	D						
		5.00	D		6.90			Stiff light brown CLAY.	5
		5.00		N=27 (5,6/9,6,6,6)					
		6.00	D						6
		6.50		N=11 (5,4/3,2,3,3)					
		6.60	D						
		6.90 - 7.50	B						7
		7.50 - 8.00	B					Stiff to very stiff grey CLAY.	
		8.00		N=19 (3,4/4,4,5,6)		7.50			8
		8.00 - 8.45	D						
		9.00	D						9
		9.50 - 9.95	U						
		10.10	D						10
		10.50	D						
		11.00		N=22 (3,3/4,5,6,7)					11
		11.00 - 11.45	D						
		12.00	D						12
		12.50		N=18 (2,3/3,4,5,6)	20.00				
		12.50 - 12.95	D						13
		13.50	D						
		14.00		N=20 (2,3/4,5,5,6)					14
		14.00 - 14.45	D						
		15.00	D						15
		15.50		N=19 (3,3/4,4,5,6)					
		15.50 - 15.95	D						16
		16.50	D						
		17.00		N=23 (3,3/5,5,6,7)					17
		17.00 - 17.45	D						
		18.00	D						18
		18.50		N=25 (3,3/5,5,7,8)					
		18.50 - 18.95	D						19
		19.00 - 20.00	B						
		20.00		N=27 (3,4/5,6,7,9)	20.00			Continued on next sheet	20

Remarks

- No groundwater was encountered during the drilling process.
- Borehole was terminated at 20.00m depth.



Borehole Log

Borehole No.

BH02

Sheet 2 of 2

Project Name: Rosedale College

Project No.
C3886

Co-ords: -

Hole Type
CP

Location: Hayes

Level:

Scale
1:100

Client: Mace Group Ltd

Dates: 21/02/2022 - 21/02/2022

Logged By
JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.00 - 20.45	D					End of borehole at 20.00 m	
									21
									22
									23
									24
									25
									26
									27
									28
									29
									30
									31
									32
									33
									34
									35
									36
									37
									38
									39
									40

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 20.00m depth.



Borehole Log

Borehole No.

BH03

Sheet 1 of 2

Project Name: Rosedale College	Project No. C3886	Co-ords: -	Hole Type CP
Location: Hayes		Level:	Scale 1:100
Client: Mace Group Ltd		Dates: 01/03/2022 - 01/03/2022	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			MADE GROUND - Grass overlying brown gravelly silty topsoil. Gravel is sub angular to sub rounded of flint and occasional brick fragments. Stiff dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded of flint and mudstone.	1
		1.20		N=18 (2,2/3,4,5,6)					
		1.20 - 1.65	D						
		1.20 - 2.00	B						
		2.00	D		2.00				2
		2.00		50 (5,10/50 for 200mm)				Very dense to dense brown slightly sandy GRAVEL. Sand is fine to coarse. Gravel angular to sub rounded of flint.	
		3.00	D						3
		3.00		50 (5,15/50 for 150mm)					
		4.00		N=12 (2,2/2,3,3,4)					4
		4.10	D		4.40				
		4.50	D					Stiff light brown CLAY.	
		5.00 - 5.45	U		4.90			Stiff to very stiff grey CLAY.	5
		5.60	D						6
		5.60 - 6.50	B						
		6.50		N=21 (2,3/4,5,6,6)					7
		6.50 - 6.95	D						
		7.50	D						8
		8.00		N=19 (2,2/4,4,5,6)					
		8.00 - 8.45	D						9
		9.00	D						
		9.50		N=22 (3,4/5,5,6,6)					10
		9.50 - 9.95	D						
		10.50	D						11
		11.00		N=18 (2,3/4,4,5,5)					
		11.00 - 11.45	D						12
		11.50 - 12.50	B						
		12.50		N=24 (3,3/5,5,7,7)					13
		12.50 - 12.95	D						
		13.50	D						14
		14.00		N=23 (3,4/5,5,6,7)					
		14.00 - 14.45	D						15
		15.00	D						
		15.50		N=24 (4,5/5,5,6,8)					16
		15.50 - 15.95	D						
		16.50	D						17
		17.00		N=41 (2,3/4,5,20,12)					
		17.00 - 17.45	D						18
		18.00	D						
		18.50		N=22 (2,3/4,5,6,7)					19
		18.50 - 18.95	D						
		19.00 - 20.00	B						20
		20.00		N=26 (3,4/5,6,7,8)	20.00			Continued on next sheet	

Remarks

- No groundwater was encountered during the drilling process.
- Borehole was terminated at 20.00m depth.
- Gas and water monitoring standpipe installed to 10.00m depth.



Borehole Log

Borehole No.

BH03

Sheet 2 of 2

Project Name: Rosedale College

Project No.
C3886

Co-ords: -

Hole Type
CP

Location: Hayes

Level:

Scale
1:100

Client: Mace Group Ltd

Dates: 01/03/2022 - 01/03/2022

Logged By
JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.00 - 20.45	D					End of borehole at 20.00 m	
									21
									22
									23
									24
									25
									26
									27
									28
									29
									30
									31
									32
									33
									34
									35
									36
									37
									38
									39
									40

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 20.00m depth.
3. Gas and water monitoring standpipe installed to 10.00m depth.



Borehole Log

Borehole No.

BH04

Sheet 1 of 2

Project Name: Rosedale College	Project No. C3886	Co-ords: -	Hole Type CP
Location: Hayes		Level:	Scale 1:100
Client: Mace Group Ltd		Dates: 28/02/2022 - 28/03/2022	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40 - 1.00	B		0.40			MADE GROUND - Grass overlying brown gravelly silty topsoil. Gravel is sub angular to sub rounded of flint and occasional brick fragments. Stiff dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded of flint and mudstone.	1
		1.00		50 (6,13/50 for 135mm)					
		1.10	D						
		2.00	D		2.00				2
		2.00		N=30 (3,6/6,8,8,8)					
		3.00		N=6 (2,3/2,2,1,1)				Very dense to dense brown slightly sandy GRAVEL. Sand is fine to coarse. Gravel angular to sub rounded of flint.	3
		3.20	D						
		4.00		N=8 (0,0/1,2,2,3)					4
		4.00 - 5.00	B						
		5.00		N=12 (1,1/2,2,4,4)					5
		5.10	D		5.40				
		5.50	D					Stiff light brown CLAY.	
		6.00	D		6.00				6
		6.50 - 6.95	U					Stiff to very stiff grey CLAY.	
		7.10	D						7
		7.10 - 8.00	B						
		8.00		N=17 (1,2/3,4,5,5)					8
		8.00 - 8.45	D						
		9.00	D						9
		9.50		N=22 (3,4/5,5,6,6)					
		9.50 - 9.95	D						10
		10.50	D						
		11.00		N=24 (3,4/4,5,7,8)					11
		11.00 - 11.45	D						
		12.00	D						12
		12.50		N=21 (3,3/4,5,6,6)					
		12.50 - 12.95	D						13
		13.50	D						
		14.00		N=24 (4,4/5,6,6,7)					14
		14.00 - 14.45	D						
		15.00	D						15
		15.50		N=23 (4,4/5,5,6,7)					
		15.50 - 15.95	D						16
		16.50	D						
		17.00		N=23 (3,4/5,5,6,7)					17
		17.00 - 17.45	D						
		18.00	D						18
		18.50		N=24 (4,4/5,5,7,7)					
		19.50	D						19
		20.00		N=29 (4,5/5,7,8,9)	20.00				20

Continued on next sheet

Remarks

- No groundwater was encountered during the drilling process.
- Borehole was terminated at 20.00m depth.



Borehole Log

Borehole No.

BH04

Sheet 2 of 2

Project Name: Rosedale College

Project No.
C3886

Co-ords: -

Hole Type
CP

Location: Hayes

Level:

Scale
1:100

Client: Mace Group Ltd

Dates: 28/02/2022 - 28/03/2022

Logged By
JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.00 - 20.45	D					End of borehole at 20.00 m	
									21
									22
									23
									24
									25
									26
									27
									28
									29
									30
									31
									32
									33
									34
									35
									36
									37
									38
									39
									40

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 20.00m depth.



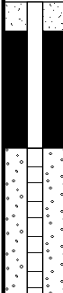
Borehole Log

Borehole No.

WS01


Sheet 1 of 1

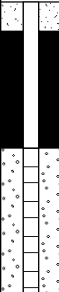
Project Name: Rosedale College	Project No. C3886	Co-ords: -	Hole Type WS
Location: Hayes		Level:	Scale 1:25
Client: Mace Group Ltd		Dates: 08/03/2022 - 08/03/2022	Logged By JB


Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.04			MADE GROUND - Asphalt concrete.	
					0.14			MADE GROUND - Concrete.	
		0.30	ES					MADE GROUND - Black and grey slightly sandy very gravelly silt. Sand is fine to coarse. Gravel is angular to sub rounded of brick, ceramics, flint and mudstone.	
		0.70	ES		0.64			Firm dark brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded of flint and mudstone.	
		0.90	D						
		1.00		N=50 (12,12/50 for 235mm)	1.00			End of borehole at 1.00 m	1
									2
									3
									4
									5

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 1.00m depth due to refusal.
3. Gas and water monitoring standpipe installed to 1.00m depth.

				<h1>Borehole Log</h1>				Borehole No. WS02 Sheet 1 of 1	
Project Name: Rosedale College				Project No. C3886		Co-ords: -		Hole Type WS	
Location: Hayes				Level:		Scale 1:25		Logged By JB	
Client: Mace Group Ltd				Dates: 08/03/2022 - 08/03/2022					

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.03			MADE GROUND - Asphalt concrete.	
					0.09			MADE GROUND - Concrete.	
					0.40			MADE GROUND - Black and grey slightly sandy very gravelly silt. Sand is fine to coarse. Gravel is angular to sub rounded of brick, ceramics, flint and mudstone.	
		0.50	ES					Firm dark brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded of flint and mudstone.	
		1.00		50 (10,12/50 for 125mm)	0.95 1.00			Very dense brown very clayey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub rounded of flint.	1
End of borehole at 1.00 m									
									2
									3
									4
									5

Remarks 1. No groundwater was encountered during the drilling process. 2. Borehole was terminated at 1.00m depth due to refusal. 3. Gas and water monitoring standpipe installed to 1.00m depth.									
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WS04

Sheet 1 of 1

Project Name: Rosedale College

Project No.
C3886

Co-ords: -

Hole Type	WS
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
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31	31
32	32
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34	34
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70	70
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72	72
73	73
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75	75
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78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
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92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

Location: Hayes


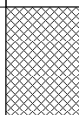
Level:

Scale
1:25

Client: Mace Group Ltd

Dates: 08/03/2022 - 08/03/2022

Logged By
JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES	50 (25 for 80mm/50 for 105mm)	0.40 0.90 1.00			MADE GROUND - Grass overlying brown gravelly silty topsoil. Gravel is sub angular to sub rounded of flint and occasional brick fragments.	1 <

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 1.00m depth due to refusal and backfilled with arisings.



Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name: Rosedale College

Project No.
C3886

Co-ords: -

Hole Type
WS

Location: Hayes


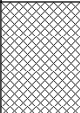
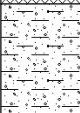

Level:

Scale
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Client: Mace Group Ltd

Dates: 08/03/2022 - 08/03/2022

Logged By
JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES					MADE GROUND - Grass overlying brown gravelly silty topsoil. Gravel is sub angular to sub rounded of flint and occasional brick fragments.	
					0.39			Firm dark brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded of flint and mudstone.	
		0.90	D		0.80			Very dense brown very clayey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub rounded of flint.	
		1.00		50 (6,13/50 for 170mm)	1.00			End of borehole at 1.00 m	1
									2
									3
									4
									5

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 1.00m depth due to refusal and backfilled with arisings.

Borehole Log

Borehole No.

WS06

Sheet 1 of 1

Project Name: Rosedale College	Project No. C3886	Co-ords: -	Hole Type WS
Location: Hayes		Level:	Scale 1:25
Client: Mace Group Ltd		Dates: 08/03/2022 - 08/03/2022	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			MADE GROUND - Grass overlying brown gravelly silty topsoil. Gravel is sub angular to sub rounded of flint and occasional brick fragments.	
		0.60	ES		0.65			Firm dark brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded of flint and mudstone.	
		1.00		50 (5,10/50 for 210mm)	1.00			Very dense brown very clayey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub rounded of flint.	
								End of borehole at 1.00 m	1
									2
									3
									4
									5

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 1.00m depth due to refusal and backfilled with arisings.

Borehole Log

Borehole No.

WS07

Sheet 1 of 1

Project Name: Rosedale College	Project No. C3886	Co-ords: -	Hole Type WS
Location: Hayes		Level:	Scale 1:25
Client: Mace Group Ltd		Dates: 09/03/2022 - 09/03/2022	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES					MADE GROUND - Grass overlying brown gravelly silty topsoil. Gravel is sub angular to sub rounded of flint and occasional brick fragments.	
					0.65				
					0.75			MADE GROUND - Brown sandy gravel. Sand is fine to coarse. Gravel is angular to sub rounded of flint.	
					0.90			MADE GROUND - Brown sandy gravel. Sand is fine to coarse. Gravel is angular to sub rounded of flint.	
								End of borehole at 0.90 m	
									1
									2
									3
									4
									5

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 0.90m depth due to sides collapsing and backfilled with arisings.

Borehole Log

Borehole No.

WS07A

Sheet 1 of 1

Project Name: Rosedale College

Project No.
C3886

Co-ords: -

Hole Type
WS

Location: Hayes

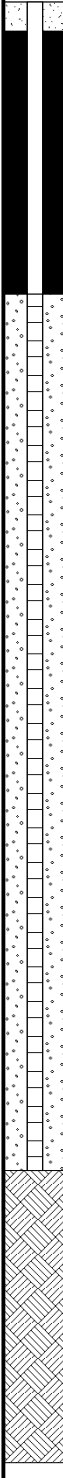

Level:

Scale
1:25

Client: Mace Group Ltd


Dates: 09/03/2022 - 09/03/2022


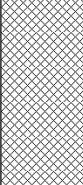
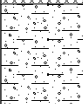
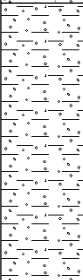
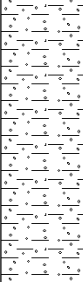
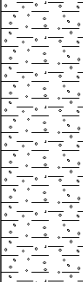
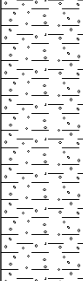

Logged By
JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								MADE GROUND - Grass overlying brown gravelly silty topsoil. Gravel is sub angular to sub rounded of flint and occasional brick fragments.	
					0.80				
					0.90			Firm dark brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded of flint and mudstone.	1
					1.10			Firm light brown slightly gravelly CLAY. Gravel is sub angular to sub rounded of flint.	
		1.20	D					Firm becoming very stiff light brown CLAY.	
		1.20		N=5 (2,1/1,1,1,2)					
		1.40	B						
		2.00		N=7 (1,2/1,2,2,2)				...becoming grey in colour between 2.00m to 5.00m depth.	2
		3.00		N=13 (2,2/3,3,3,4)					3
		4.00		N=12 (2,2/2,3,3,4)					4
		5.00		N=23 (4,5/5,6,6,6)					5
					5.00			End of borehole at 5.00 m	

Remarks


- No groundwater was encountered during the drilling process.
- Borehole was terminated at 5.00m depth due to refusal.
- Gas and water monitoring standpipe installed to 5.00m depth.

				<h1>Borehole Log</h1>			Borehole No. WS08 Sheet 1 of 1	
Project Name: Rosedale College				Project No. C3886		Co-ords: -		Hole Type WS
Location: Hayes				Level:		Scale 1:25		
Client: Mace Group Ltd				Dates: 09/03/2022 - 09/03/2022		Logged By JB		

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40	D		0.65			MADE GROUND - Grass overlying brown gravelly silty topsoil. Gravel is sub angular to sub rounded of flint and occasional brick fragments.	
					1.00			Firm dark brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded of flint and mudstone.	1
		1.20		N=7 (1,1/1,2,2,2)				Firm light brown slightly gravelly CLAY. Gravel is sub angular to sub rounded of flint.	
		2.00		N=11 (2,2/2,2,3,4)				...becoming grey in colour between 2.00m to 5.00m depth.	2
		3.00 3.00	D	N=9 (2,2/2,2,2,3)					3
		4.00		N=11 (1,2/2,2,3,4)					4
		5.00		N=14 (2,2/3,3,4,4)	5.00			End of borehole at 5.00 m	5

Remarks

- No groundwater was encountered during the drilling process.
- Borehole was terminated at 5.00m depth due to refusal and backfilled with arisings.




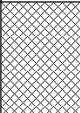

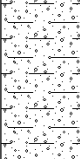
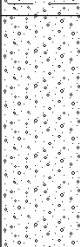
Borehole Log

Borehole No.

WS09

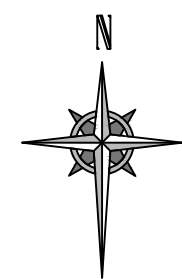
Sheet 1 of 1

Project Name: Rosedale College	Project No. C3886	Co-ords: -	Hole Type WS
Location: Hayes		Level:	Scale 1:25
Client: Mace Group Ltd		Dates: 09/03/2022 - 09/03/2022	Logged By JB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES		0.40			MADE GROUND - Grass overlying brown gravelly silty topsoil. Gravel is sub angular to sub rounded of flint and occasional brick fragments.	
					0.60			Firm dark brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub rounded of flint and mudstone.	
		1.00		N=27 (5,6/5,7,6,9)	1.20			Very dense brown very clayey slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub rounded of flint.	1
		2.00		50 (8,11/50 for 210mm)	2.00			Very dense brown very sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub rounded of flint.	2
								End of borehole at 2.00 m	2
									3
									4
									5

Remarks

1. No groundwater was encountered during the drilling process.
2. Borehole was terminated at 2.00m depth due to refusal and backfilled with arisings.



SOAKAGE TESTS TO BRE DIGEST 365

- Suggested Soakage Test Location at 2.0m depth
- Suggested Soakage Test Location at 0.75m depth
- Suggested CBR Test Location at 0.75m depth

REVISED TEST
LOCATIONS
21.08.23

- GENERAL NOTES**
1. Do not scale.
 2. This drawing is to be read in conjunction with all other relevant drawings/reports.
 3. All dimensions shown are in millimetres unless noted otherwise.
 4. This drawing is based on THE HOUSE SURVEY Drawing Number, Z280200, Topographical/Utility Survey, dated Feb 2022.
 5. All survey information is provided by the surveying company and HSP cannot accept any liability for any discrepancies there in. All survey information to be verified on site by contractor. Should discrepancies be identified, HSP to be notified immediately.

LEGEND	
	Kerb / Hard Edge
	Change of Surface
	Wall
	Retaining Wall
	Security Fence
	Fence
	Building
	Overhead Feature
	Top of Embankment
	Bottom of Embankment
	Hedge
	Vegetation / Tree Canopy

	Tree	AB 35.30	Air Brick Level
	Gate	435.30	Level
	Outfall	CL 35.30	Cover Level
	Tree Stump	IL 35.30	Invert Level
		TL 35.30	Threshold Level
		435.30	Top of Kerb
		TV 35.30	Top of Wall Level

B	Boltard	GU	Gully
BH	Borehole	IC	Inspect. cover
BM	Bench Mark	KO	Kerb Outlet
BS	Bias Shop	LP	Lamp Post
BT	Telecom cover	MH	Manhole
CT	Cable TV cover	MK	Marker
EP	Electric pole	OF	Outfall
ER	Earthing rod	P	Post
FH	Fire Hydrant	RE	Roadside Eye
FS	Flagstaff	RS	Road Sign
G	Gas Cover	TP	Telecom pole
⊙	Survey station	W	Water cover

Utilities	
	British Telecom
	BT Overhead
	Cable TV
	Closed Circuit TV
	Combined Service Drainage Route
	Communications
	Electric
	Electric Overhead
	Field Drain
	Foul Water Drainage Route
	Gas
	Street Lighting
	Surface Water Drainage Route
	Water
	Multi Service Route
	Multi Service Trench
	Empty Ducting
	GPR Anomaly Possible Utility
	Unknown Drainage Route
	Unknown Utility
	Assumed BT
	Assumed Cable
	Assumed Electric
	Assumed Gas
	Assumed Street Lighting
	Assumed Unknown
	Assumed Water
	BT - Taken from Records
	Cable - Taken from Records
	Electric - Taken from Records
	Gas - Taken from Records
	Street Lighting - Taken from Records
	Water - Taken from Records
	Survey Extents

All below ground details shown have been identified from above ground without excavation. The Survey House Ltd use electro-magnetic and/or ground penetrating radar (GPR) methods to investigate for underground utilities, services and features. Results using these methods are not absolute and are recommended that excavations are carried out to confirm any identifications, positions and depths.

Any areas on the drawing where services or features have not been shown are not necessary clear of services or features but are an indication that no items have been identified during our investigation. All reasonable care and normal good practice should still be employed during design and construction.

Certain types of services such as plastic or concrete pipes, some conduit and ducting where direct access cannot be achieved for tracing may not be shown and alternative locating methods should be used.

The Survey House Ltd has used all reasonable care to research available services records but completeness or use of the services records supplied to it by The Survey House Ltd cannot be guaranteed. Therefore The Survey House Ltd cannot be held responsible for any features associated or Taken from Records (TR).

Depths obtained using electro-magnetic or GPR are effected by ground conditions and should be treated as indicative only. Electro-magnetic depths to utilities and services are generally taken to the centre of a feature. GPR depths to the top of a feature and drainage depth shown to invert, unless otherwise indicated.

Drainage pipe sizes will be obtained without entering the chamber and therefore should be treated as approximate. Pipe dimensions which have not been obtained directly will be taken from records where available.

All services, drainage and utility routes are assumed straight between access points, unless otherwise stated. The number of cables in runs will not be shown unless specifically requested. All services are below ground unless indicated.

Services, utilities and features may not have been surveyed if obstructed or not reasonably visible or accessible at time of survey.

All critical dimensions and measurements should be checked and verified with any errors or discrepancies notified to The Survey House Ltd immediately. The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The contractor must check and verify all site and building dimensions, levels, utilities and drainage detail and corrections prior to commencing work.

P03	IA	08.03.22	Updated survey added	LB
P02	IA	11.02.22	Updated survey added	LB
P01	IA	27.01.22	First revision	LB
REV	BY	DATE	DETAILS	CHD

STATUS	S2 - INFORMATION
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CLIENT

Mace Group

PROJECT

Hemel Hempstead School

TITLE
Topographical and Utility
Survey



SCALE	PROJECT NO.	SHEET
1:500	C3863	SIZE A0
DATE	DRAWN	CHECKED
09.03.22	IA	LB
DRAWING NO.	REV	
C3863-HSP-00-00-DR-G-SK100	P03	