



Executive Summary

Remada Ltd was commissioned by Lidl Great Britain Ltd to undertake a Phase 2 Ground Investigation at Purbrook Way, Havant, PO9 3QJ at the location indicated in **Figure 1**.

Site Setting & History

The site is irregular in shape and with boundaries that are parallel with Purbrook Way the south and the adjacent B&Q store to the east. The western and northern boundary is curved and formed by the access road to B&Q. The topography of the site is obscured by impenetrable dense vegetation in central and southern parts however the northern is grassy and slopes down to the access road that serves B&Q.

The site has not been previously developed but its present-day topography and historic maps indicated that is formed of a spoil heap of surplus soils. The source of spoil heap (made ground) is not known but may be due to construction of either the B&Q store or adjacent roads (Purbrook Way and/or A3(M)).

Published Geology & Hydrogeology

Published geological maps indicate that the site is directly underlain by London Clay of thickness 77 to 120m which is designated as unproductive strata, overlying Reading Beds and a sequence of chalks.

The investigation comprised 3 No cable tool boreholes to target 10m depth and 5 No window sample holes to 5m depth. Due to dense vegetation and restraints imposed by the ecologist, it was not possible to access all window sample locations with the proposed car park. Made Ground was observed at all exploratory locations as firm to stiff orange/brown grey slightly gravelly clay to a maximum depth of 5.0m in CP1 and CP2 beneath the store footprint. At CP3A and CP3B the fill material contained concrete boulders and concrete kerbstones that were removed by excavator and the exploratory hole was advanced as a trial pit. WS2 was also obstructed by a concrete boulder within the fill material that was subsequently removed by excavator and the exploratory hole was advanced as a trial pit.

Bedrock was encountered in all of the exploratory holes as stiff to very stiff micaceous blue grey CLAY considered to be representative of London Clay. Due to the change in topographical elevation between the perimeter of the site and central area beneath the proposed store footprint, the depth to bedrock varied from 0.25m at WS1 to 5.0m in CP1 and CP2.

Human Health Assessment

The results of soil chemical analysis were compared to Human Health Generic Assessment Criteria for commercial land use. None of the analytes tested were detected at concentrations that exceeded the human health GAC protective of on-site workers.

Water Resources Assessment

The results of the soil chemical analysis undertaken has identified that concentrations of metals and inorganic contaminants are within the range of typical made ground. Detectable concentrations of TPH and PAHs were encountered WS2 however BGS Sheet 316 indicates that the London Clay extends to a minimum of 77m and it is therefore considered to be protective of the underlying groundwater source protection zone. There are no watercourses within close proximity of site.

Waste Classification

Additional sampling and analyses were undertaken on the made ground fill at between 0.5m and 3.5m bgl to enable an assessment of potential waste disposal classification as it anticipated that ground will be reduced to enable the development. The concentrations of metals and organic contaminants were generally in the range of inert soils and in general, the results of the chemical analysis indicates that the material would generally be classified as inert however due to concentration of Total Organic Carbon it may necessary to discuss the results with potential receive site to ensure that the surplus is removed as an inert material.



2 SUMMARY OF PHASE 1 DESK STUDY

The Executive Summary and Conceptual Site Model presented within the Phase 1 Desk Study are reproduced below:

Site Setting

*The site is irregular in shape and with boundaries that are parallel with Purbrook Way the south and the adjacent B&Q store to the east as indicated in **Figure 2**. The western and northern boundary is curved and formed by the access road to B&Q. The topography of the site is obscured by impenetrable dense vegetation in central and southern parts however the northern is grassy and slopes down to the access road that serves B&Q. The boundary to B&Q is formed by a retaining wall that retains the site at approximately 3m above the adjacent car park. The southern boundary of the site also reduces in level to form a low-lying abandoned track adjacent to Purbrook Way.*

Site History

The site has not been previously developed but its present-day topography and historic maps indicated that is formed of a spoil heap of surplus soils. The source of spoil heap (made ground) is not known but may be due to construction of either the B&Q store or adjacent roads (Purbrook Way and/or A3(M)).

Published Geology / Hydrogeology

Published geological maps indicate that the site is directly underlain by London Clay of thickness 77 to 120m which is designated as unproductive strata.

Recommendations

Environmental

The desk study has identified a number of on-site and off-site potential sources of contamination that would require further investigation. The following is recommended:

- *Investigation of the lateral and vertical extent of made ground/fill beneath the proposed store footprint;*
- *Collection of soil and groundwater samples from the areas identified above for contaminants of concern; and*
- *Ground gas monitoring.*

Geotechnical

It is recommended that a ground investigation is undertaken to enable preliminary foundation design.



4 GEOTECHNICAL & ENVIRONMENTAL INVESTIGATION FINDINGS

4.1 Ground Conditions

A brief description of the published geology is provided together with a summary of the ground conditions encountered during the intrusive investigation. Exploratory logs are presented at the end of the report.

4.1.1 Published Geology

Bedrock beneath the site is formed of London Clay and designated as unproductive strata. However, a Principal Aquifer associated with a sequence of chalk members is recorded approximately 2000m to the south. BGS Map 316 indicates that the site is underlain by London Clay to a depth of 77 to 120m, overlying Reading Beds and the following sequence of chalk members: Portsdown, Spetisbury, Tarrant, Newhaven, Seaford and Lewes etc.

4.1.2 Made Ground

Made Ground was observed at all exploratory locations as firm to stiff orange/brown grey slightly gravelly clay to a maximum depth of 5.0m in CP1 and CP2 beneath the store footprint. At CP3A and CP3B the fill material contained concrete boulders and concrete kerbstones that were removed by excavator and the exploratory hole was advanced as a trial pit.

4.1.3 Superficial Deposits

No superficial deposits were positively identified underlying the study site during Remada's investigation.

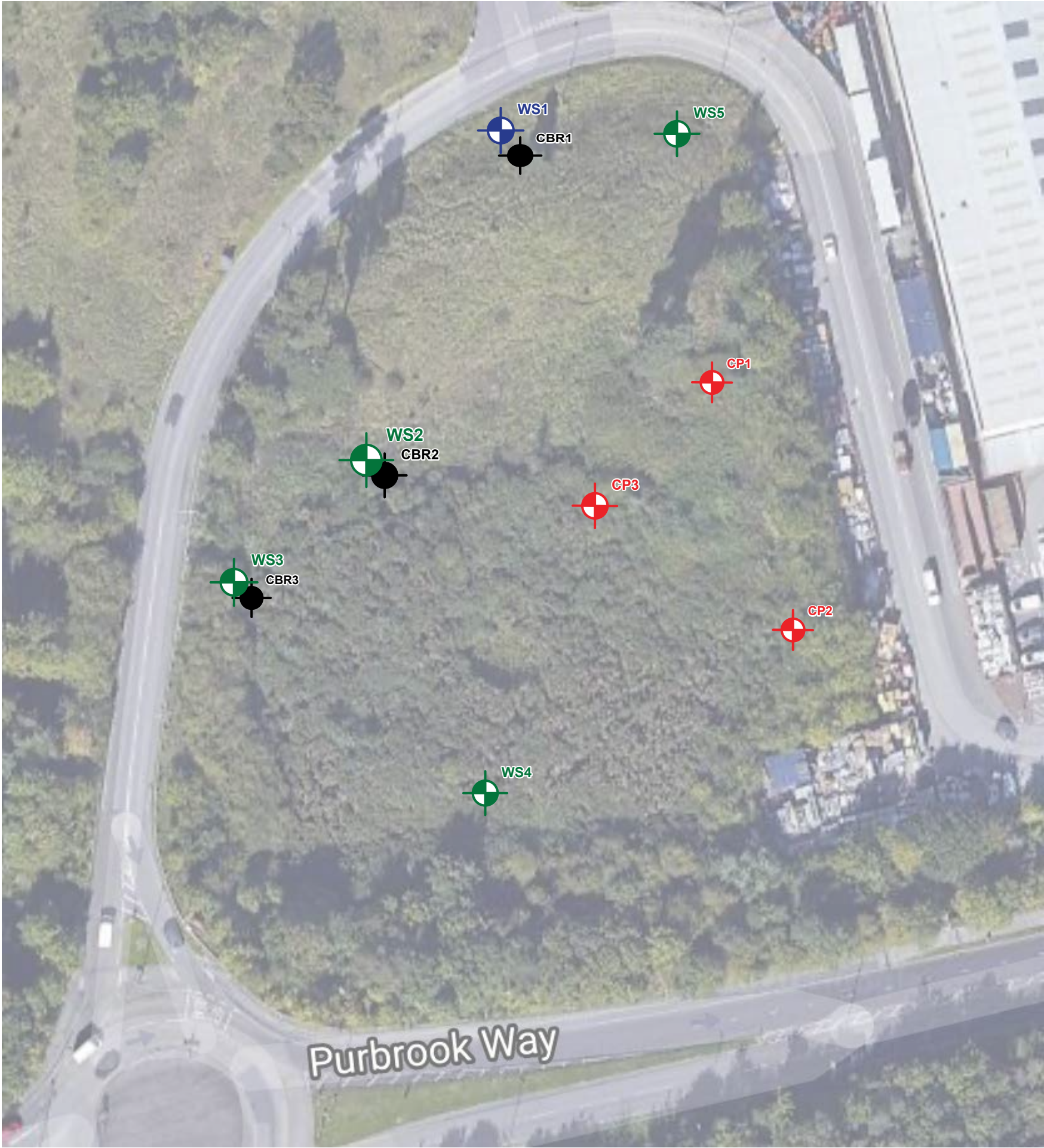
4.1.4 Bedrock

Bedrock was encountered in all of the exploratory holes as stiff to very stiff micaceous blue grey CLAY considered to be representative of London Clay. Due to the change in topographical elevation between the permitted of the site and central area beneath the proposed store footprint, the depth to bedrock varied from 0.25m at WS1 to 5.0m in CP1 and CP2. The topographical elevation of the stiff to very stiff micaceous blue grey CLAY reduced from 37.9m AOD beneath the north of the site at WS1 to 35.3m AOD at CP2 adjacent to the retaining wall beneath the southern end of the proposed store footprint.

4.2 In-situ Testing

4.2.1 Standard Penetration Tests (SPTs)

In-situ SPTs were undertaken to assist with the interpretation of strata encountered and the results of uncorrected N-values versus depth are plotted in the graph below. It should be noted that the SPTs that refused within the made ground and the weathered bedrock have not been included in the graph.



Legend

WS1

Window Sample & Installation

WS2

Window Sample

CP1

Cabletool Borehole & Installation

CBR1

CBR Test

Notes

WS 4: proposed location not accessible as vegetation clearance not permitted by ecologist

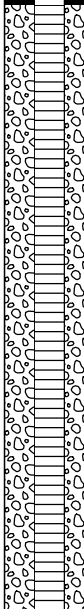
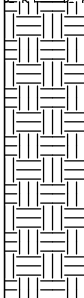
Project Title		
Havant, Purbrook Way		
Drawing Title		
Figure 2: Exploratory Locations with Existing Layout		
Client		
Lidl Great Britain Ltd		
Scale	Drawn	Size
As shown	GJ	A3
Date	Job No.	Drawing / Rev No.
20.07.20	770	02



EXPLORATORY LOGS

BOREHOLE LOG

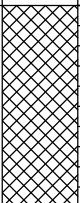
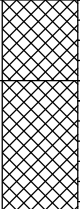
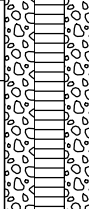
Project Havant				BOREHOLE No WS1	
Job No 770.02	Date 11-08-20	Ground Level (m) 38.18	Co-Ordinates () E 469,415.0 N 107,845.0		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water				STRATA		Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION			
0.00-0.25	ES			37.93		0.25	MADE GROUND: Firm to stiff ferruginous red/brown/grey silty clay with flecks of chalk (earthworks fill).			
0.25-1.00	D							Firm to stiff micaceous blue/grey CLAY (London Clay). Becoming stiff...		
1.00		N14					Becoming very stiff....			
2.00		N19								
3.00		N24				(5.25)				
4.00		N26								
5.00		N39								
				32.68		5.50				

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination
											No groundwater encountered.
											Borehole positioned on slope so working platform cut with excavator. Top of borehole approximately 0.5m below adjacent ground surface.
All dimensions in metres Scale 1:37.5			Client Lidl Great Britain Ltd			Method/ Plant Used Tracked Rig					

BOREHOLE LOG

Project Havant				BOREHOLE No WS2	
Job No 770.02	Date 11-08-20	Ground Level (m) 42.12	Co-Ordinates () E 469,396.0 N 107,796.0		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water				STRATA		Geology	Instrument/ Backfill	
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION				
1.00	ES	N10				(1.00)	MADE GROUND: Light brown/grey gravelly sandy clay. Gravel is chalk, brick and concrete (earthworks fill).				
				41.12		1.00	MADE GROUND: Concrete boulder with steel beam - Removed by excavator.				
40.62				1.50		MADE GROUND: Soft to firm red/brown/grey clay with black staining and a hydrocarbon odour (earthworks fill).					
1.50-1.90	D	N8		40.22		(0.40)	MADE GROUND: Firm to stiff blue/grey/brown clay (earthworks fill).				
2.00-2.75				2.00						(0.85)	MADE GROUND: Firm to stiff brown/grey clay (earthworks fill).

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered.
All dimensions in metres Scale 1:37.5			Client Lidl Great Britain Ltd			Method/ Plant Used Tracked Rig			Logged By GJ		

BOREHOLE LOG

Project Havant				BOREHOLE No WS3	
Job No 770.02	Date 11-08-20	Ground Level (m) 42.57	Co-Ordinates () E 469,380.0 N 107,780.0		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water				STRATA		Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION			
1.00-2.00 1.00	ES	N21				(2.25)	MADE GROUND: Stiff light brown gravelly slightly sandy clay. Gravel is brick (earthworks fill). Becoming very stiff.....			
2.00		N58/ 200 mm		40.32		2.25	MADE GROUND: Firm brown gravelly clay. Gravel is chalk (earthworks fill).			
3.00		N18		39.37		3.20	MADE GROUND: Stiff brown/blue/grey sandy clay (earthworks fill).			
4.00		N19				(2.30)				
				37.07		5.50	Stiff blue/grey micaceous clay			
				36.57		(0.50) 6.00				

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered.
All dimensions in metres Scale 1:37.5			Client Lidl Great Britain Ltd			Method/ Plant Used Tracked Rig			Logged By GJ		

BOREHOLE LOG

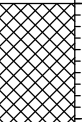
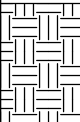
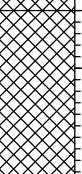
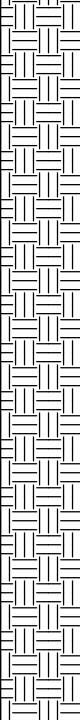
Project Havant				BOREHOLE No WS5	
Job No 770.02	Date 11-08-20	Ground Level (m) 39.12	Co-Ordinates () E 469,442.0 N 107,844.0		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS				STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.60-0.80	ES					(1.60)	MADE GROUND: Firm to stiff ferruginous red/brown/grey clay.		
1.00		N10							
				37.52		1.60	Firm blue grey micaceous CLAY.		
2.00		N37					Becoming stiff...		
2.55-3.00	U						Becoming very stiff....		
3.00		N50/ 295 mm				(3.90)			
				33.62		5.50			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered.
All dimensions in metres Scale 1:37.5			Client Lidl Great Britain Ltd			Method/ Plant Used Tracked Rig			Logged By GJ		

BOREHOLE LOG

Project Havant				BOREHOLE No CP1	
Job No 770.02	Date 17-08-20 18-08-20	Ground Level (m) 41.87	Co-Ordinates () E 469,447.0 N 107,809.0		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water				STRATA	Geology	Instrument/ Backfill	
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick- ness)	DESCRIPTION			
0.50	ES	N22	40.77		(1.10)	MADE GROUND: Firm to stiff orange/brown very sandy slightly gravelly clay (earthworks fill).				
1.50	D ES				(0.90)	MADE GROUND: Firm to stiff orange / brown sandy clay (earthworks fill).				
2.00 2.00					39.87 39.37	2.00 2.50			MADE GROUND: Orange brown silty clayey sand (earthworks fill).	
2.50	U100				N12	37.87				(1.50)
3.00 3.00	D	4.00	Stiff to very stiff blue grey slightly micacious CLAY.							
4.00	U100	N20								
4.45 4.50	D									
5.50	D									
6.00 6.00	D	N18								
7.00	U100									
7.50	N20									
9.00		N20								
10.00										

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered.
All dimensions in metres Scale 1:65.625			Client Lidl Great Britain Ltd			Method/ Plant Used Dando 2000			Logged By GJ		

BOREHOLE LOG

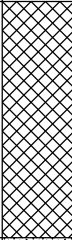
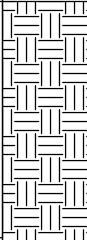
Project Havant				BOREHOLE No CP2	
Job No 770.02	Date 18-08-20 19-08-20	Ground Level (m) 40.53	Co-Ordinates () E 107,744.0 N 469,455.0		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS				STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.50	ES	N13				(2.60)	MADE GROUND: Firm to stiff orange/brown grey slightly gravelly clay (earthworks fill).		
1.50	ES								
2.20	U100			37.93		2.60			
3.00	ES	N19				(2.40)	MADE GROUND: Stiff to very stiff orange brown silty clay (earthworks fill).		
4.00	U100								
4.50	D	N19		35.53		5.00			
4.50							Stiff to very stiff blue/grey slightly micaceous CLAY.		
6.00		N16							
6.50	D								
7.00	U100	N18				(5.50)			
7.45	D								
7.50									
9.00		N26							
10.00		N24							
				30.03		10.50			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered
All dimensions in metres Scale 1:65.625			Client Lidl Great Britain Ltd			Method/ Plant Used Dando 2000			Logged By GJ		

BOREHOLE LOG

Project Havant				BOREHOLE No CP3A	
Job No 770.02	Date 17-08-20 17-08-20	Ground Level (m) 42.11	Co-Ordinates () E 469,424.0 N 107,791.0		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water				STRATA		Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION			
0.50-0.70	ES	N16				(2.05)	Made Ground: Stiff to very stiff orange brown slightly gravelly clay. Gravel is concrete and brick.			
1.50				40.06		2.05	Obstruction			
				39.61		2.50				

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered
All dimensions in metres Scale 1:65.625			Client Lidl Great Britain Ltd			Method/ Plant Used Dando 2000			Logged By GJ		

BOREHOLE LOG

Project Havant				BOREHOLE No CP3B	
Job No 770.02	Date 17-08-20 17-08-20	Ground Level (m) 42.11	Co-Ordinates () E 469,424.0 N 107,792.0		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water				STRATA		Geology	Instrument/ Backfill	
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION				
0.50	ES	N38				(2.10)	MADE GROUND: Stiff to very stiff slightly gravelly clay. Gravel is concrete and brick.				
1.50	D ES										
1.50											
1.50											
				40.01		2.10					
				39.71		2.40	OBSTRUCTION: Concrete boulders and kerbstones removed by 8 tonne excavator and explorator hole continued as as trial pit - see photos.				
				39.21		(0.50) 2.90	MADE GROUND: Stiff to very stiff orange brown/grey gravelly clay. Gravel is concrete and brick.				
							MADE GROUND: Stiff to very stiff orange/brown slightly sandy CLAY.				
						(2.10)					
				37.11		5.00					
				36.61		(0.50) 5.50	Very stiff blue grey slightly micacious CLAY.				



Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Depth	Date	Time	Casing Depth	Casing Dia. mm	Water Depth	From	To	Hours	From	To	
											NVO - No Visual or Olfactory Evidence of Contamination No groundwater encountered
All dimensions in metres Scale 1:65.625			Client Lidl Great Britain Ltd			Method/ Plant Used Dando 2000			Logged By GJ		

