

Appendix E – BGS Borehole Records

TL 45 NW / 1154308.5953

GEOLOGICAL SURVEY AND MUSEUM

County and 6" Sheet

1" N.S.

Cambridge

408W. (U)

Permanent Record No.

F

Trial holes by G.W. Lack (after 1947)

at University Farm, Cambridge

Stated site near Dutch Barn, towards Observatory

Hole No I

Soil + gravel mixture

0 - 4'

(1.22 m)

Sandy mixture

4 - 4'6"

(1.37 m)

Fine sand

4'6" - 5'6"

(1.68 m)

Gravel

5'6" - 6'9"

(2.00 m) W.L. 6'2"

Sandy marl

6'9" - 7'6"

(2.29 m)

Marl

7'6" - 11'

(3.35 m)

Hole No 2

Soil + gravel mixture

0 - 5'

(1.52 m)

Sandy marl

5' - 12'

(3.66 m) No water

Hole No 3

Soil + gravel mixture

0 - 7'

(2.13 m)

Fine sand

7' - 8'

(2.44 m)

Gravel

8' - 12'

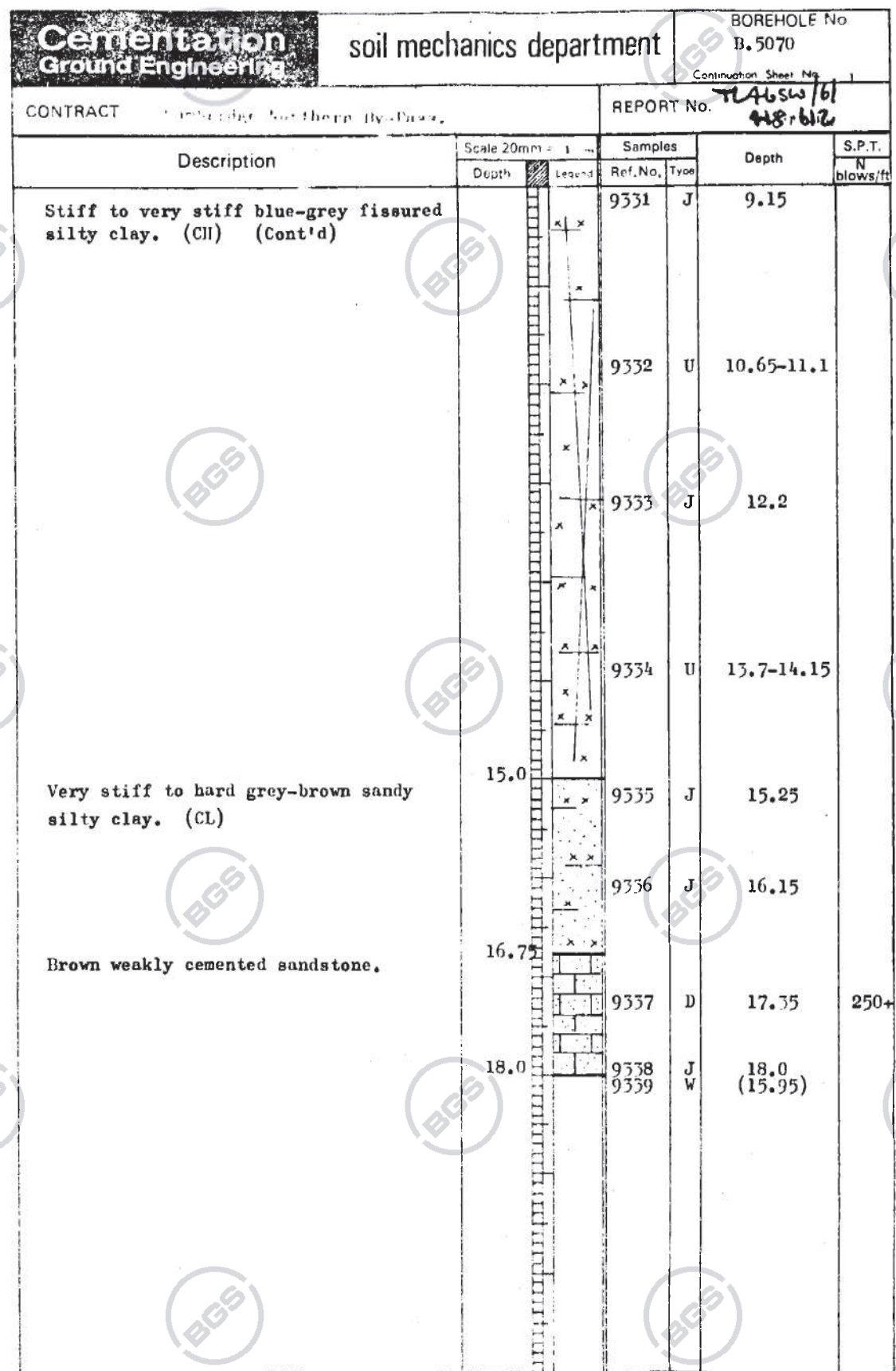
(3.66 m) W.L. 9'3"

"Observatory gravel" Drift, though No I very probably touched the solid Chalk Marl. ^{In No III} perhaps disturbed marl (commonly marly loam base of drift). Site indicated at farm, 26.9.50. all three within 20 yds. of each other. S.E.H. 28.8.50. 26.9.50.

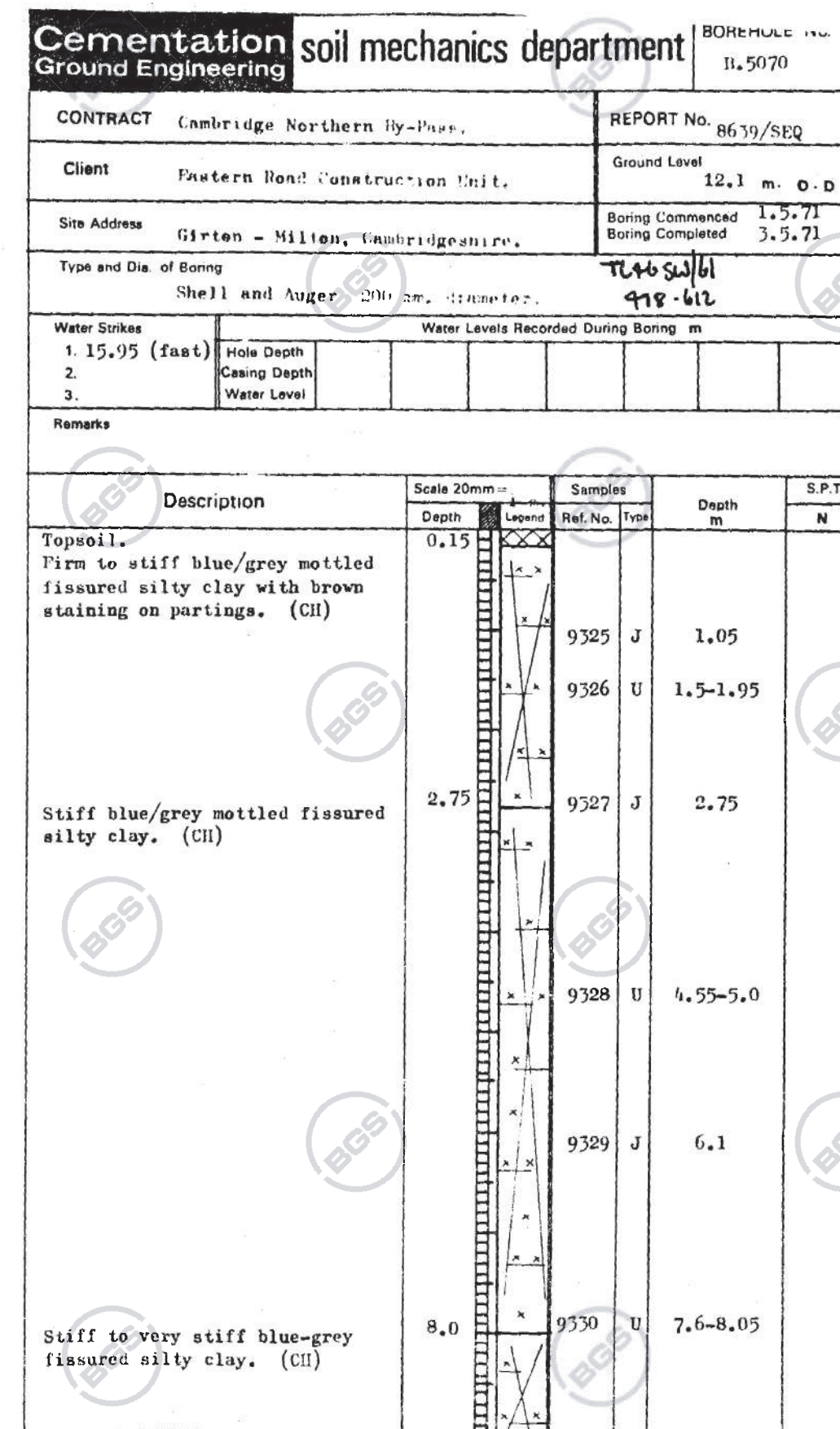
Notes by S.E.A. Holmes from G.W. Lack, well-borers, note book from foreman (RA Tucker)

Date August 1950

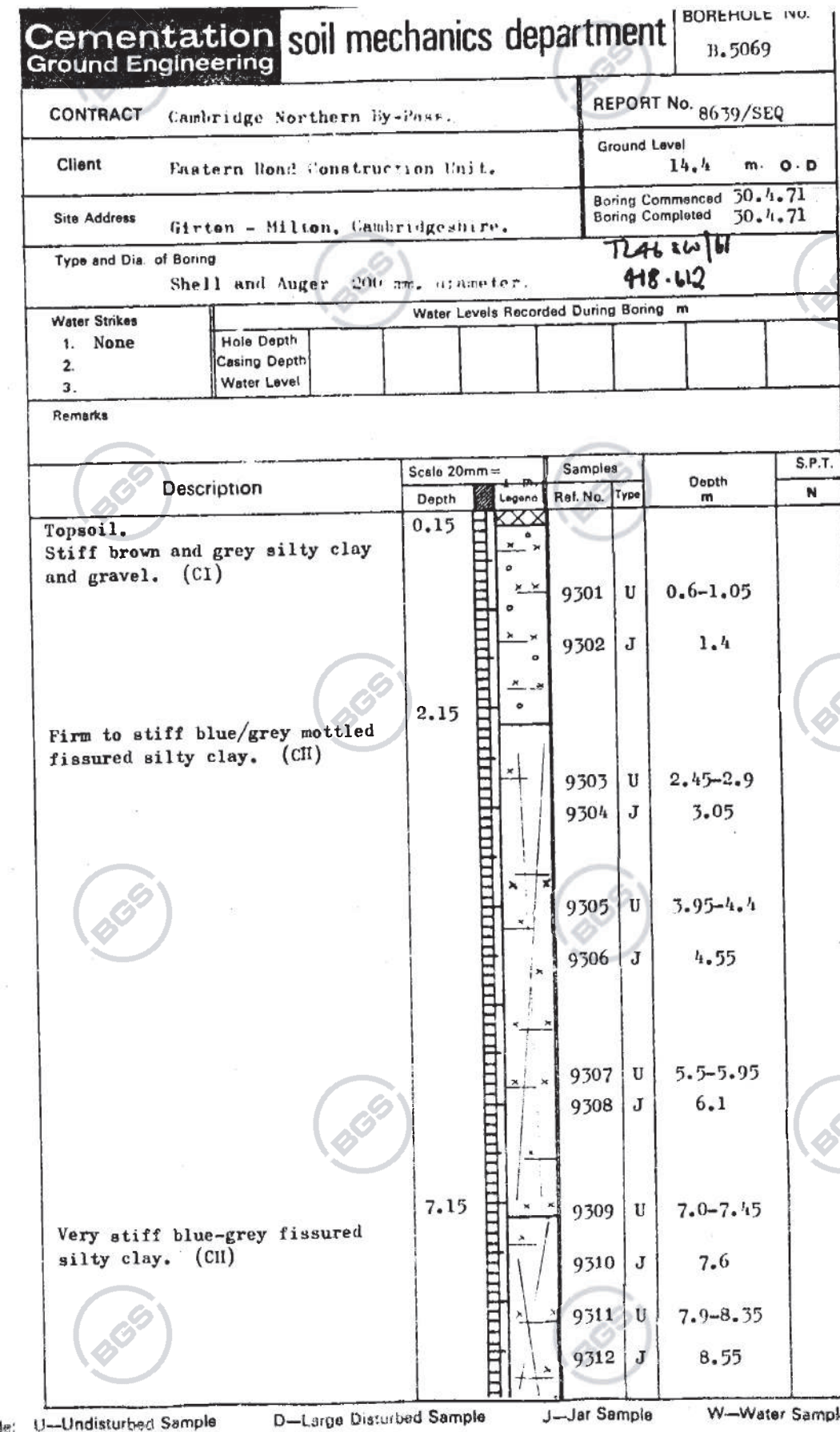
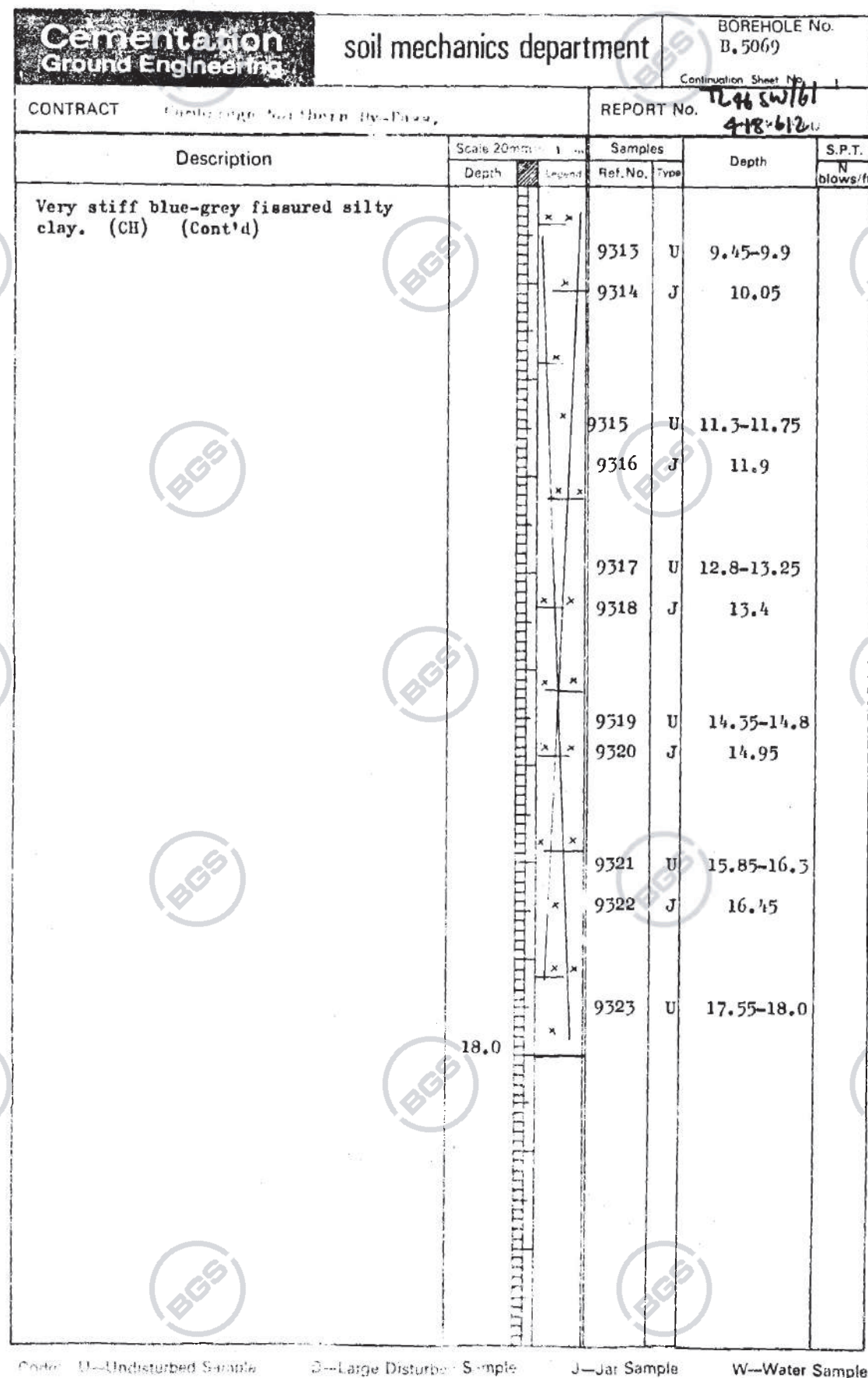
Geologist's Temporary No.



Code: U—Undisturbed Sample D—Large Disturbed Sample J—Jar Sample W—Water Sample



Code: U—Undisturbed Sample D—Large Disturbed Sample J—Jar Sample W—Water Sample

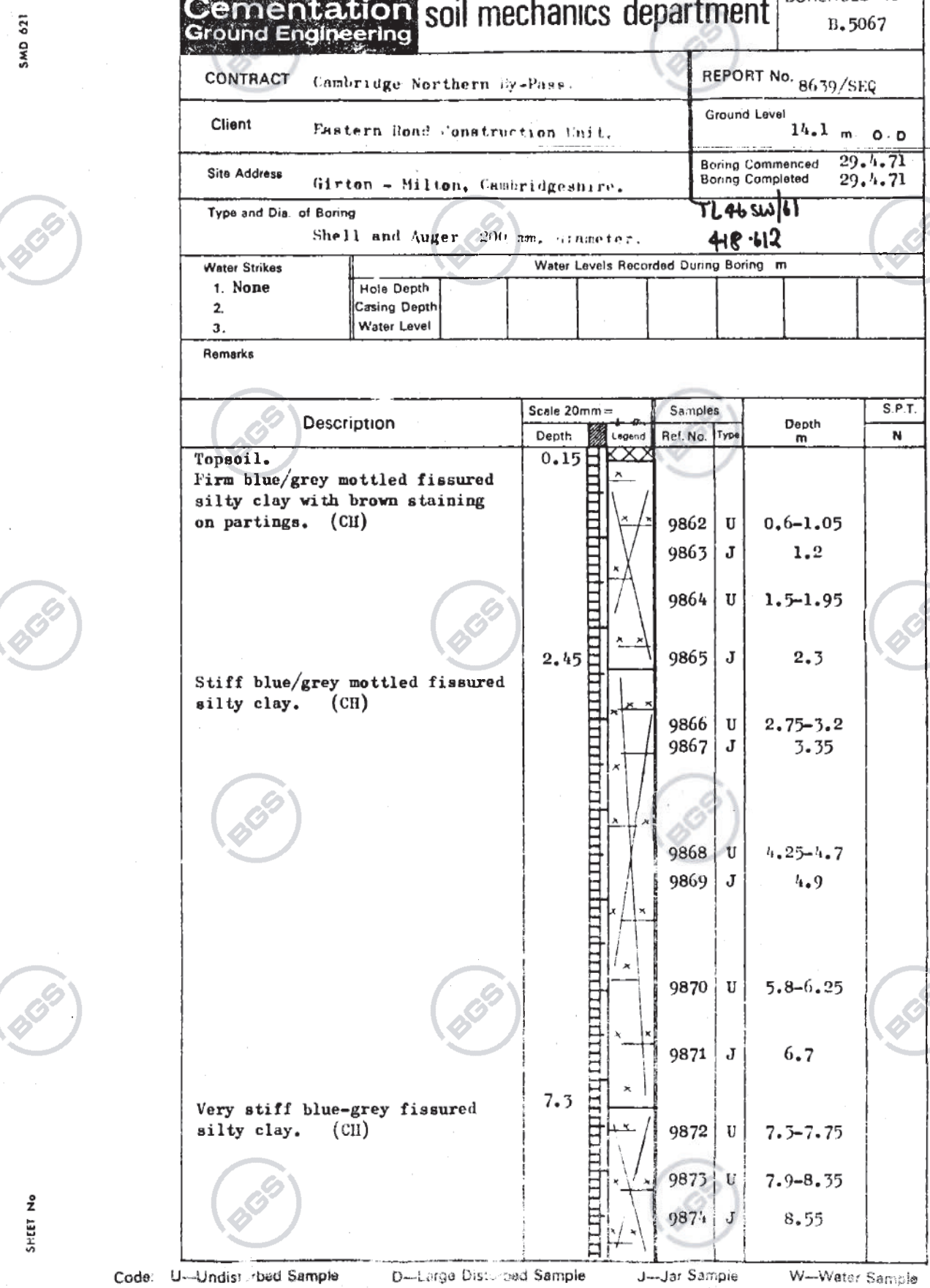
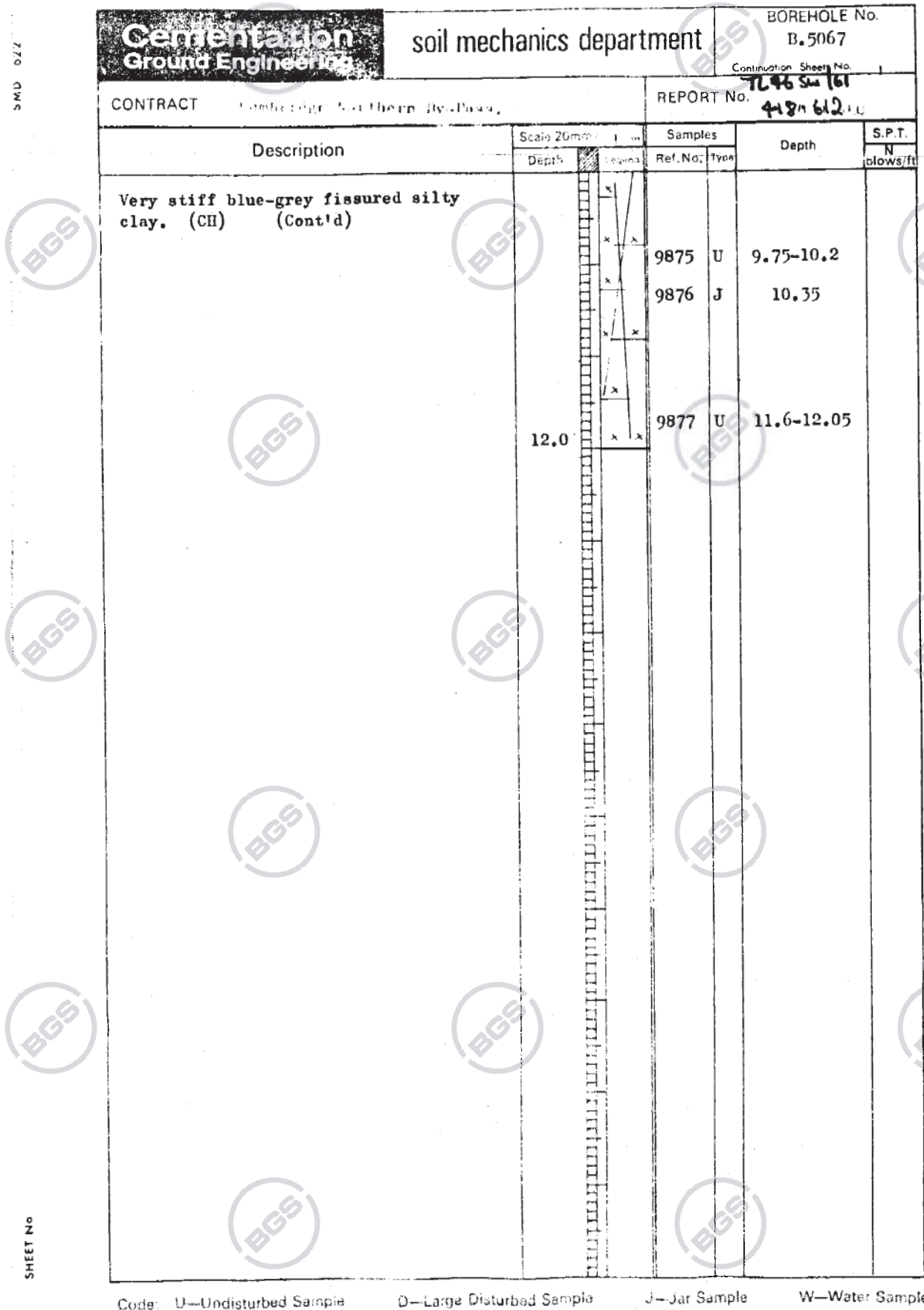


Cementation Ground Engineering		soil mechanics department		BOREHOLE No. B.5068	
CONTRACT		REPORT No. 418.612		Continuation Sheet No. 1	
Description	Scale 20mm = 1m	Samples	Depth	S.P.T.	
	Depth	Ref. No.	Type	N blows/ft	
Very stiff blue-grey fissured silty clay. (CH) (Cont'd)		9890	U	9.75-10.2	
		9891	J	10.35	
		9892	U	11.3-11.75	
		9893	J	11.9	
		9894	U	12.8-13.25	
		9895	J	13.4	
		9896	U	14.35-14.8	
		9897	J	14.95	
		9898	U	15.85-16.3	
		9899	J	16.45	
	9900	U	17.55-18.0		

Code: U—Undisturbed Sample D—Large Disturbed Sample J—Jar Sample W—Water Sample

Cementation Ground Engineering		soil mechanics department		BOREHOLE No. B.5068	
CONTRACT		REPORT No. 8679/SEQ		Ground Level 14.3 m. O.D.	
Client		Site Address		Boring Commenced 29.4.71 Boring Completed 30.4.71	
Type and Dia. of Boring		Shell and Auger 200 mm. diameter.		418.612	
Water Strikes		Water Levels Recorded During Boring m			
1. None		Hole Depth			
2.		Casing Depth			
3.		Water Level			
Remarks					
Description	Scale 20mm = 1m	Samples	Depth	S.P.T.	
	Depth	Ref. No.	Type	N	
Topsoil. Firm to stiff blue/grey mottled fissured silty clay with brown staining on partings. (CH)	0.15	9878	U	0.9-1.35	
		9879	J	1.5	
Stiff blue/grey mottled fissured silty clay. (CH)		9880	U	2.45-2.9	
		9881	J	3.05	
		9882	U	3.95-4.4	
		9883	J	4.55	
Very stiff blue-grey fissured silty clay. (CH)		9884	U	5.5-5.95	
		9885	J	6.1	
		9886	U	7.5-7.75	
	9887	J	7.6		
	9888	U	8.25-8.7		
	9889	J	8.85		

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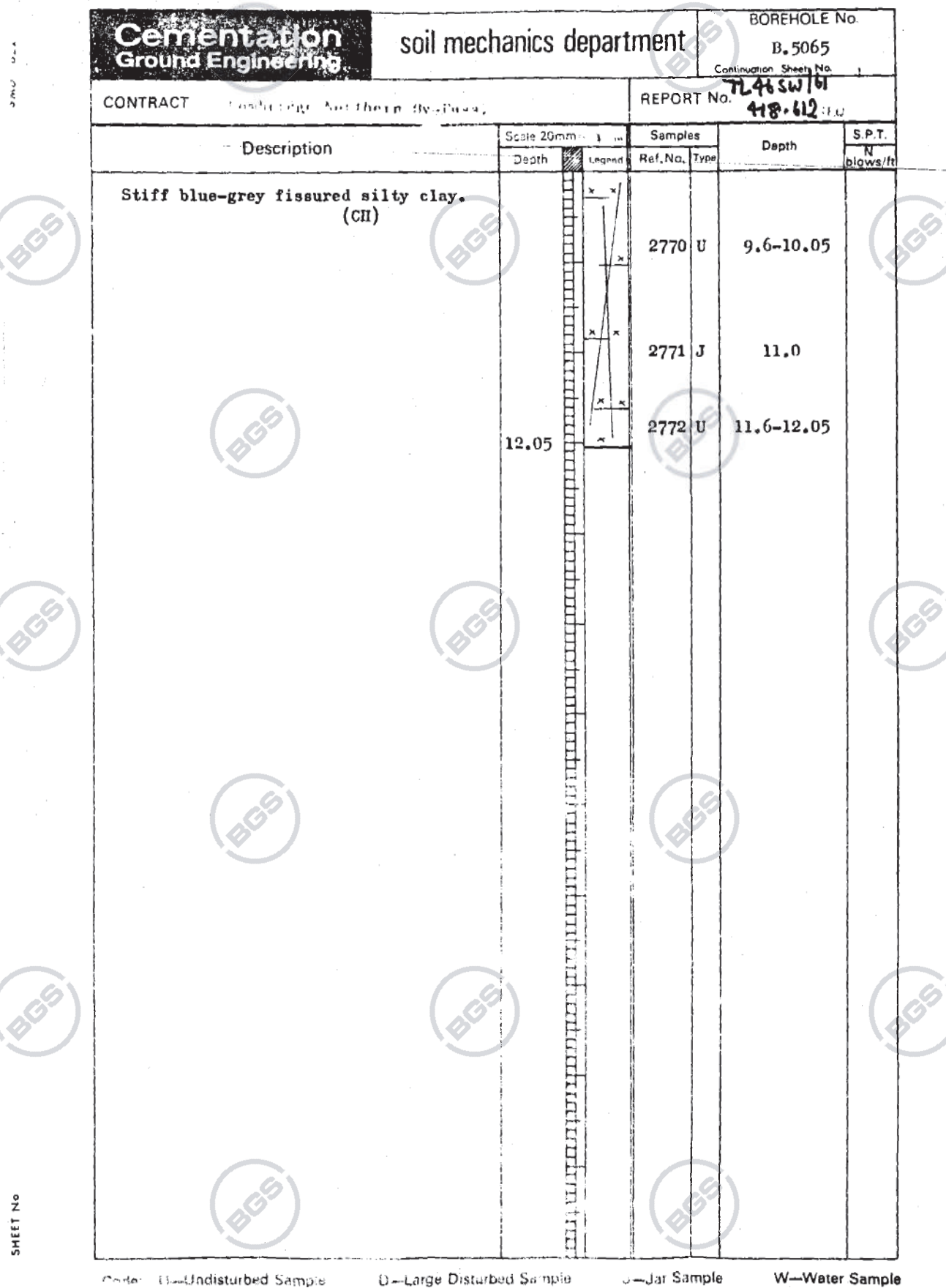


Cementation Ground Engineering		soil mechanics department		BOREHOLE No. B.5066	
CONTRACT		REPORT No.		Continuation Sheet No.	
Cambridge Northern By-Pass.		TL 46 SW 61		418.612	
Description	Scale 20mm = 1m	Samples	Depth	S.P.T.	
	Depth	Ref. No. Type	Depth	N blows/ft	
Stiff blue-grey fissured silty clay. (CH) (Cont'd)	12.0	9859 U	9.15-9.6		
		9860 J	9.75		
		9861 U	11.6-12.05		

Code: U—Undisturbed Sample D—Large Disturbed Sample J—Jar Sample W—Water Sample

Cementation Ground Engineering		soil mechanics department		BOREHOLE No. B.5066	
CONTRACT		REPORT No.		Ground Level	
Cambridge Northern By-Pass.		8679/SEQ		14.1 m. O.D.	
Client		Eastern Road Construction Unit.		Boring Commenced	
Site Address		Girton - Milton, Cambridgeshire.		Boring Completed	
Type and Dia. of Boring		Shell and Auger 200 mm. diameter.		TL 46 SW 61	
Water Strikes		Water Levels Recorded During Boring m		418.612	
1. None		Hole Depth			
2.		Casing Depth			
3.		Water Level			
Remarks					
Description	Scale 20mm = 1m	Samples	Depth	S.P.T.	
	Depth	Ref. No. Type	Depth	N	
Topsoil.	0.15				
Stiff brown sandy clay with gravel. (CI)	1.05	9848 U	0.6-1.05		
Firm blue/grey mottled fissured silty clay with white phosphate veins. (CH)	1.85	9849 U	1.4-1.85		
		9850 J	1.85		
Stiff blue/grey mottled fissured silty clay. (CH)	2.75	9851 U	3.05-3.5		
		9852 J	3.65		
		9853 U	4.55-5.0		
		9854 J	5.2		
		9855 U	6.1-6.55		
		9856 J	6.7		
		9857 U	7.6-8.05		
		9858 J	8.25		
Stiff blue-grey fissured silty clay. (CH)	8.5				

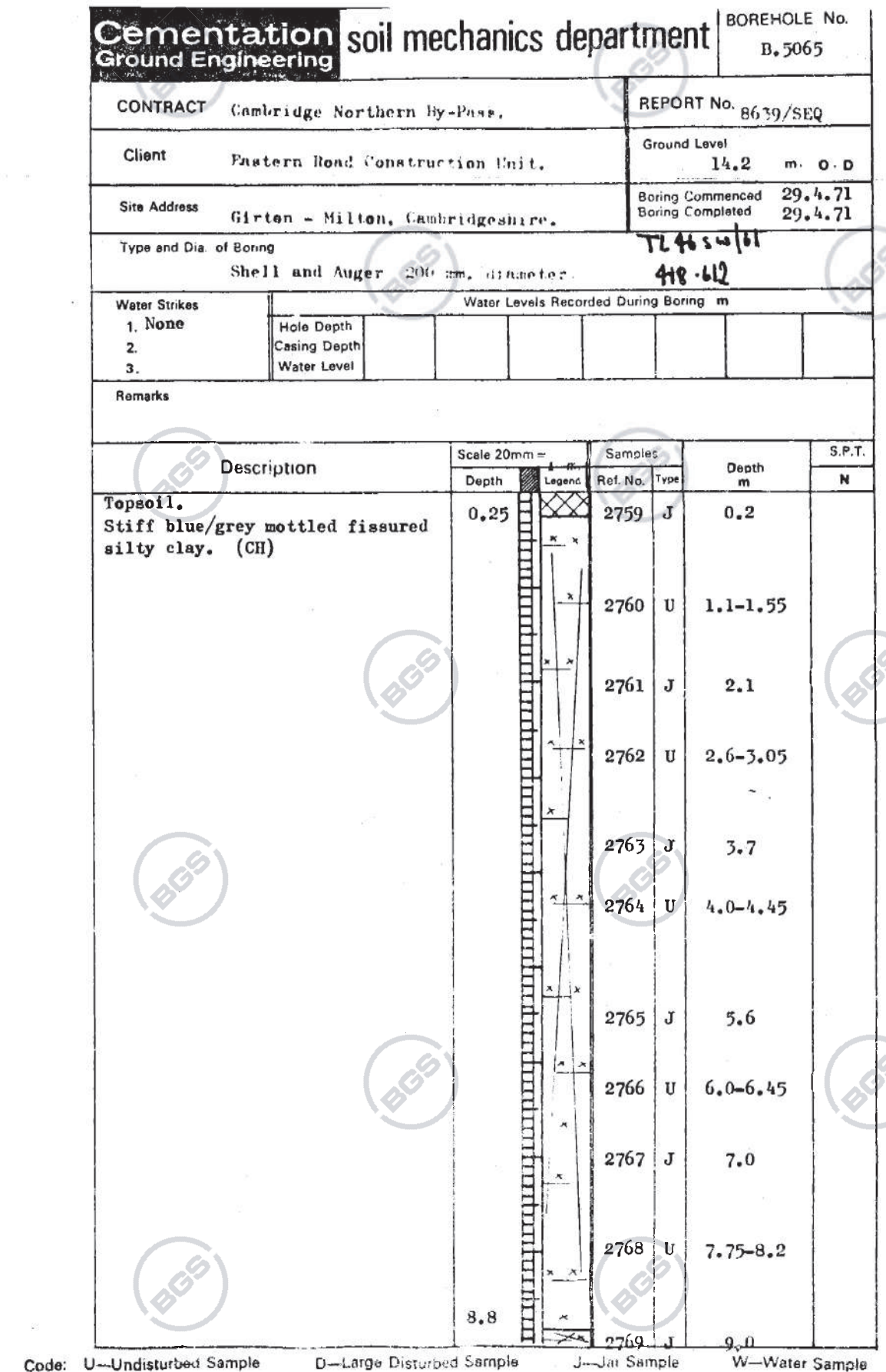
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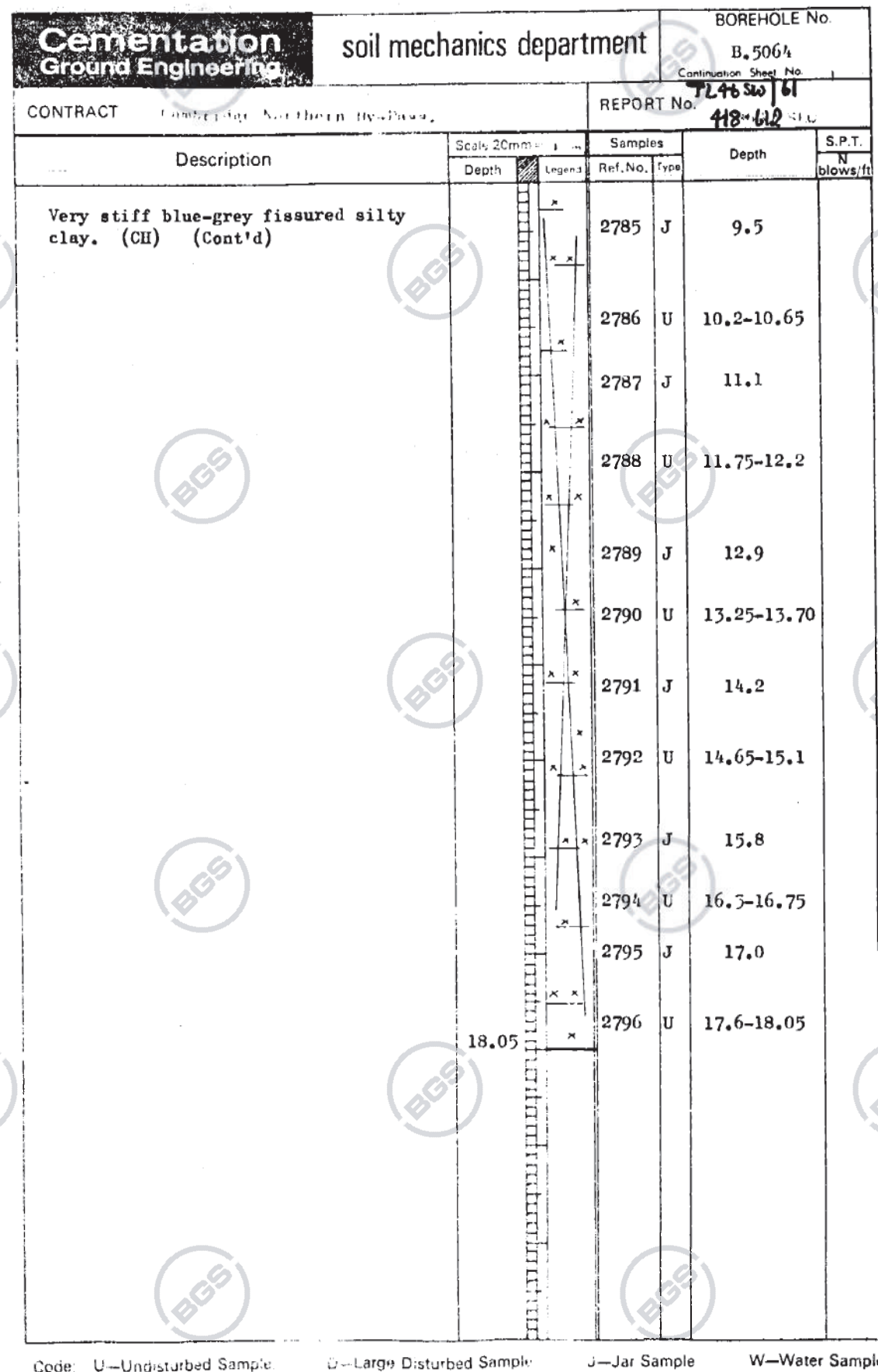


SMD 621

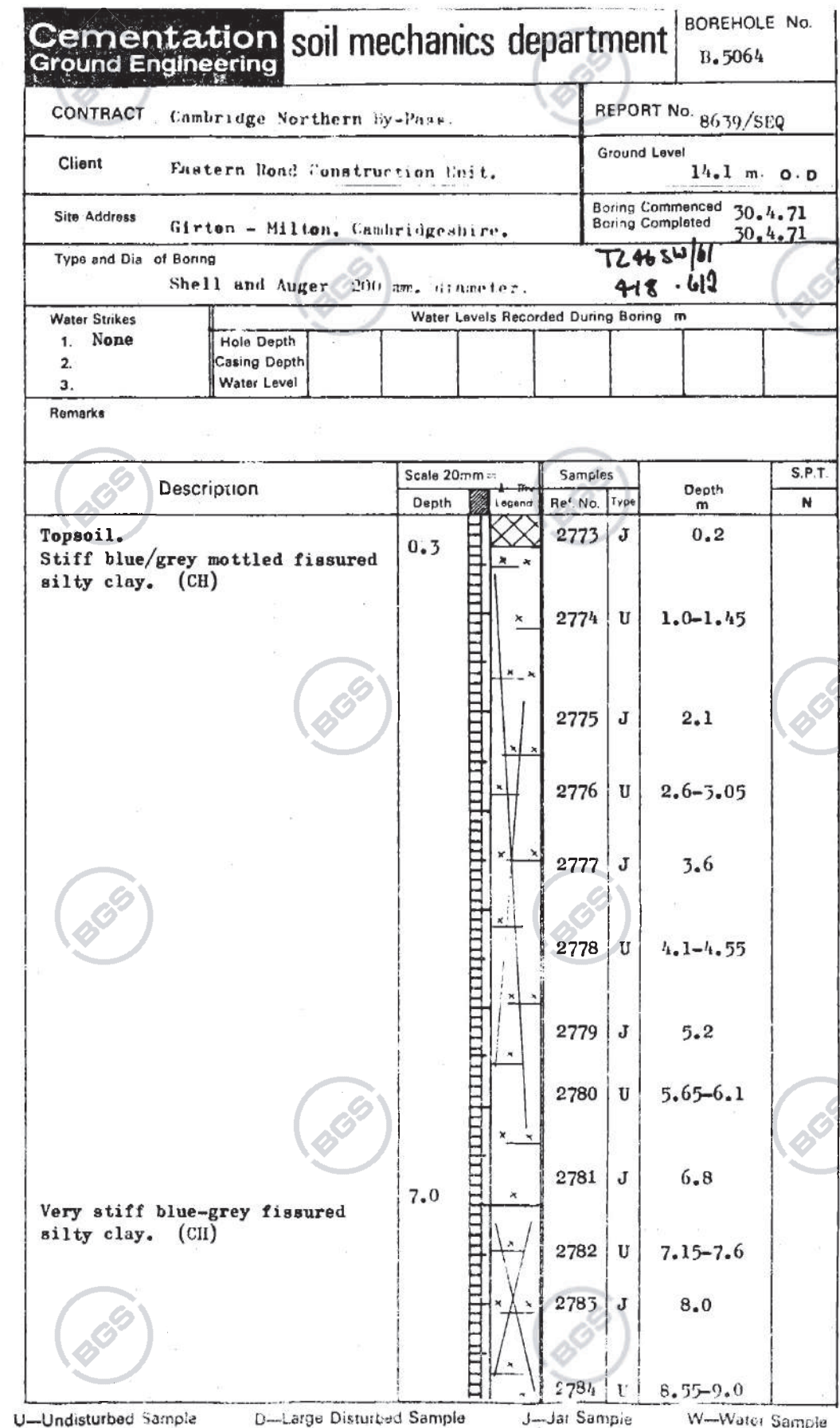


SHEET No



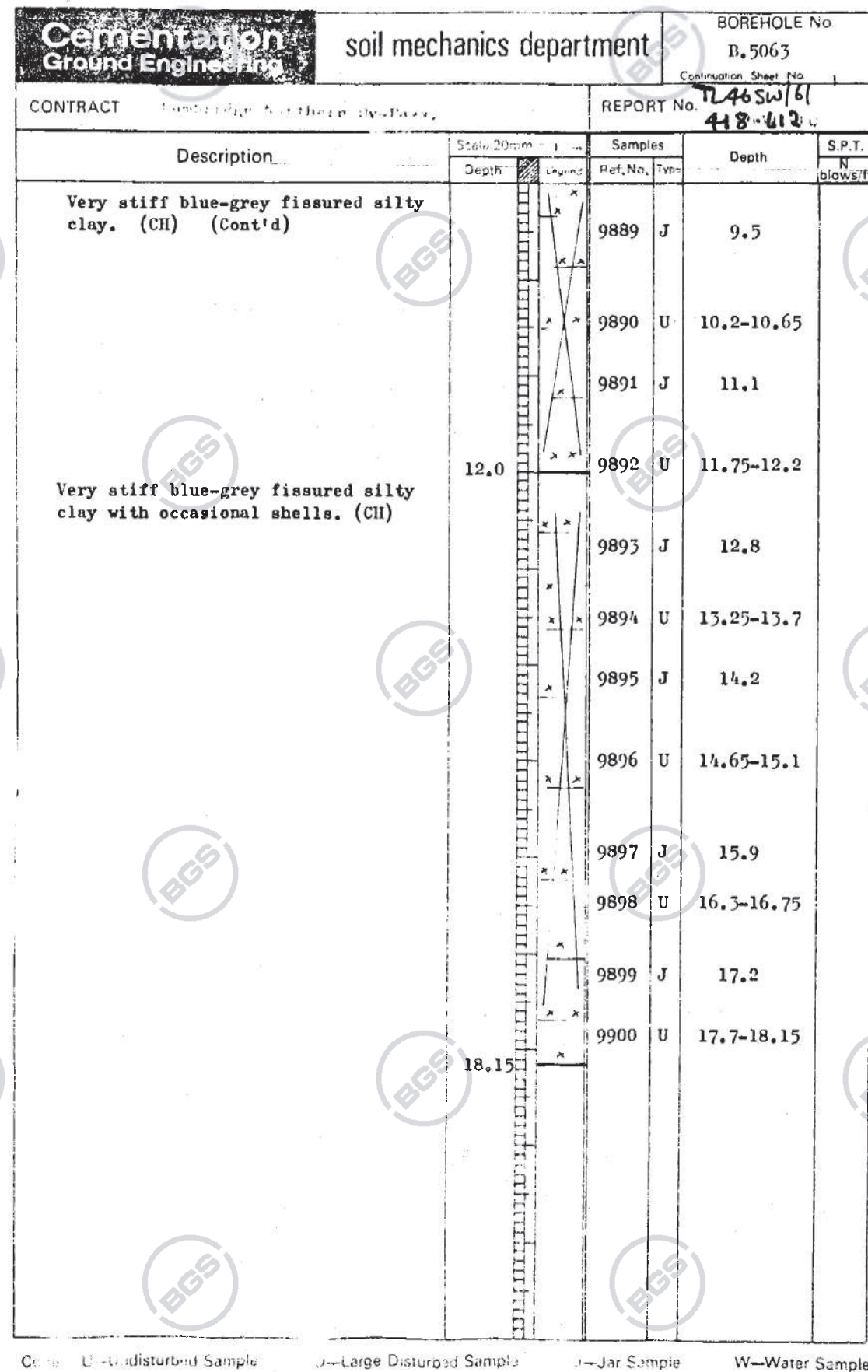


SMD 621



SHEET No

SMD 622



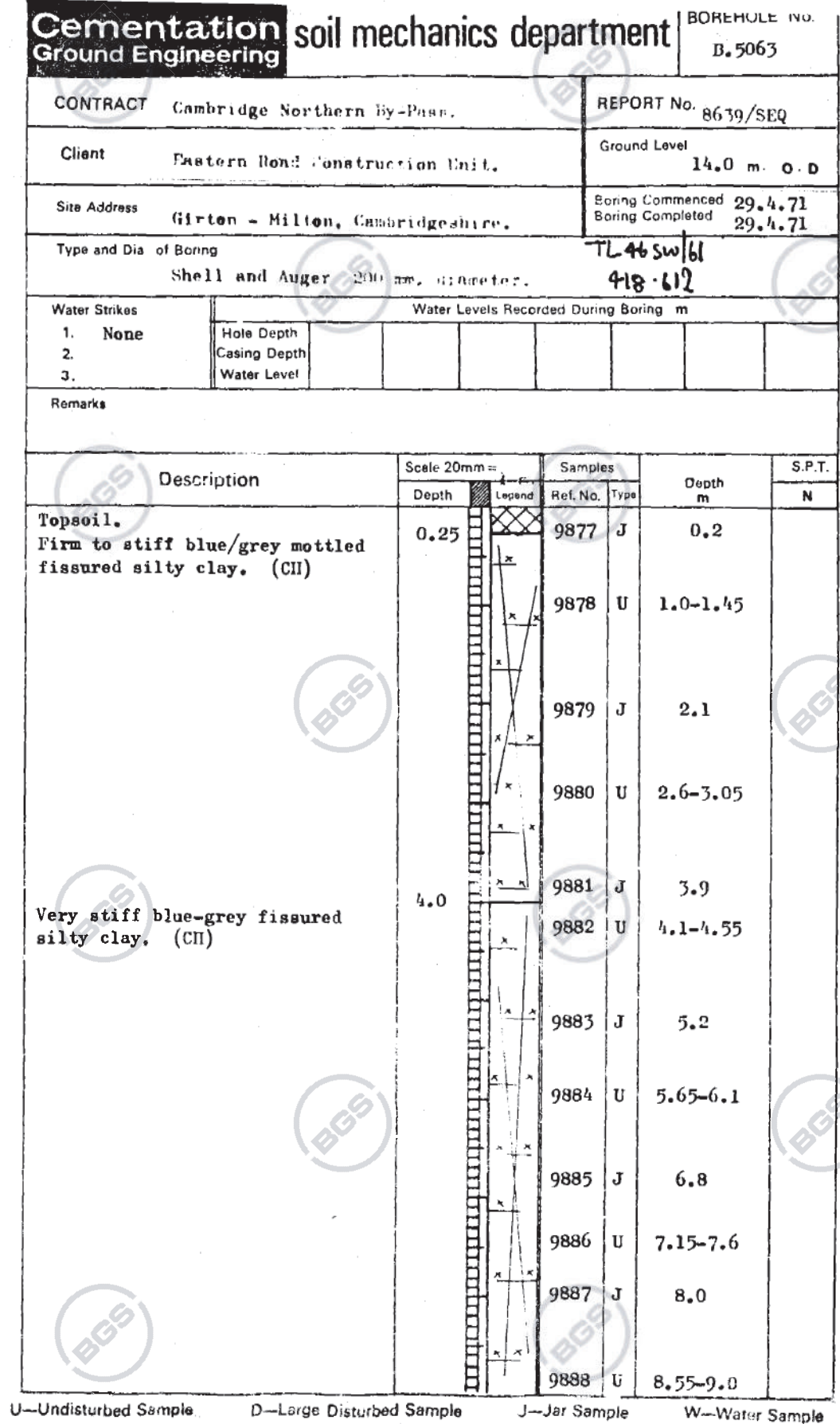
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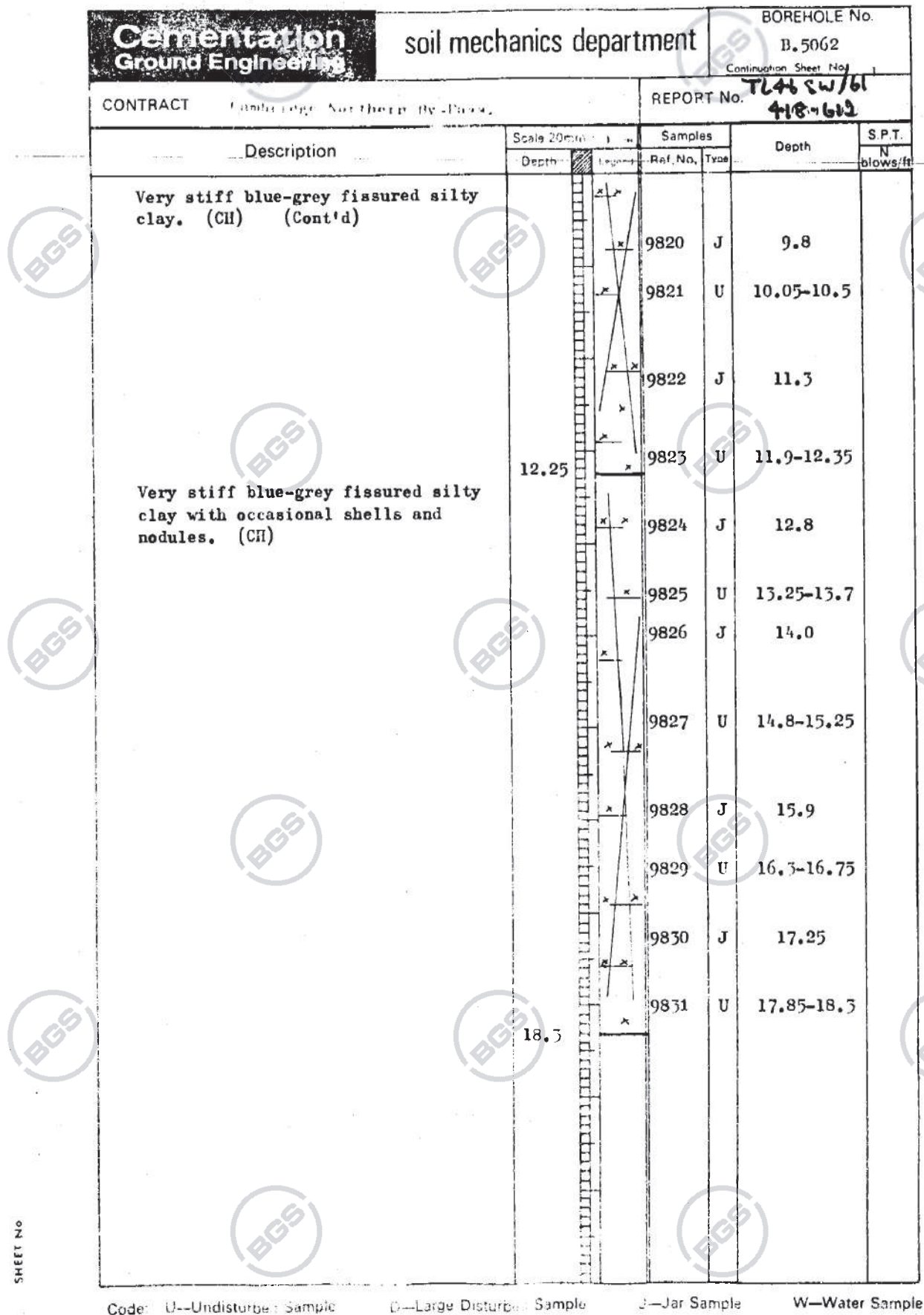
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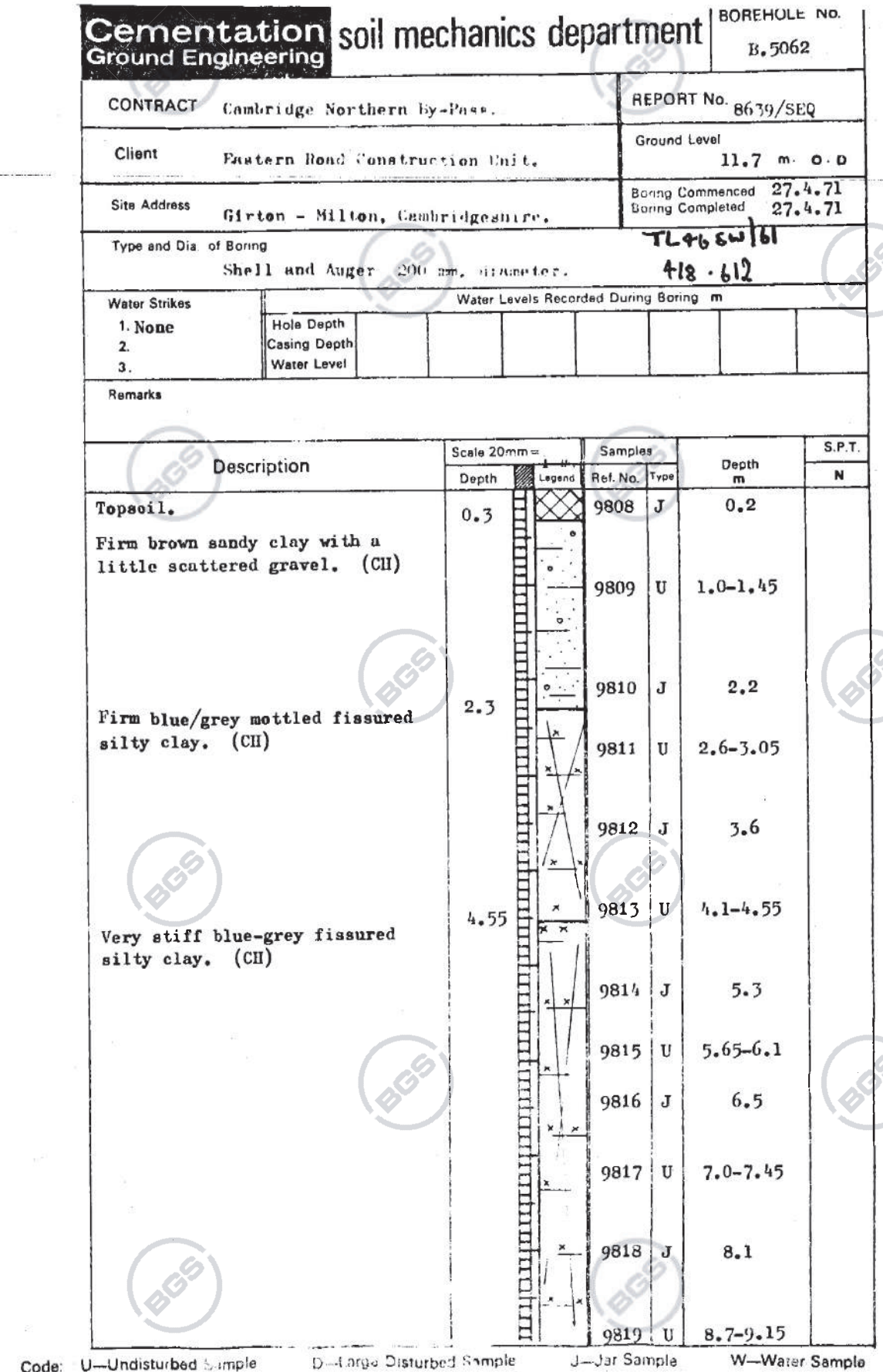


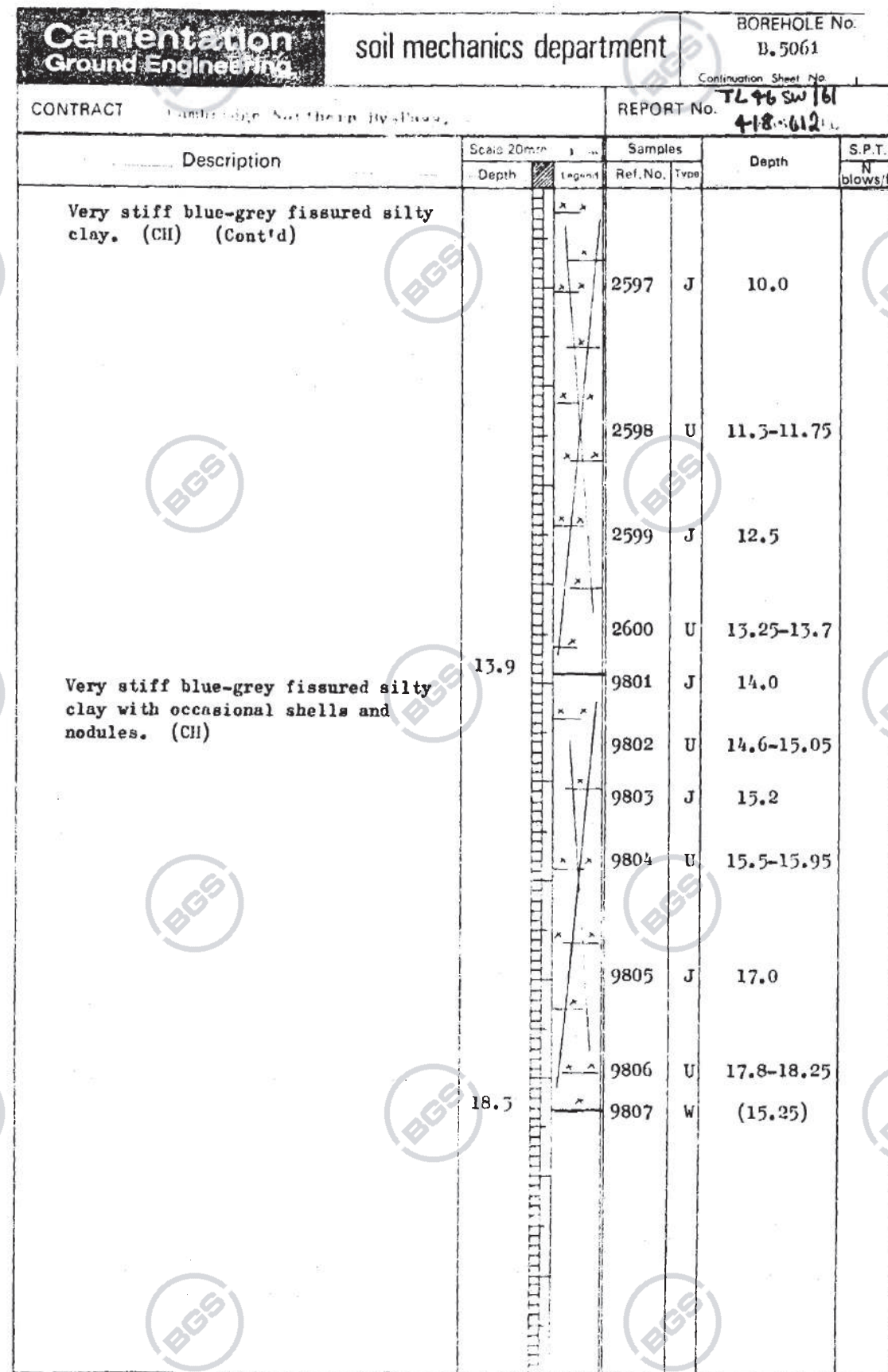


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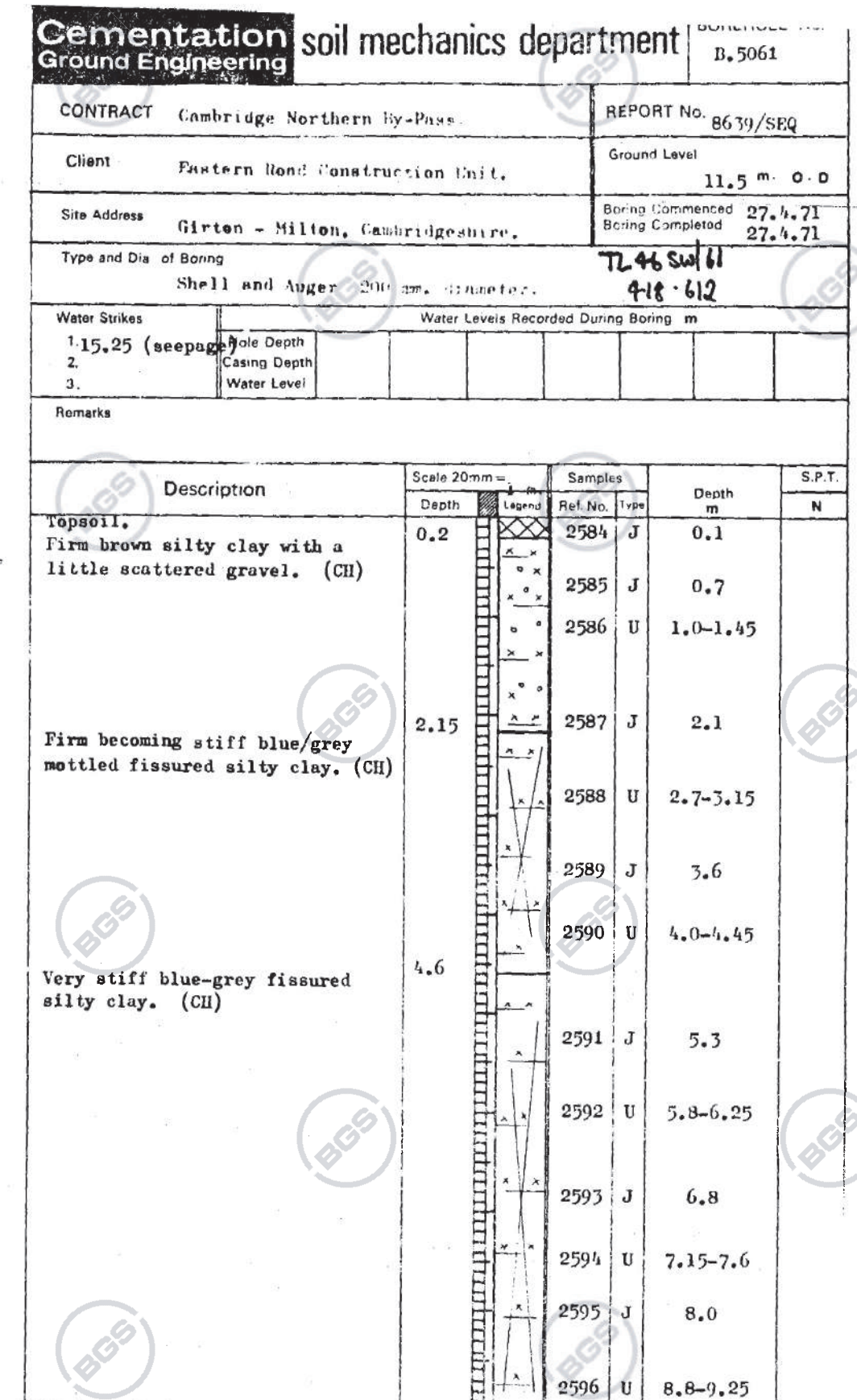


SHEET No





Code: U—Undisturbed Sample D—Large Disturbed Sample J—Jar Sample W—Water Sample



Code: U—Undisturbed Sample D—Large Disturbed Sample J—Jar Sample W—Water Sample

SMD 622

Cementation Ground Engineering		soil mechanics department		BOREHOLE No. B.5060	
CONTRACT Cambridge Northern By-Pass		REPORT No. TL46SW/61 418-612		Continuation Sheet No. 1	
Description	Scale 20mm = 1m Depth	Samples Ref. No. Type	Depth	S.P.T. N blows/ft	
Stiff blue-grey fissured silty clay. (CH) (Cont'd)		9865 J	9.9		
		9866 U	10.3-10.75		
		9867 J	11.3		
	12.0	9868 U	11.75-12.2		
		9869 J	12.8		
		9870 U	13.0-13.45		
		9871 J	14.0		
		9872 U	14.6-15.05		
		9873 J	15.5		
		9874 U	16.15-16.6		
		9875 J	17.0		
		9876 U	17.8-18.25		
Very stiff blue-grey fissured silty clay. (CH)	18.25				

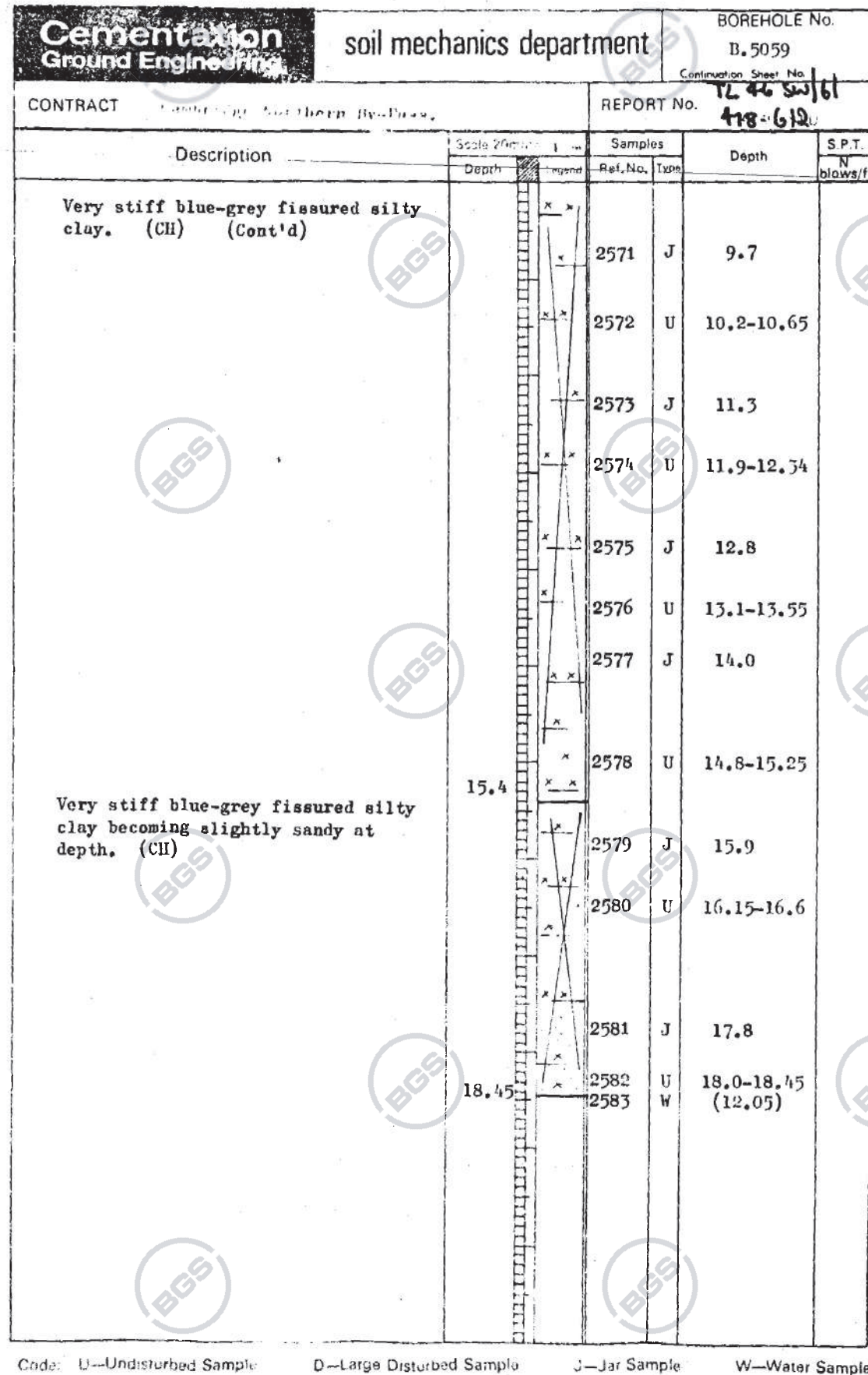
Code: U—Undisturbed Sample D—Large Disturbed Sample J—Jar Sample W—Water Sample

SMD 621

Cementation Ground Engineering		soil mechanics department		BOREHOLE No. B.5060	
CONTRACT Cambridge Northern By-Pass		REPORT No. 8639/SEG		Ground Level 11.2 m O.D.	
Client Eastern Road Construction Unit.		Boring Commenced 28.4.71		Boring Completed 28.4.71	
Site Address Gilton - Milton, Cambridgeshire.		Type and Dia. of Boring Shell and Auger 200 mm diameter.		TL46SW/61 418-612	
Water Strikes 1. None		Water Levels Recorded During Boring m			
Hole Depth		Casing Depth		Water Level	
Remarks					
Description	Scale 20mm = 1m Depth	Samples Ref. No. Type	Depth m	S.P.T. N	
Topsoil.	0.3	9854 J	0.2		
Firm blue/grey and brown mottled fissured silty clay. (CH)		9855 J	0.9		
	1.3	9856 U	1.3-1.75		
		9857 J	2.2		
		9858 U	2.7-3.15		
		9859 J	3.5		
Firm blue-grey mottled fissured silty clay. (CH)					
		9860 U	5.5-5.95		
		9861 J	6.3		
		9862 U	7.2-7.65		
		9863 J	8.0		
Stiff blue-grey fissured silty clay. (CH)		9864 U	8.85-9.3		

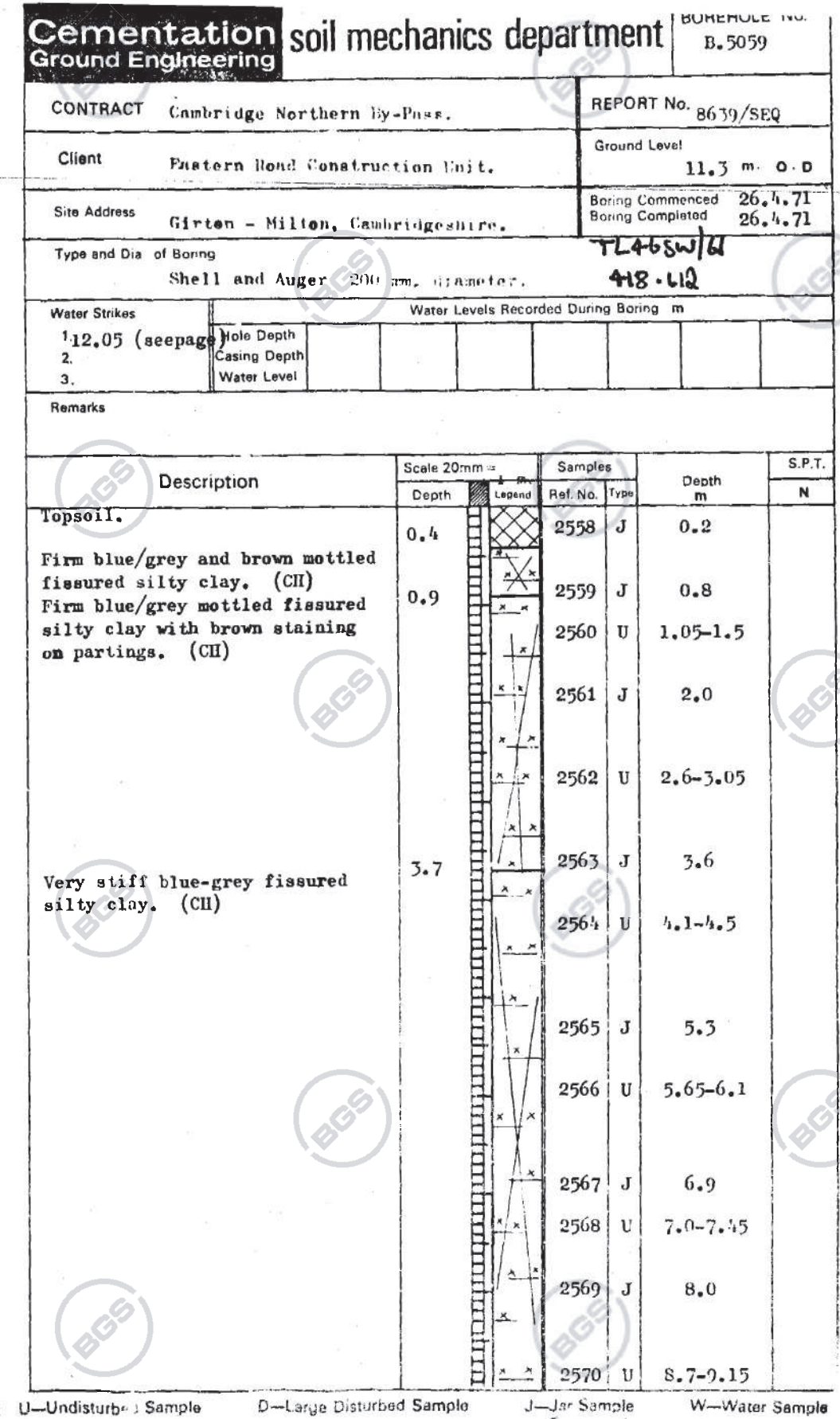
Code: U—Undisturbed Sample D—Large Disturbed Sample J—Jar Sample W—Water Sample

SMD 622

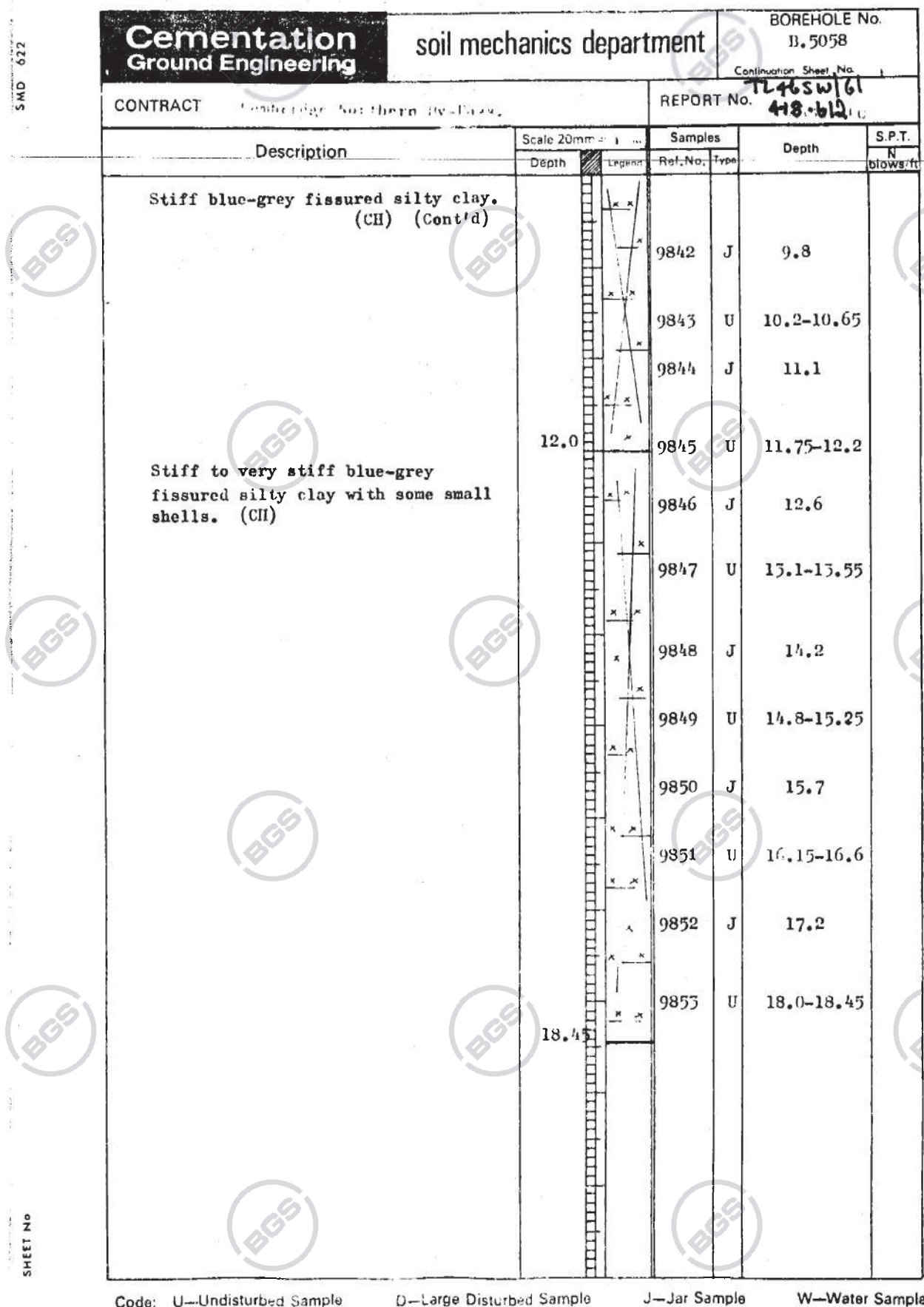


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SMD 621



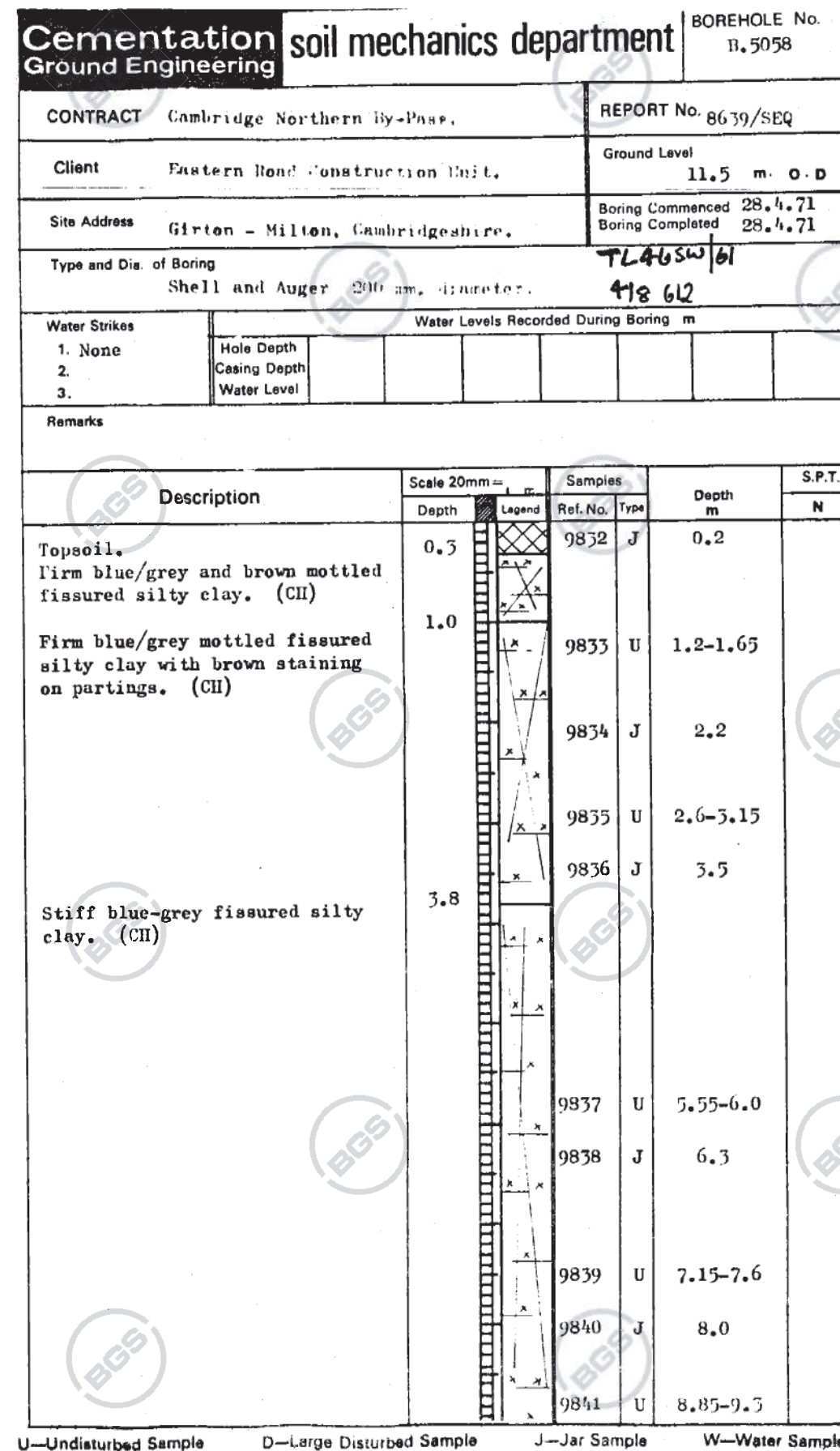
SHEET No



SMD 621



SHEET No



TL 46 SW 134 4189 6473 Near Meadow Farm, Oakington

Surface level +7.4 m
Water struck at -2.2 m
152 mm percussion
March 1977

Block D

Waste 10.3 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Boulder Clay	Soil, brown and reddish yellow mottled stony sandy clay	1.0	1.0
	Clay, brownish yellow, becoming light olive-brown and strong brown mottled	1.1	2.1
	Clay, laminated, silty, with some coarse chalk sand, dark grey	4.0	6.1
	Silt, dark grey	3.1	9.2
Kimmeridge Clay	Clay, with chalk and occasional quartzite pebbles and limestone cobbles, very dark grey	1.1	10.3
	Clay, firm, fossiliferous, very dark grey	3.0+	13.3

TL 46 SW 135 4256 6041 Near Bunker's Hill, Gorton

Surface level +23.8 m
Water struck at +22.0 m
152 mm percussion
January 1977

Block D

Overburden 0.3 m
Mineral 2.3 m
Bedrock 3.0 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
Observatory Gravels	Soil, greyish brown, stony, sandy, clay loam	0.3	0.3
	Sandy gravel	2.3	2.6
	Gravel: fine with coarse, angular to subangular, white, yellow and grey flint with fine rounded to well-rounded chalk, with some ironstone, quartz and limestone and occasional sandstone, quartzite and phosphatic nodules Sand: medium with fine, subangular to rounded, quartz with chalk and coarse, subrounded chalk with angular flint; yellowish brown		
Gault	Clay, firm, grey	3.0+	5.6

GRADING

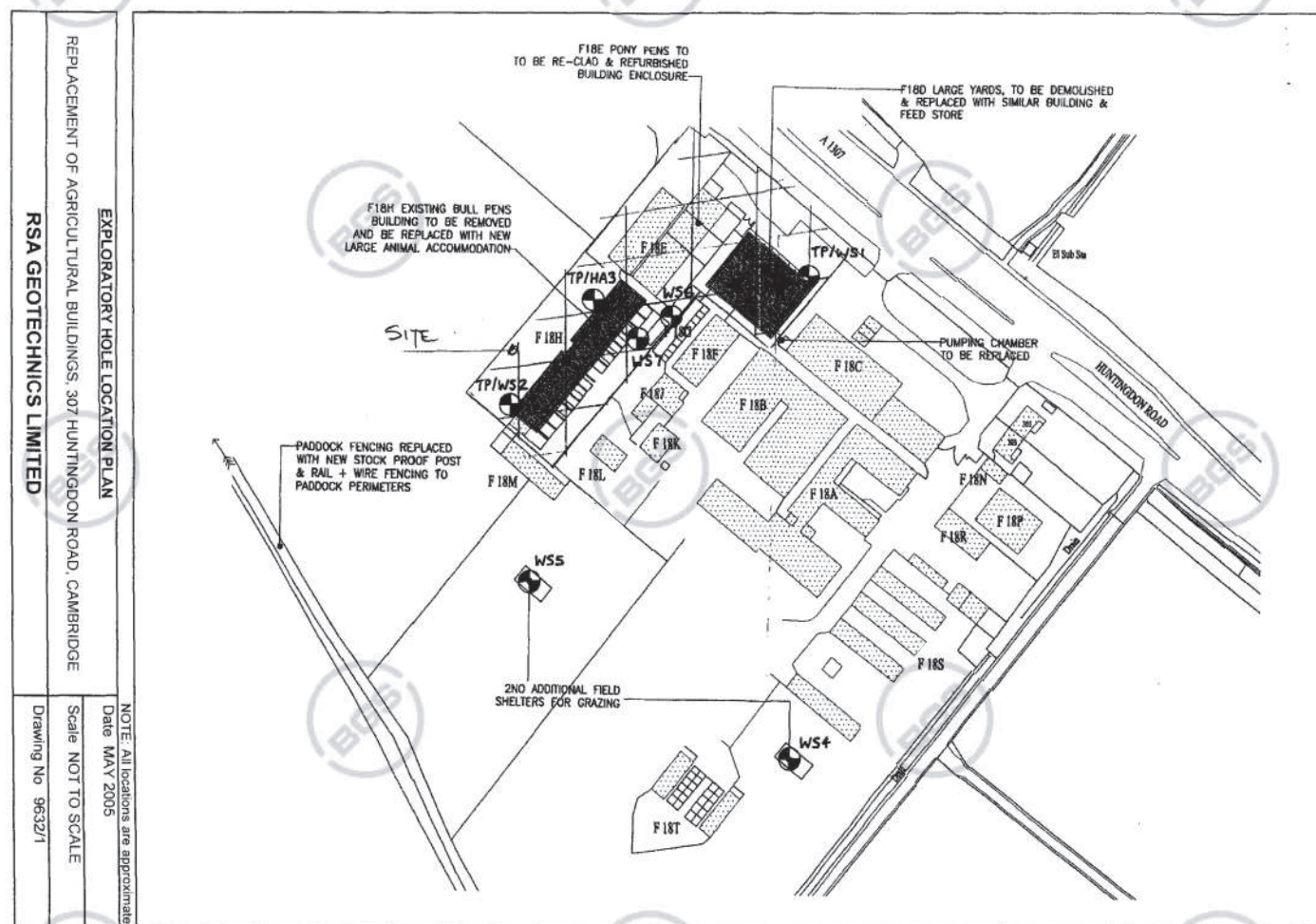
Mean for deposit percentages			Depth below surface (m)	percentages				
Fines	Sand	Gravel		Fines	Sand	Gravel		
				-1/16	+1/16-1/4	+1/4-1/2	+1/2-3/4	+3/4-1
9	52	39	0.3-1.5	13	7	30	13	29
			1.5-2.6	5	7	27	19	34
			Mean	9	7	29	16	31

COMPOSITION

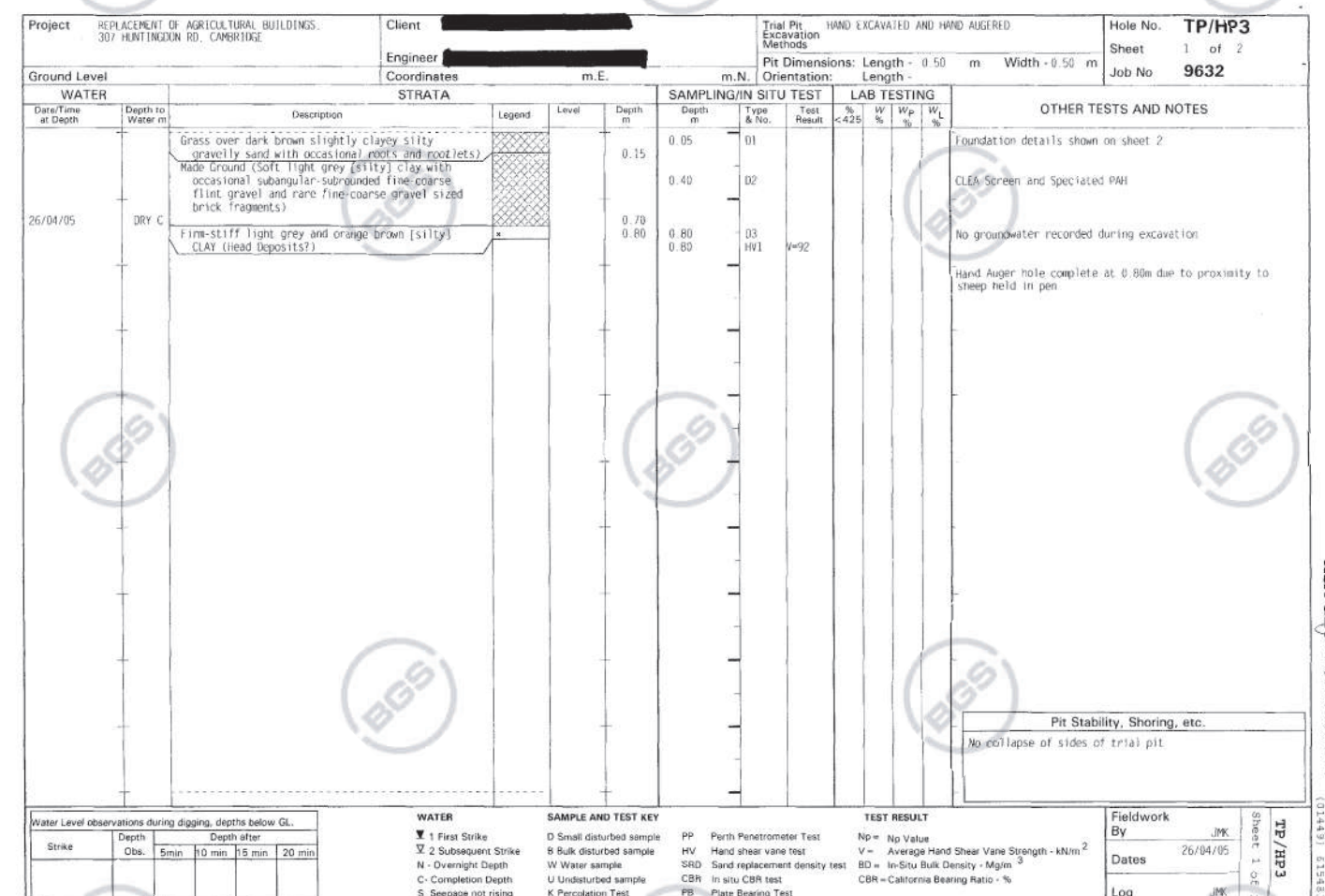
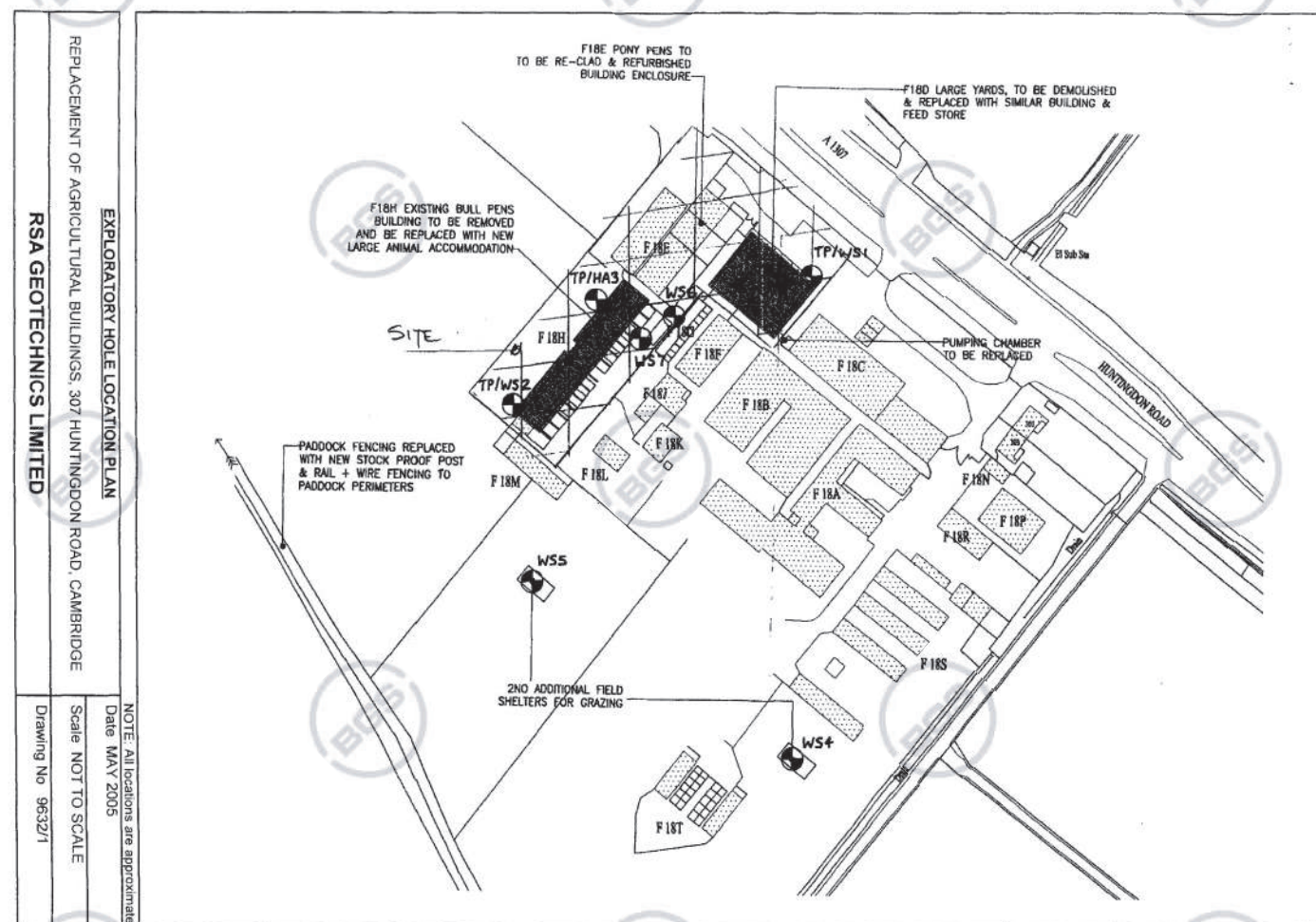
Depth below surface (m)	Percentages by weight in 4-16 mm size range						
	Flint	Quartz	Sandstone and quartzite	Limestone and phosphate	Chalk	Ironstone	Others
0.3-1.5	80	1	3	1	12	trace	3
1.5-2.6	58	2	3	2	33	-	2
Mean	69	1	3	1	23	trace	3

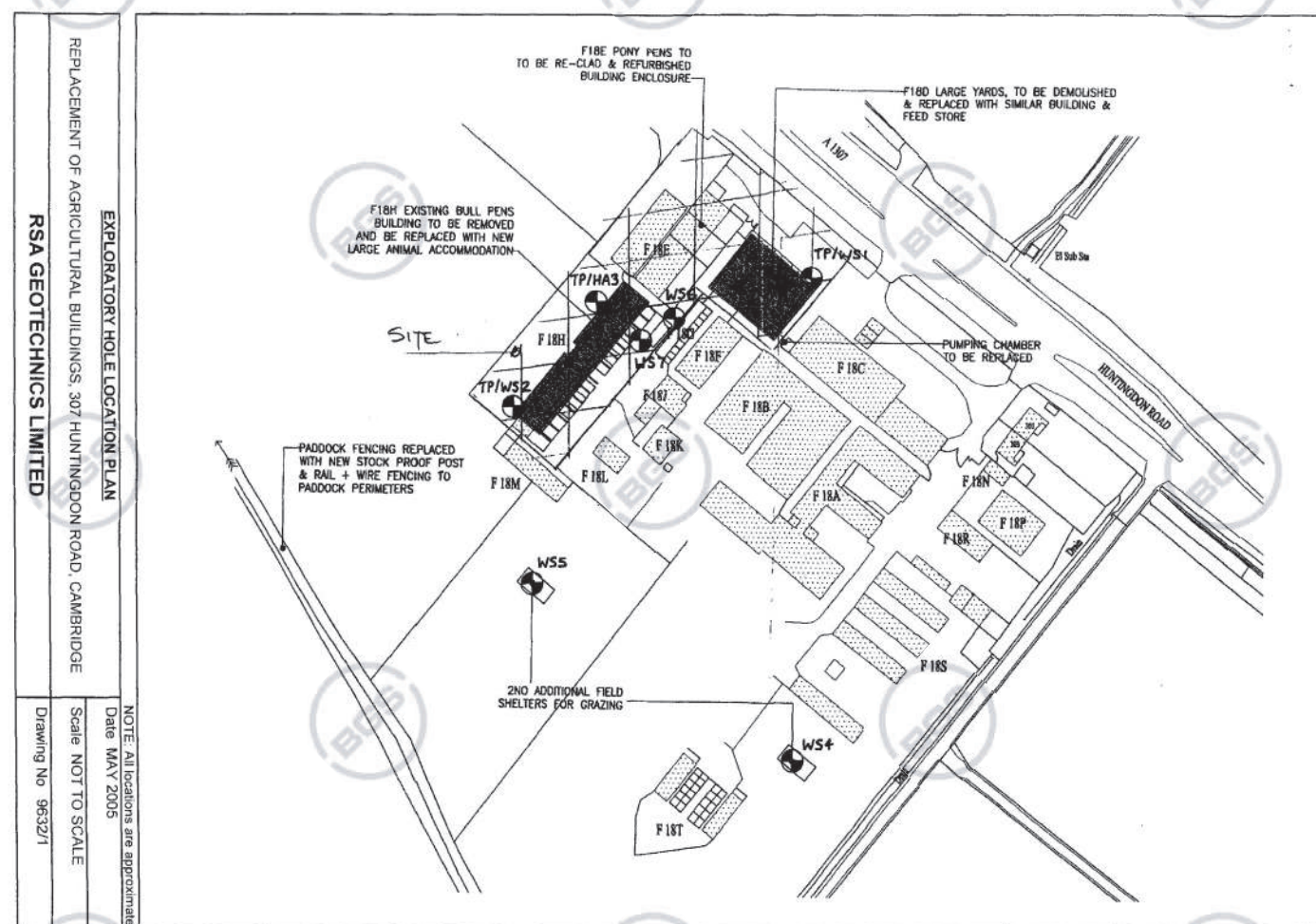
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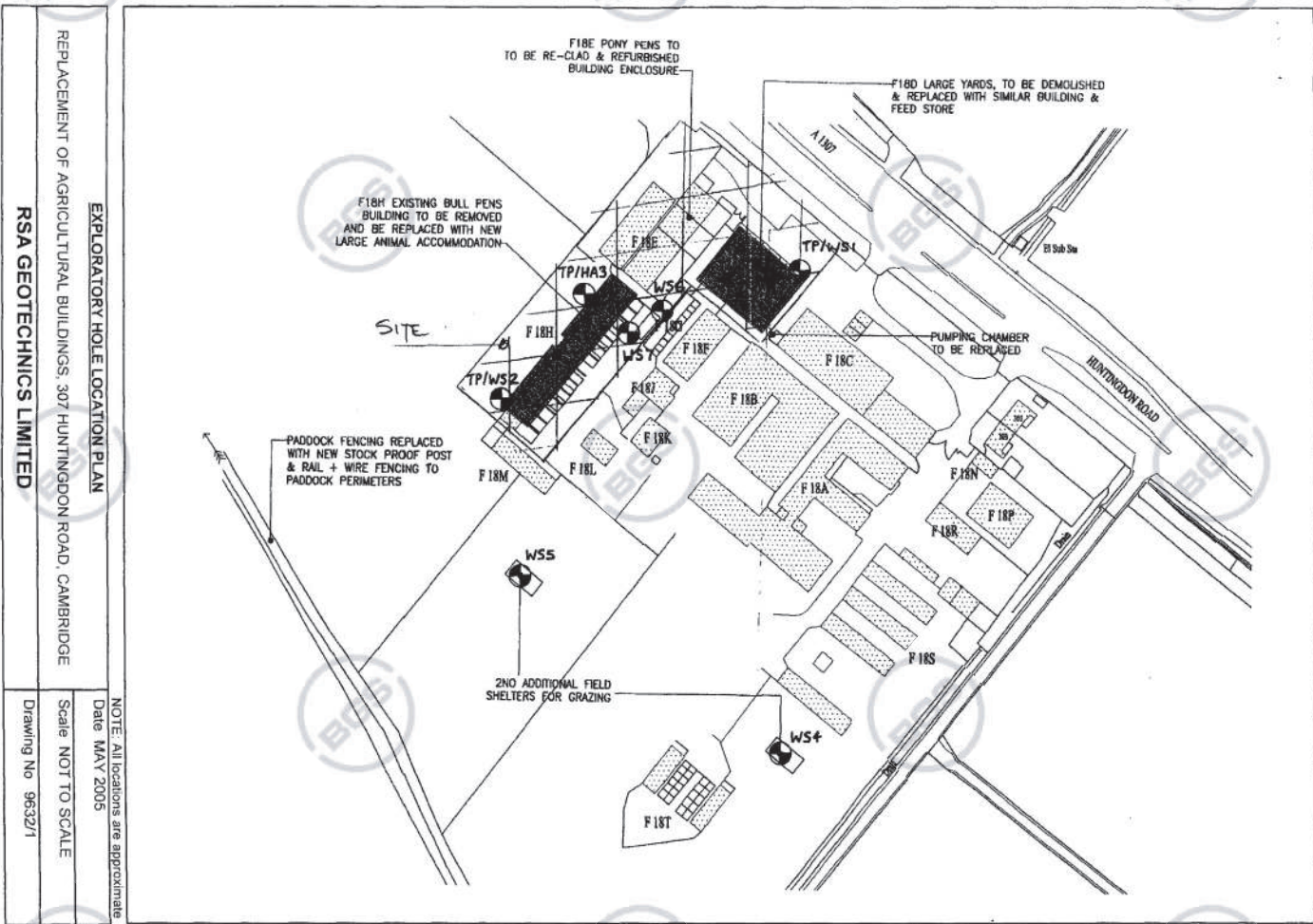
Project REPLACEMENT OF AGRICULTURAL BUILDINGS, 307 HUNTINGDON RD, CAMBRIDGE		Client		Trial Pit Excavation Methods		Hole No. TP/WS1	
Ground Level		Engineer		Pit Dimensions: Length - 0.55 m Width - 0.50 m		Sheet 1 of 2	
Coordinates		m.E.		Orientation: Length -		Job No 9632	
WATER	STRATA	SAMPLING/IN SITU TEST		LAB TESTING		OTHER TESTS AND NOTES	
Date/Time at Depth	Description	Depth m	Type & No.	Test Result	% W % W _p % W _L %		
	Made Ground (Reinforced concrete over plastic membrane with 6mm reinforcements at 90mm depth)	0.15	D1			Foundation details shown on sheet 2 CEA-Screen and Speciated PAH	
	Made Ground (Dark grey fine-medium gravel, sized ash and clinker fragments with coarse gravel-boulder sized concrete fragments)	0.40	D2				
	Made Ground (Brown, orange brown and light grey (silty) clay with fine gravel sized clinker fragments and fine-medium flint gravel with roots and rootlets)	0.70	D3				
	Firm blue grey (silty) CLAY with occasional orange brown silt pockets and rare subangular fine flint gravel (head deposits)	1.00	D4	Y-61	100 39 29 71	pH and Water Soluble Sulphate Groundwater seepage recorded at 1.10m land excavated to 1.20m	
	- becoming lighter in colour with depth	1.00	HV1				
		1.70	D5			Window sampler hole complete at 4.00m	
	Firm-stiff blue grey (silty) CLAY with occasional white selenite crystals and orange brown silt pockets (Gault Clay)	2.00	D6	Y-68			
		2.00	HV2				
		3.00	D7	Y-121		Pit Stability, Shoring, etc. No collapse of sides of trial pit	
	- no selenite with depth	3.00	HV3				
	becoming stiffer with depth	3.50	D8			Pit Stability, Shoring, etc. No collapse of sides of trial pit	
		4.00	D9	Y-140+			
		4.00	HV4				
26/04/05	MET C						
Water Level observations during digging, depths below GL:		SAMPLE AND TEST KEY		TEST RESULT		Fieldwork	
Strike	Depth	1 First Strike	D Small disturbed sample	PP Perth Penetrometer Test	Np = Np Value	By	TP/WS1
	Obs.	2 Subsequent Strike	B Bulk disturbed sample	HV Hand shear vane test	V = Average Hand Shear Vane Strength - kN/m ²	Dates	26/04/05
	5 min	N Overnight Depth	W Water sample	SRD Sand replacement density test	BD = In-Situ Bulk Density - Mg/m ³	Log	
	10 min	C Completion Depth	U Undisturbed sample	CBR In situ CBR test	CBR = California Bearing Ratio - %		
	15 min	S Seepage not rising	K Percolation Test	PB Plate Bearing Test			
	20 min						



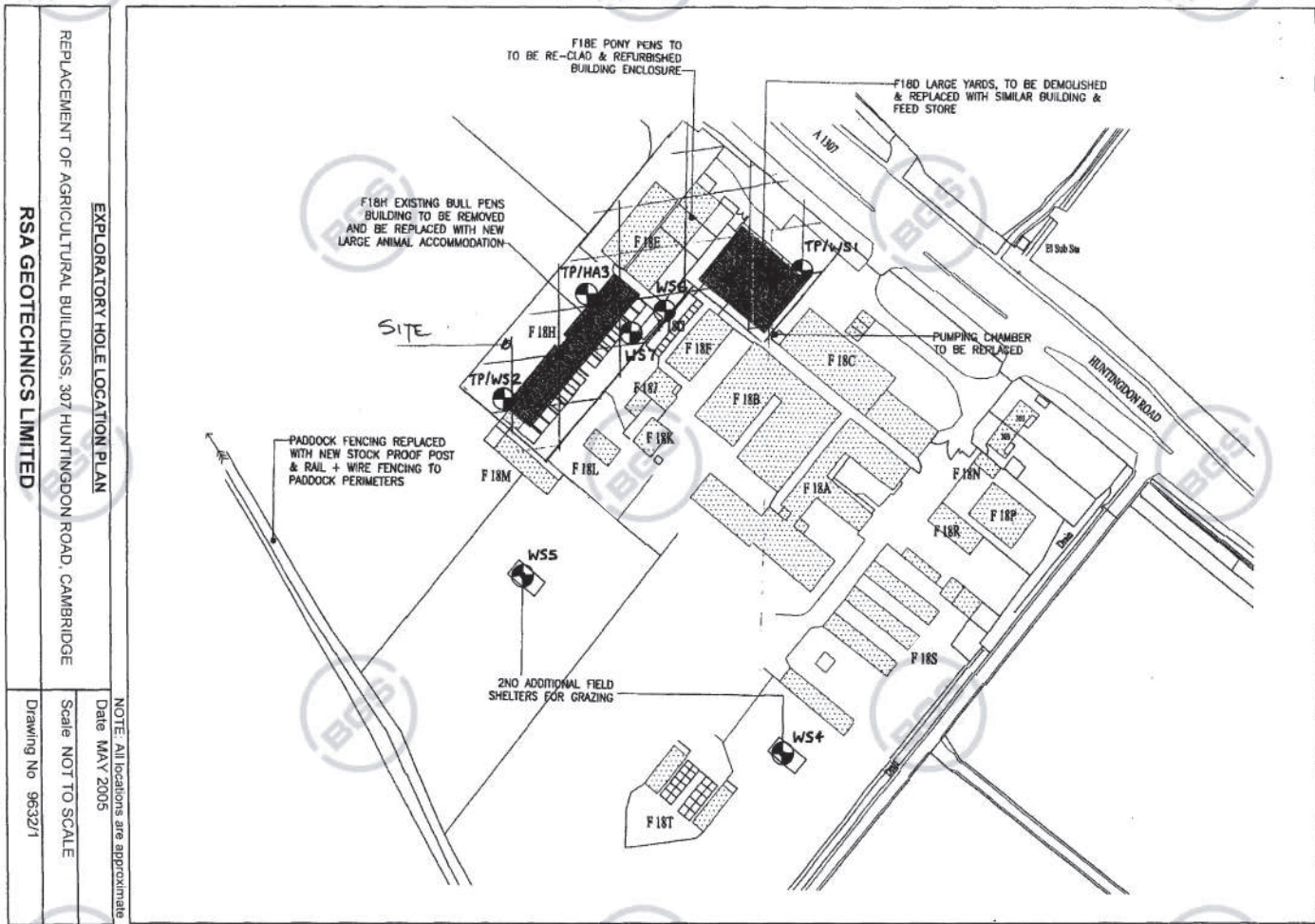
Project		Client		Trial Pit Excavation Method		Hole No.	
REPLACEMENT OF AGRICULTURAL BUILDINGS, 307 HUNTINGDON RD, CAMBRIDGE				HAND EXCAVATED/COMPETITOR RIG		TP/WS2	
Ground Level		Engineer		Pit Dimensions: Length - 0.50 m Width - 0.40 m		Sheet 1 of 2	
Coordinates		m.E.		Orientation: Length -		Job No 9632	
WATER		STRATA		SAMPLING/IN SITU TEST		LAB TESTING	
Date/Time at Depth	Depth to Water m	Description	Legend	Level	Depth m	Type & No.	Test Result
		Made Ground (Vegetation over brown slightly clayey silty gravelly sandy topsoil with occasional fine-coarse gravel sized brick fragments and roots and rootlets)			0.10	D1	
		Made Ground (Very soft dark brown slightly sandy (silty) gravelly clay with occasional fine-coarse gravel sized brick fragments)			0.40	D2	
		Made Ground (Soft-fine light grey and orange brown (silty) clay with occasional subangular subrounded fine-coarse flint gravel and rare fine-coarse gravel sized brick fragments)			0.70	D3	
		Stiff orange brown and light grey (silty) CLAY with occasional subrounded siltstone fragments and very rare fine flint gravel (Head Deposits)			0.80	HN1	
					0.90	D4	
					1.50	D5	
		Stiff light brown (silty) CLAY with orange brown pockets of clay (Gault Clay)			2.00	D6	
					2.00	HN2	
		Stiff light brown (silty) CLAY with occasional pockets of selenite crystals (Gault Clay)			2.50	D7	
					3.00	D8	
					3.00	HN3	
26/04/05	WET C						
						OTHER TESTS AND NOTES	
						Foundation details shown on sheet 2	
						CLEA-Screen and Speciated PAH	
						Groundwater seepage recorded at 0.75m	
						Hand excavated to 0.80m	
						pH and Water Soluble Sulphate	
						Window sampler hole complete at 3.00m	
						Pit Stability, Shoring, etc.	
						No collapse of sides of trial pit	
						Fieldwork By	
						26/04/05	
						Log	
						TP/WS2	
						Sheet 1 of 2	
						1014439, 615493	



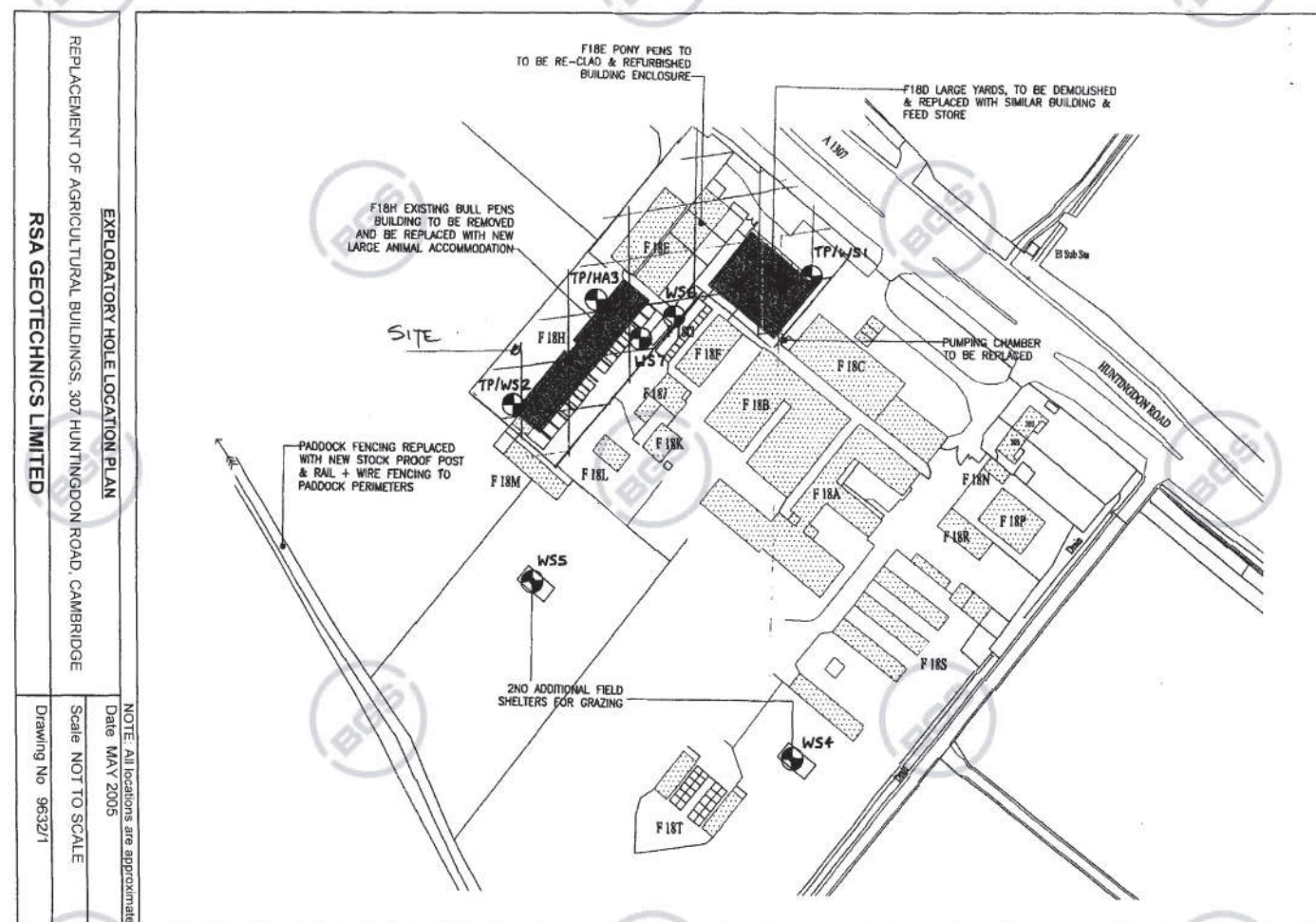
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Project				Client				Boring Methods				Hole No.															
REPLACEMENT OF AGRICULTURAL BUILDINGS, 307 HUNTINGDON RD, CAMBRIDGE				Engineer				PERCUSSIVE WINDOW SAMPLER				WS5															
Ground Level				Coordinates				m.E.				Sheet															
												Job No															
												9632															
WATER				STRATA				SAMPLING/IN SITU TEST				LAB TESTING															
Date/Time at Depth	Depth of casing m	Depth to Water m	Inst.	Description	Legend	Level	Depth m	Depth m	Type & No.	Blows/Strength	% <42 ϕ	Wp %	W _L %	ρ Mg/m ³	Cu _u 2	OTHER TESTS AND NOTES											
				Firm brown slightly sandy (silty) clayey topsoil with subangular-subrounded fine flint gravel and fine-medium roots and rootlets			0.20	0.10	D1																		
				Stiff light brown (silty) CLAY with some subangular-subrounded fine-medium flint gravel and occasional fine roots and rootlets (Head Deposits)				0.30	D2																		
				Firm light brown and light grey (silty) CLAY with occasional white silt pockets, rare subangular fine flint gravel and rare fine rootlets (Head Deposits)			0.80	0.90	D3	(V=80)																	
				Stiff light grey (silty) CLAY with orange brown silt pockets and very rare subangular-subrounded fine gravel sized siltstone (Gault Clay)			1.10	1.20	D4																		
				- becoming stiffer with depth				1.80	D5																		
				Stiff light grey to very light brown (silty) CLAY (Gault Clay)			2.00	2.00	HW2	(V=124)																	
				- with subangular-subrounded fine gravel sized selenite with depth				2.50	D6							No groundwater recorded during fieldwork.											
							3.00	3.00	D7																		
							3.00	3.00	HW3	(V=129)						Window sampler hole complete at 3.00m											
26/04/05		DRY C																									
Water Level observations during boring, depths below GL				WATER				SAMPLE KEY				TEST KEY				BLOWS / STRENGTH											
Strike	Depth Obs.	5 min	10 min	15 min	20 min	1 First Strike	2 Subsequent Strike	3 Completion Depth	4 Seepage not rising	D Small disturbed sample	B Bulk disturbed sample	W Water sample	U Undisturbed sample	P Piston sample	S Standard penetration test	C Cone penetration test	K Permeability test	V In situ vane test	N = N value	26/150 blows, for 150mm, drive after seating	26", blows for part or whole of seating drive only	(26) U sample blow count	V = Vane Strength - kN/m ²	Fieldwork By	26/04/05	Dates	Log



Project		REPLACEMENT OF AGRICULTURAL BUILDINGS, 307 HUNTINGDON RD, CAMBRIDGE		Client		Boring Methods		PERCUSSIVE WINDOW SAMPLER		Hole No.		WS6					
				Engineer						Sheet		1 of 1					
Ground Level				Coordinates		m.E.		m.N.		Job No.		9632					
WATER				STRATA				SAMPLING/IN SITU TEST		LAB TESTING							
Date/Time at Depth	Depth of Casing m	Depth to Water m	Inst.	Description	Legend	Level	Depth m	Depth m	Type & No.	Blows/Strength	% <425	W %	Wp %	W L %	ρ Mg/m ³	Cu, 2	OTHER TESTS AND NOTES
				Made Ground (Concrete)			0.10										
				Made Ground (Brown slightly sandy (silty) clay with angular sub-rounded fine-medium flint gravel and fine-coarse brick fragments)				0.50	D1								CLEA Screen and Speciated PAH
				Stiff grey (silty) CLAY with occasional brown silt pockets, fine-medium chalk gravel, rare subrounded medium flint gravel and very rare shell fragments (Head Deposits)			0.80	0.90	D2								
				Stiff light grey and orange brown (silty) CLAY with subangular fine flint gravel (Head Deposits)			1.20	1.30	D3								Window sampler hole collapsed to 1.50m after drilling to 2.00m
				Stiff light orange brown (silty) CLAY with rare selenite crystals (Gault Clay)			1.80	1.90	D4								
								2.00	HV1	(V=109)							
				becoming browner in colour with depth				2.40	D5								No groundwater recorded during fieldwork
											</						



Project

REPLACEMENT OF AGRICULTURAL BUILDINGS,
307 HUNTINGDON RD., CAMBRIDGE

Client

Boring Methods

PERCUSSIVE WINDOW SAMPLER

Hole No.

WS7

Sheet

1 of 1

Job No

9632

Ground Level

Coordinates

m.E.

m.N.

WATER				STRATA		SAMPLING/IN SITU TEST				LAB TESTING				OTHER TESTS AND NOTES	
Date/Time at Depth	Depth of Casing m	Depth to Water m	Inst.	Description	Legend	Level	Depth m	Type & No.	Blows/Strength	% I < 425	Wp %	Wv %	ρ_{30} Mg/m ³		C_u kN/m ²
				Made Ground (Concrete)			0.07								
				Made Ground (Orange brown silty fine-medium sand with fine-coarse gravel sized concrete fragments)			0.50	D1							
				Stiff grey orange and brown (silty) CLAY with white and cream pockets of silt (head Deposits?)			0.70	D2							
							1.50	D3							
				- occasional gypsum crystals below 2.00m			2.00	D4							
				Stiff brown (silty) CLAY with pockets of selenite crystals (Gault Clay)			2.20	D5	(V=121)						
				- with fine-medium gravel sized siltstone from 2.80m			2.90	D6							
							3.00	HV2	(V=140)						

Water Level observations during boring, depths below GL

Strike	Depth Obs.	Depth after			
		5min	10 min	15 min	20 min

WATER

▼ 1 First Strike
▣ 2 Subsequent Strike
N - Overnight Depth
C - Completion Depth
S - Seepage not rising

SAMPLE KEY

D Small disturbed sample
C Cone penetration test
W Water sample
U Undisturbed sample
P Piston sample

TEST KEY

S Standard penetration test
N = N value
261/50 blows, for 150mm, drive after seating
26* blows for part or whole of seating drive only
(26) U sample blow count
V = Vane Strength - kN/m²

BLOWS / STRENGTH

Fieldwork

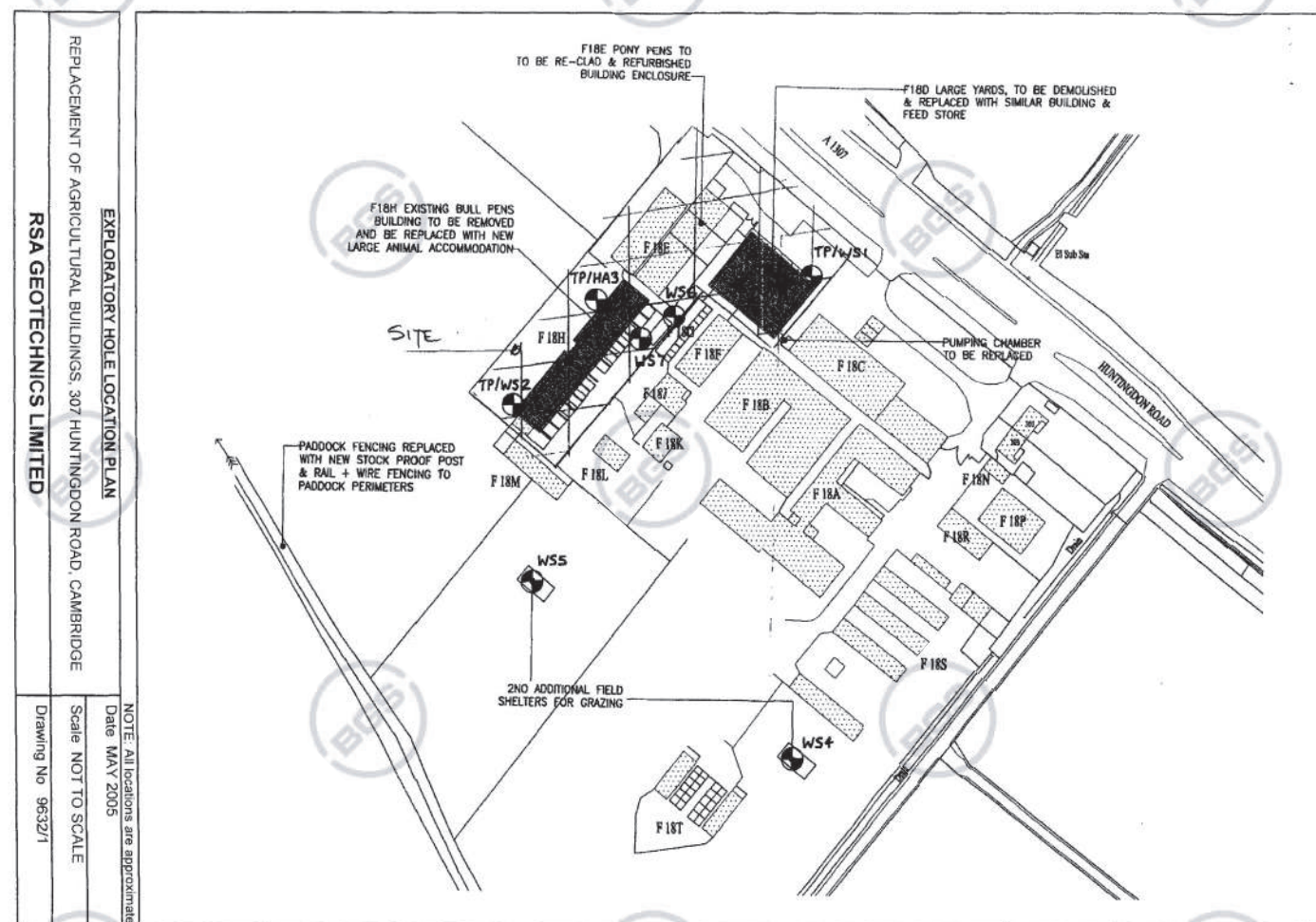
By

Dates

Log

Sheet 1 of 1

WS7

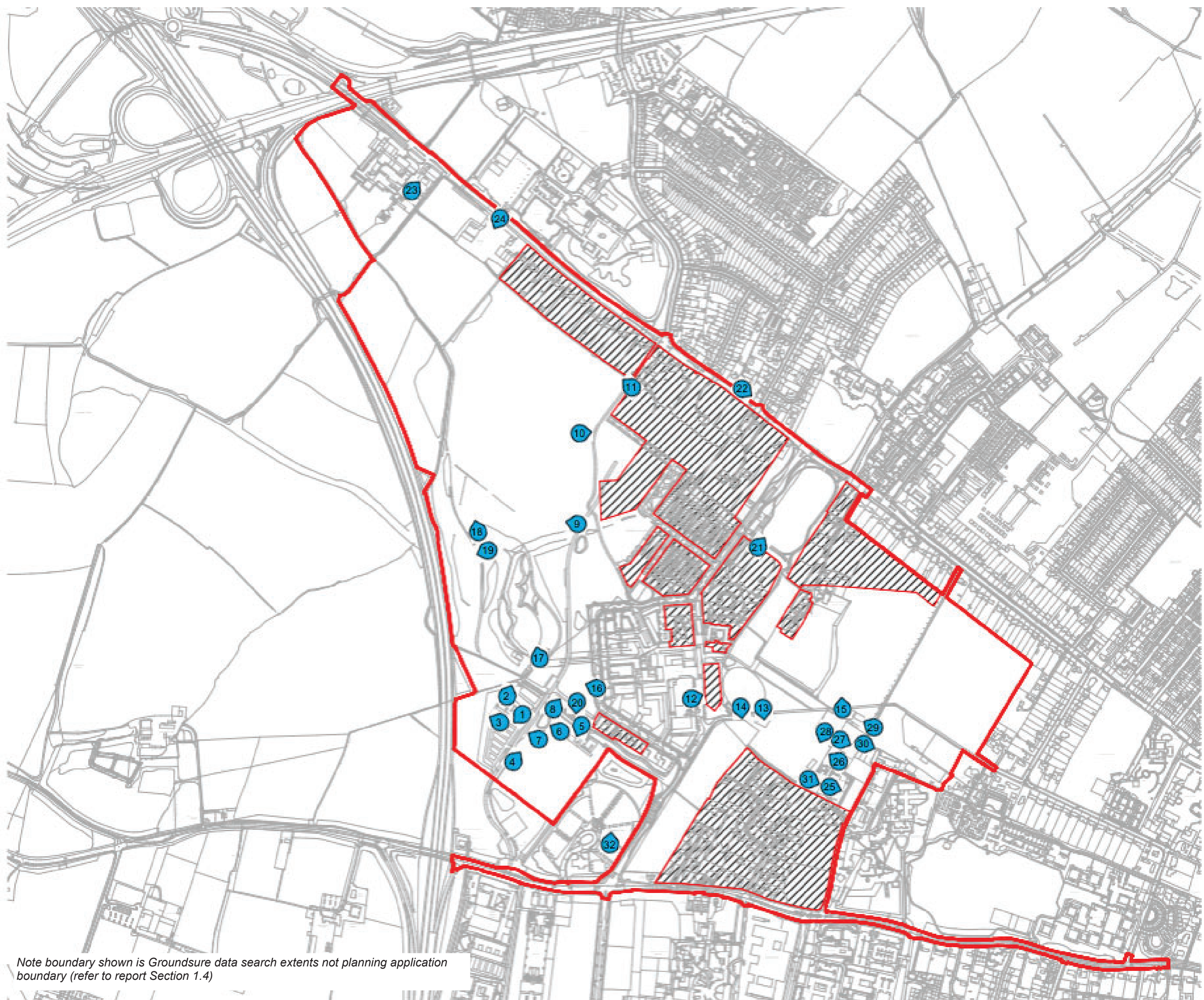


British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL						Site A14 Ellington to Fen Ditton	Number 4235
Excavation Method Drive-in Window Sampler		Dimensions 116mm to 1.00m		Ground Level (mOD) 15.03		Client Highways Agency	Job Number 5138919a
Location 541927.8 E 261185.4 N		Dates 18/07/2008		Project Contractor Costain Skanska		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend
0.50 0.50 0.50 0.70 0.70	D2 MES1 D4 E3		18/07/2008: 18/07/2008:	14.44	(0.59) 0.59	MADE GROUND Dark brown slightly sandy gravelly clay with rare cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of chert, and fragments of brick, clinker, concrete, tarmac and ceramic tile. Cobbles are subangular of tarmac.	
1.50 1.50 1.80	E5 MES5 D6			13.61	(0.83) 1.42	Stiff fissured orange brown CLAY. Fissures are very closely to closely spaced, subhorizontal, randomly orientated, undulating with 2-4mm of dark orange or dark grey discoloration. Rare rootlets. (GAULT CLAY)	
2.50 2.60	E7 D8						
3.50	D9				(4.58)		
4.50	D10						
5.50	D11						
			18/07/2008:	9.03	6.00	Complete at 6.00m	
Remarks Hand dug inspection pit to 1.20m. No services encountered. Borehole terminated at 6.00m depth. Borehole installed with standpipe as shown.						Scale (approx) 1:50	Logged By
						Figure No.	

Appendix F – Zetica Preliminary UXO Desktop Report

	
Pre-Desk Study Assessment	
Site:	Land at North West Cambridge, Cambridgeshire
Client:	AECOM
Contact:	Joseph Staines
Date:	4 th September 2024
Pre-WWI Military Activity on or Affecting the Site	None identified.
WWI Military Activity on or Affecting the Site	None identified.
WWI Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: ■ Transport infrastructure and public utilities.
WWI Bombing	None identified on the Site.
Interwar Military Activity on or Affecting the Site	None identified.
WWII Military Activity on or Affecting the Site	2No. British bomber aircraft crashed on the Site.
WWII Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: ■ Transport infrastructure and public utilities. ■ Industries important to the war effort, including aircraft manufacturing. ■ Royal Air Force (RAF) Oakington. ■ Military camps and training areas. ■ Anti-Aircraft (AA) and anti-invasion defences.
WWII Bombing Decoys (within 5km of Site)	2No. The nearest was located approximately 3km southwest of the Site.
WWII Bombing	During WWII the Site was located on the boundary between the Municipal Borough (MB) of Cambridge and the Rural District (RD) of Chesterton. Cambridge MB officially recorded 123No. High Explosive (HE) bombs with a bombing density of 12.2 bombs per 405 hectares (ha). Chesterton RD officially recorded 539No. HE bombs with a bombing density of 4.8 bombs per 405ha. Readily available records have been found to indicate that several HE bombs fell in close proximity to the Site.
Post-WWII Military Activity on or Affecting the Site	None identified.
Recommendation	It is recommended that a detailed desk study is commissioned to assess, and potentially zone, the Unexploded Ordnance (UXO) hazard level on the Site.
Further information	For information about Zetica’s detailed UXO desk studies and other UXO services, please visit our website: www.zeticauxo.com. Details and downloadable resources covering the most common sources of UXO hazard affecting sites in the UK can be found here. If you have any further queries, please don’t hesitate to get in contact with us at uxo@zetica.com or 01993 886 682.
This summary is based on a cursory review of readily available records. Caution is advised if you plan to action work based on this summary. It should be noted that where a potentially significant source of UXO hazard has been identified on the Site, the requirement for a detailed desk study and risk assessment has been confirmed and no further research will be undertaken at this stage. It is possible that further in-depth research as part of a detailed UXO desk study and risk assessment may identify other potential sources of UXO hazard on the Site.	

Appendix G – Site walkover photolog



Note boundary shown is Groundsure data search extents not planning application boundary (refer to report Section 1.4)

AECOM PHOTOGRAPHIC LOG			
Client Name: University of Cambridge		Site Location: North West Cambridge Development	Project No. 60732815
Photo No. 1	Date: 16/09/24		
Direction Photo Taken: South-West			
Description			
Contractors' car park within Wilson James owned specifically fenced logistics area, towards the south of the site. The car park is observed to be full. A haul road used by HGVs is observed to the left of this image.			
Photo No. 2	Date: 16/09/24		
Direction Photo Taken: North			
Description			
Partially buried water storage tank observed, with man-made pond with abundant vegetation observed behind including area of coniferous trees observed in the background of the photo.			

AECOM PHOTOGRAPHIC LOG			
Client Name: University of Cambridge		Site Location: North West Cambridge Development	Project No. 60732815
Photo No. 3	Date: 16/09/24		
Direction Photo Taken: North-West			
Description			
The area at the western-most extent of the contractor's car park comprises an electrical substation and commercial waste bin, being used for the disposal of waste vegetation. This area is bounded by Heras fencing, which was observed to be open at the time of the site walkover.			
Photo No. 4	Date: 16/09/24		
Direction Photo Taken: North			
Description			
Field of dry grass adjacent to haul / access road to the site from the south. Goods storage yard observed at the edge of the field. In the background, inhabited residential properties are observed with cranes as part of the construction site beyond.			

AECOM		PHOTOGRAPHIC LOG	
Client Name: University of Cambridge		Site Location: North West Cambridge Development	
Project No. 60732815			
Photo No. 5	Date: 16/09/24		
Direction Photo Taken: South			
Description Goods storage yard comprising gravel surface and storage for generic construction material (bricks, scaffold poles, metal fencing and sand)			
Photo No. 6	Date: 16/09/24		
Direction Photo Taken: West			
Description Man-made pond with abundant vegetation comprising a plastic lining and wooden fencing around the pond perimeter. The Wilson James site office is observed in the background.			

AECOM		PHOTOGRAPHIC LOG	
Client Name: University of Cambridge		Site Location: North West Cambridge Development	
Project No. 60732815			
Photo No. 7	Date: 16/09/24		
Direction Photo Taken: West			
Description 'Moby-dick' wheel wash for site vehicles including HGVs comprising below-ground water recycling tank and wash unit. A storage drum of unknown use is visible in the foreground. The contractor's car park is visible in the background of the photo.			
Photo No. 8	Date: 16/09/24		
Direction Photo Taken: East			
Description Man-made pond with vegetation and wooden fencing around the pond perimeter. Residential properties as part of the Proposed Development observed in the background.			

AECOM		PHOTOGRAPHIC LOG	
Client Name: University of Cambridge		Site Location: North West Cambridge Development	Project No. 60732815
Photo No. 9	Date: 16/09/24		
Direction Photo Taken: West			
Description			
Highly vegetated man-made mound within field on site. Haul road comprising tarmacadam and gravel road surface observed in the foreground and M11 motorway observed in the background.			

Photo No. 10	Date: 16/09/24		
Direction Photo Taken: South			
Description			
Bennett construction site as part of the Proposed Development. The site includes a gate to control access to the site and a site office observed in the background. Informed by site representative that material of pre-existing mound was removed on the location of the site offices and used to resurface the site. Site road comprising cycle lane and pedestrian walkway bound by green fencing and accessible via site access turnstiles to the south.			

AECOM		PHOTOGRAPHIC LOG	
Client Name: University of Cambridge		Site Location: North West Cambridge Development	Project No. 60732815
Photo No. 11	Date: 16/09/24		
Direction Photo Taken: North-West			
Description			
The northern site boundary is pictured, with residential properties fronting Huntington Road (A1307) to the north (off-site) and path with highly vegetated mound to the south (on-site). Green metal fencing and access gate in the foreground.			

Photo No. 12	Date: 16/09/24		
Direction Photo Taken: North			
Description			
Hill construction site off-site. The site includes a gate with turnstiles to the left of the image, site offices and two cement silos observed in the background.			

AECOM			PHOTOGRAPHIC LOG		
Client Name: University of Cambridge		Site Location: North West Cambridge Development		Project No. 60732815	
Photo No. 13	Date: 16/09/24				
Direction Photo Taken: East					
Description Goods storage yard owned by Hill, the construction company currently developing one of the packages of the Proposed Development. The goods yard comprises gravel surface with heras fencing around and storage for generic construction material (wooden pallets, a skip, bricks, breeze blocks, tools, and metal fencing).					
Photo No. 14	Date: 16/09/24				
Direction Photo Taken: East					
Description Soil heap within Hill construction site, derived from excavation on the opposite side of the road (not pictured). Jerry cans of unknown use disposed of on soil heap.					

AECOM			PHOTOGRAPHIC LOG		
Client Name: University of Cambridge		Site Location: North West Cambridge Development		Project No. 60732815	
Photo No. 15	Date: 16/09/24				
Direction Photo Taken: West					
Description Made-made unlined pond with wooden fencing around. Pond is observed to be largely dry with a small puddle of water observed.					
Photo No. 16	Date: 16/09/24				
Direction Photo Taken: West					
Description Disused goods storage yard surrounded by metal fencing previously used for storing construction materials. The goods yard ground surface comprises a mixture of gravel, tarmac and made ground with a concrete former building foundation observed in the center.					

AECOM		PHOTOGRAPHIC LOG	
Client Name: University of Cambridge		Site Location: North West Cambridge Development	
Project No. 60732815			
Photo No. 17	Date: 16/09/24		
Direction Photo Taken: North			
Description The lake at Brook Leys is pictured with abundant vegetation surrounding it. The lake had a flow direction towards the south and ducks were observed on the lake. A metal viewing tower / sculpture is observed in the background.			
Photo No. 18	Date: 16/09/24		
Direction Photo Taken: North			
Description Metal fencing and gate surrounding Brook Leys open space. The gate pictured was locked at the time of the walkover preventing access to the northern part of the site from the south.			

AECOM		PHOTOGRAPHIC LOG	
Client Name: University of Cambridge		Site Location: North West Cambridge Development	
Project No. 60732815			
Photo No. 19	Date: 16/09/24		
Direction Photo Taken: West			
Description Photo taken through gap in metal fencing surrounding Brook Leys open space. Surface water feature running N-S throughout the site, connected to Washpit Brook to the north.			
Photo No. 20	Date: 16/09/24		
Direction Photo Taken: South			
Description Washpit Brook is pictured as stagnant water in a storm drain. There is no clear flow direction at this location. Approximately 0.5 m water depth at the storm drain measured by AECOM engineer.			

AECOM		PHOTOGRAPHIC LOG	
Client Name: University of Cambridge		Site Location: North West Cambridge Development	
Project No. 60732815			
Photo No. 21	Date: 16/09/24		
Direction Photo Taken: North			
Description Water above-ground storage tank (AST) within playing field comprising grass area and football nets.			
Photo No. 22		Date: 16/09/24	
Direction Photo Taken: South-East			
Description BP Petrol forecourt pictured. No evidence of oil spills or hydrocarbon sheen in drains observed. Commercial waste bins and recycling metal baskets. No litter or evidence of fly tipping observed.			

AECOM		PHOTOGRAPHIC LOG	
Client Name: University of Cambridge		Site Location: North West Cambridge Development	
Project No. 60732815			
Photo No. 23	Date: 16/09/24		
Direction Photo Taken: North			
Description Electrical substation pictured behind metal fencing within University of Cambridge owned land, used as Biomedical Research labs, comprising offices, research laboratories, stables and pens and some disused buildings.			
Photo No. 24		Date: 16/09/24	
Direction Photo Taken: South			
Description Photo taken from behind metal fencing. Land comprising disused warehouses and buildings of unknown use. Contractors pictured putting up herras fencing on site.			

AECOM		PHOTOGRAPHIC LOG	
Client Name: University of Cambridge		Site Location: North West Cambridge Development	
Project No. 60732815			
Photo No. 25	Date: 16/09/24		
Direction Photo Taken: East			
Description			
Gravel Hill Farm. Outbuilding used for storage of construction materials and goods storage. Skip containing waste vegetation pictured in the foreground.			
Photo No. 26	Date: 16/09/24		
Direction Photo Taken: East			
Description			
Gravel Hill Farm. Outbuilding with electric vehicle charging points and parking spaces pictured.			

AECOM		PHOTOGRAPHIC LOG	
Client Name: University of Cambridge		Site Location: North West Cambridge Development	
Project No. 60732815			
Photo No. 27	Date: 16/09/24		
Direction Photo Taken: East			
Description			
Gravel Hill Farm. Surface water feature surrounded by wooden fencing and dense vegetation, labelled with 'deep water' hazard warning sign. Plant / good storage yard pictured in background with plant and vehicles present.			
Photo No. 28	Date: 16/09/24		
Direction Photo Taken: South			
Description			
Field with allotment and greenhouse pictured.			

AECOM		PHOTOGRAPHIC LOG	
Client Name: University of Cambridge		Site Location: North West Cambridge Development	Project No. 60732815
Photo No. 31	Date: 16/09/24		
Direction Photo Taken: East			
Description Underground storage tank, likely used for water storage within area fenced off with metal fencing at Gravel Hill Farm. Storage warehouse / former farm building and staff car park pictured in background.			
Photo No. 32	Date: 16/09/24		
Direction Photo Taken:			
Description Madingley Road Park and Ride – Public car park located due west of the Site, comprising parking spaces, internal roads, a bus terminal and electric vehicle charging points.			

Appendix: Water Resource, Flood Risk and Drainage

Annex 1: Legislation, Planning Policy and Other Relevant Standard and Guidance

Annex 2: Foul Drainage Sketches

Annex 3: Anglian Water Correspondences

Annex 4: Flood Risk Assessment and Surface Water Drainage Strategy

Annex 5: Cambridge Water Correspondence

Appendix: Water Resource, Flood Risk and Drainage

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ANNEX 1: LEGISLATION, PLANNING POLICY AND OTHER RELEVANT STANDARD GUIDANCE

This assessment has been undertaken taking into account relevant legislation and guidance set out in national, regional and local planning policy (summarised in the sections below and within **ES Volume 3, Appendix: Water Resources, Flood Risk and Drainage**). The legislation and policy requirements have informed the preparation of **ES Volume 1, Chapter 14: Water Resources, Flood Risk and Drainage**.

National Legislation

Water Act, 2014

The Water Act was published in 2014. The aim of the Act was to reform the water industry to make it more innovative and responsive to customers and to increase the resilience of water supplies to natural hazards such as droughts and floods.

Policies and objectives which are of particular relevance to flood risk and drainage include:

- “To enable developers and any new water or sewage companies to connect new building developments to the water mains and sewage system; and
- Provide measures to restore sustainable abstraction of water and the encouragement for the use of Sustainable Drainage Systems (SuDS).”

Land Drainage Act, 1991

The Land Drainage Act was published in 1991 and requires that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded. It provides the general guidance of the flood risk management works.

Flood and Water Management Act, 2010

The Flood and Water Management Act was implemented in 2010 to help improve flood risk management and ensure the security of water supplies in England and Wales. The Act updates legislation to ensure better protection from flooding, manage water more sustainably, improve public services and secure water resources during periods of drought.

The Act aims to:

- reduce the likelihood and impacts of flooding;
- improve authority ability to manage the risk of flooding;
- improve water quality;
- give water companies better powers to conserve water during drought;
- reduce red tape and other burdens on water and sewerage companies;
- improve the overall efficiency and management of the industry; and
- reduce pollution

Flood Risk Regulations, 2009

The Flood Risk Regulations 2009, implement the European Floods Directive and require the Lead Local Flood Authority (LLFA) and the EA to prepare and publish Flood Risk Management Plans on a six-year cycle.

The regulations identify and take action in areas with the most significant flood risks and require the following to be produced:

- Preparation of a Preliminary Flood Risk Assessment Report (PFRA) including the identification of flood risk areas;
- Preparation of Flood Hazard Maps and Flood Risk Maps;
- Preparation of Flood Risk management Plans; and
- Cooperating with the EA and other LLFAs.

Appendix: Water Resource, Flood Risk and Drainage

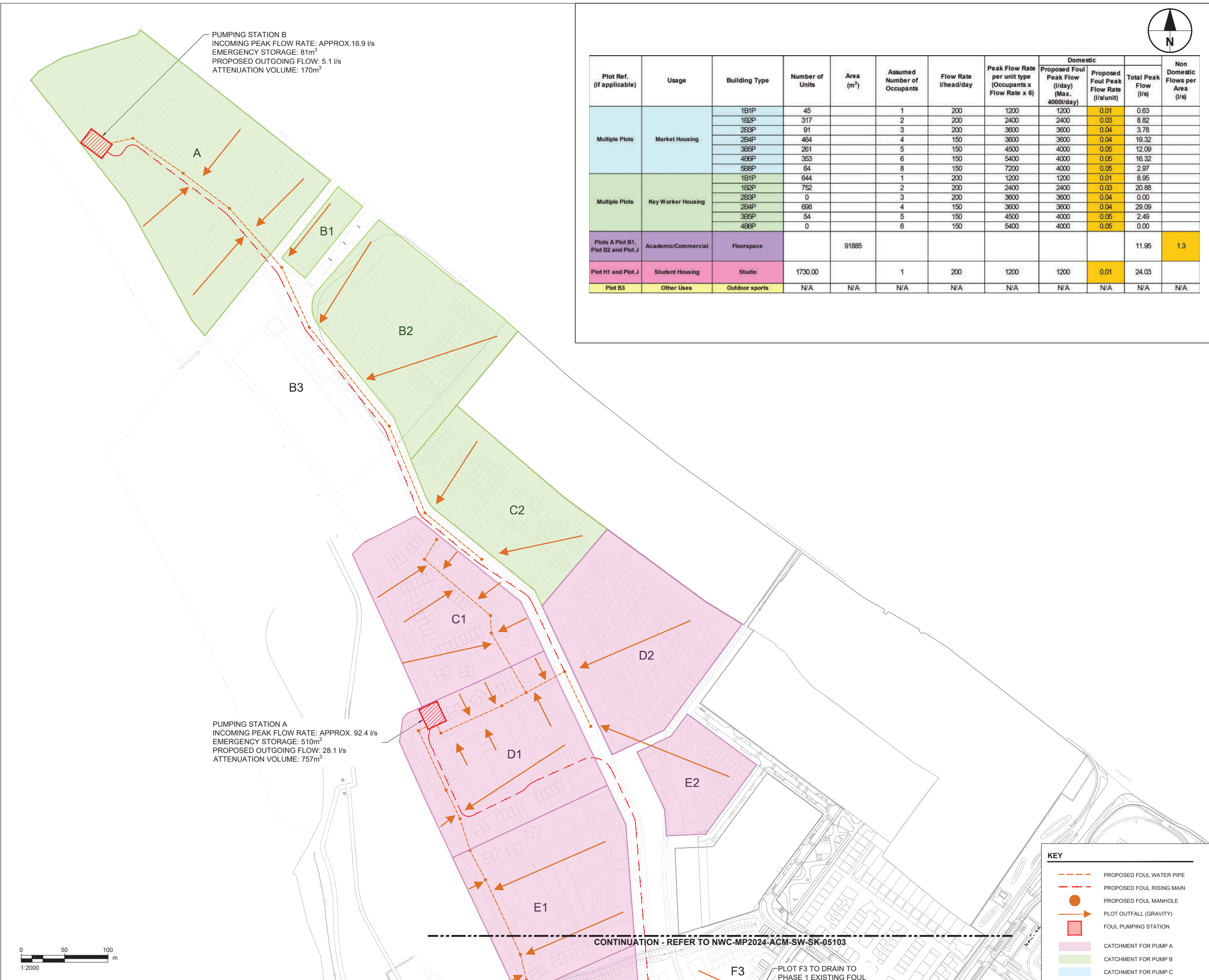
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[illegible]

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION, ANY DISCREPANCIES IN DIMENSIONS OR DETAILS ON OR BETWEEN THESE DRAWINGS SHOULD BE DRAWN TO THE ATTENTION OF THE ARCHITECT AND/OR THE ENGINEER FOR CLARIFICATION.
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3. DRAINAGE DESIGN IS BASED ON GRANT ASSOCIATES PROPOSED LEVELS RECEIVED ON 20.11.2024.
4. FOUL DRAINAGE NETWORK IS SUBJECT TO DETAILED HYDRAULIC MODELLING FOLLOWING DEVELOPMENT OF MASTERPLAN AND SITEWIDE LEVELS.
5. FOUL FLOW RATES CALCULATION IS BASED ON HAWKINS BROWN ACCOMMODATION SCHEDULE (NWC-SW-ZZ-HB-XX-XX-SH-A-000000_Rev16) RECEIVED 11/04/2025.
6. PLOT BOUNDARIES AND PLOT BUILDINGS BASED ON HAWKINS BROWN MASTERPLAN PP9-10009 - ILLUSTRATIVE MASTERPLAN_250410 RECEIVED 11/04/2025
7. PROPOSED SITEWIDE FOUL NETWORK IS BASED ON MINIMUM 1.2m COVER TO PIPES AND PIPE SIZES RANGING FROM DN150 TO DN375.
8. EMERGENCY STORAGE IS BASED ON 8 HOURS OF DRY WEATHER FLOW. EMERGENCY STORAGE VOLUME IS SUBJECT TO AGREEMENT WITH ANGLIAN WATER.
9. PROPOSED PUMPING STATION ATTENUATION VOLUME IS BASED ON 4 HOUR DURATION AND REDUCED RATE TO NOT EXCEED THE MAXIMUM FLOW RATE ALLOWED FOR IN PHASE 1 DRAINAGE NETWORK FROM FUTURE PLOTS. ATTENUATION VOLUME AND PUMP RATES IS SUBJECT TO AGREEMENT WITH ANGLIAN WATER.

ISSUE/REVISION		
P02	09/05/2025	UPDATED MASTERPLAN
P01	17/12/2024	First Issue
I/R	DATE	DESCRIPTION

PURPOSE OF ISSUE

FOR INFORMATION

SCALE	SUITABILITY
1:2000	S0

PROJECT NUMBER
60732815

SHEET TITLE

FOUL DRAINAGE SKETCH
(GRANT LEVELS)
SHEET 1

SHEET NUMBER	REV
NWC-MP2024-ACM-SW-SK-05102	P02

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6. PLOT BOUNDARIES AND PLOT BUILDINGS BASED ON HAWKINS BROWN MASTERPLAN PP9-10009 - ILLUSTRATIVE MASTERPLAN_260410 RECEIVED 11/04/2025
7. PROPOSED SITEWIDE FOUL NETWORK IS BASED ON MINIMUM 1.2m COVER TO PIPES AND PIPE SIZES RANGING FROM DN150 TO DN375.
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P02	09/05/25	UPDATED MASTERPLAN
P01	17/12/24	First Issue
I/R	DATE	DESCRIPTION

FOR INFORMATION

SCALE	SUITABILITY
1:2000	S0

60732815

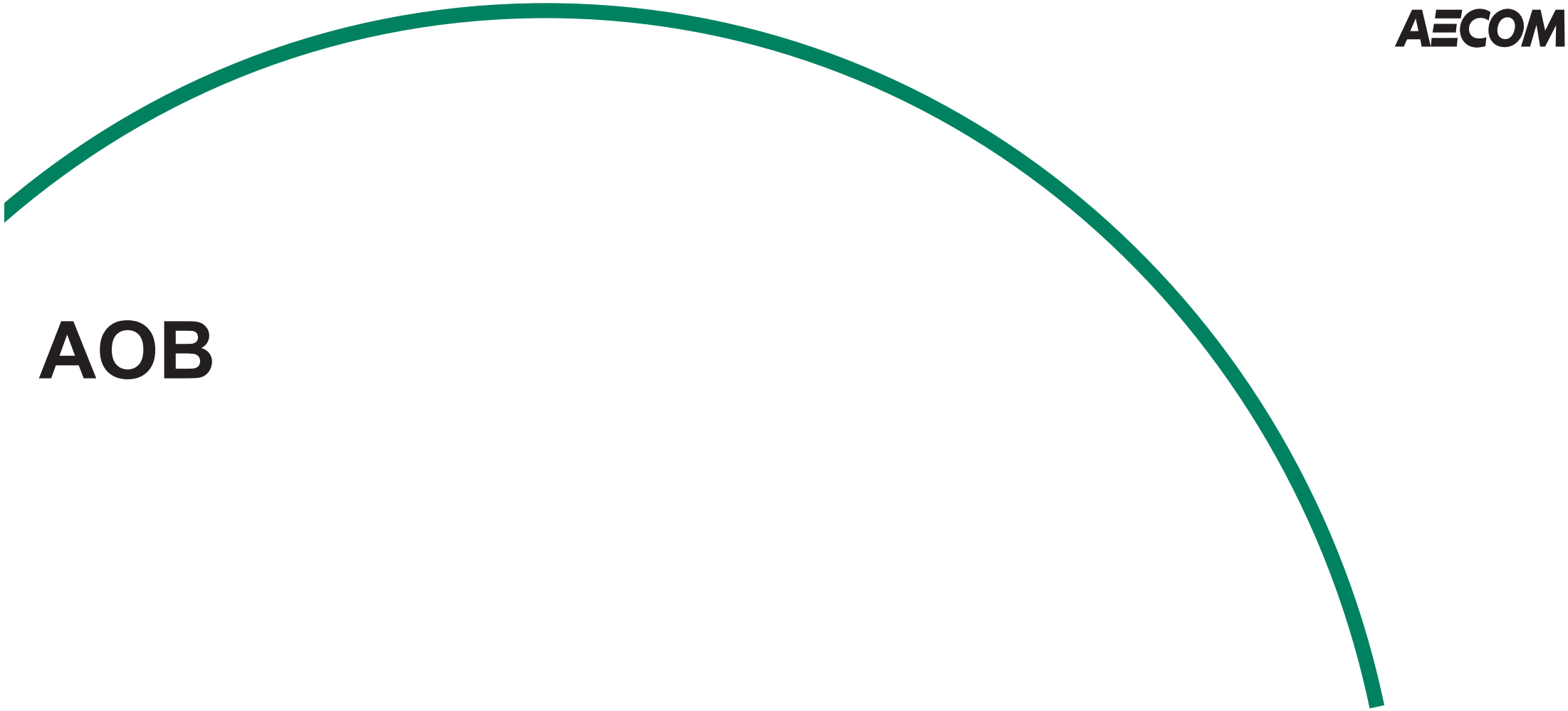
FOUL DRAINAGE SKETCH

SHEET 2

NWC-MP2024-ACM-SW-SK-05103

P02





Delivering a better world

Appendix: Water Resource, Flood Risk and Drainage

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North West Cambridge

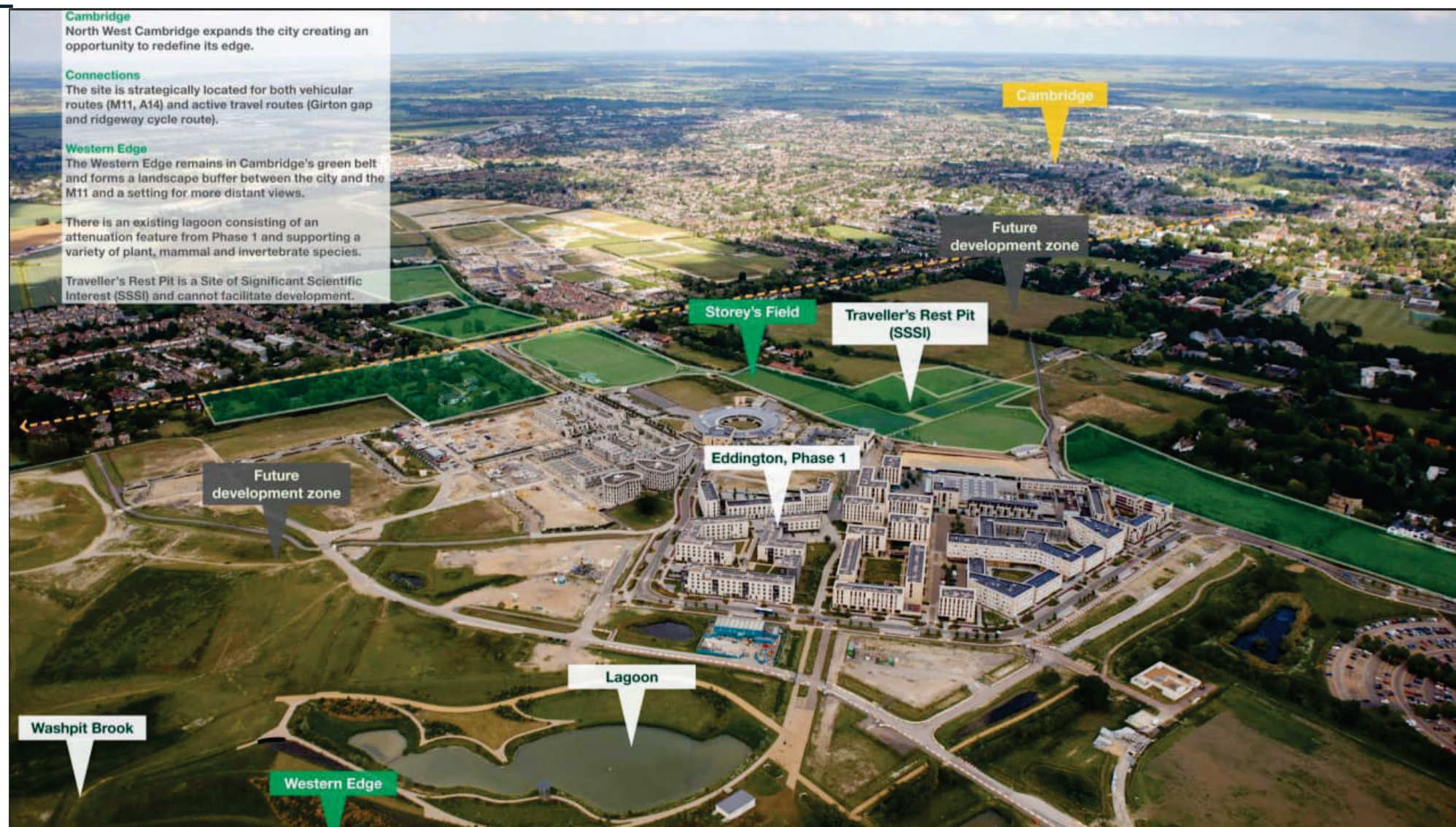
Initial Meeting with Anglian Water

12th November 2024

Delivering a better world

Agenda

1. Introductions
2. Proposed development overview and previously consented scheme
3. Foul water drainage background
4. Proposed foul water drainage strategy
5. AOB



Proposed Development Overview

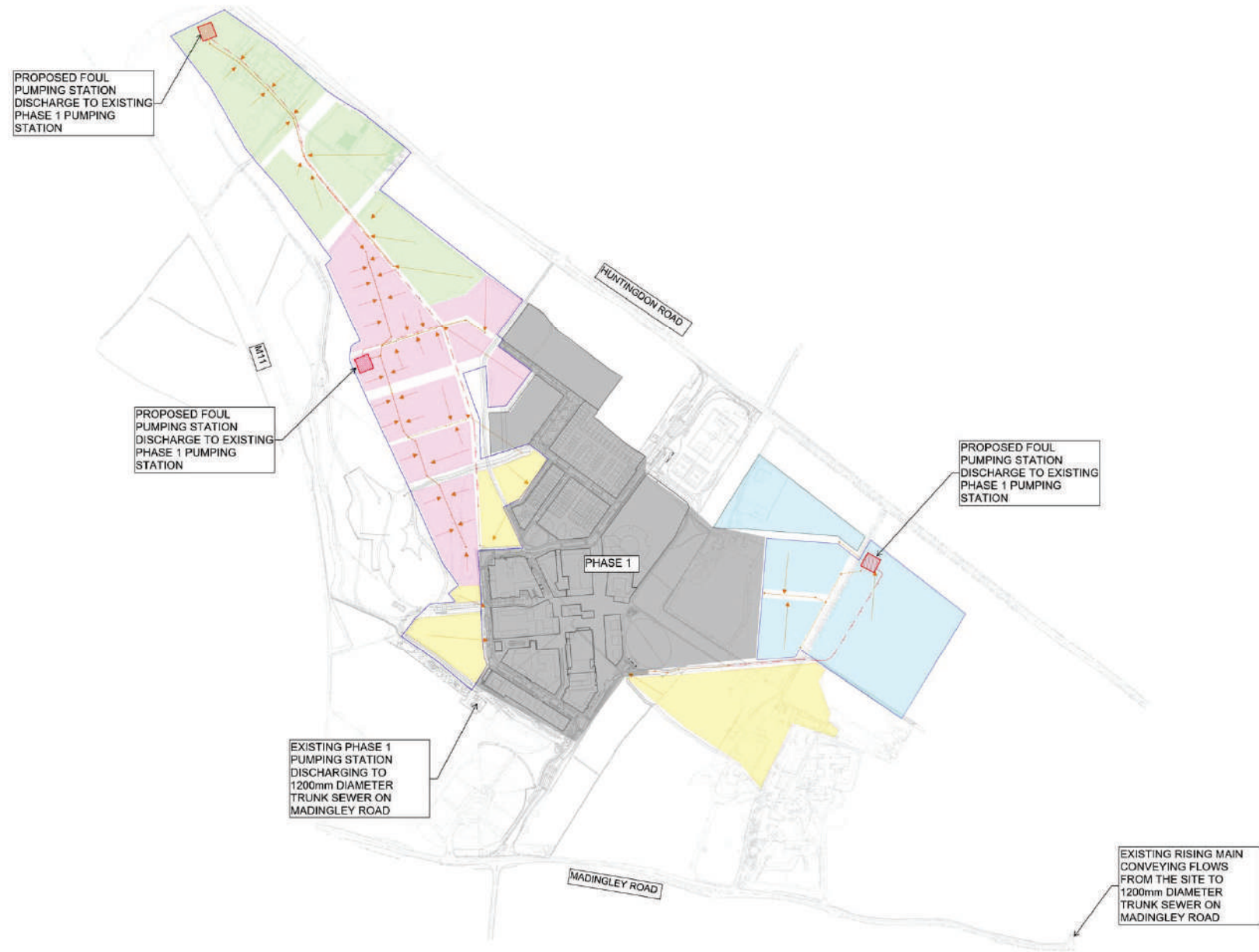
- Allocated site for 3000 dwellings (student accommodation, employment, retail and community uses).
- Proposals seek an uplift to between 4500 and 6000 dwellings, student accommodation, employment, retail and community use subject to testing of design typologies and infrastructure constraints.
- Phase 1 (approx. 1800 dwellings) formed part of the previously consented scheme and have been constructed.



- Foul water discharge to a series of pumping station before ultimately pumped to phase 1 foul pumping station. Phase 1 foul drainage and pumping station included allowance for discharge from remainder site.

- Phase 1 foul pumping station discharge to 1200mm diameter trunk sewer in Madingley Road. Discharge rate to trunk sewer agreed as part of phase 1 works.
- Phase 1 pumping station currently offered for adoption.





Proposed Foul Water Drainage Strategy

- Foul water discharge to a series of pumping station before ultimately pumped to existing phase 1 foul drainage and pumping station.
- Proposed pump rates restricted in accordance with allowance made in the existing phase 1 foul drainage network as part of previous consented scheme. Therefore, no impact on existing sewers.
- Peak foul flow rate calculation based on:
 - 200 l/person/day for studio, 1 bed and units with maximum 2 persons per unit
 - 150 l/person/day for larger 2, 3 and 4 bed units with 4 to 8 persons per unit with flow rates capped at a maximum of 4000 l/unit/day
 - Peak factor of 6 for residential peak flows
 - Non-residential flows based on 1.3 l/s/ha
- Pumping station will include two forms of storage, attenuation to restrict the incoming foul flows and emergency storage during the event of pump failures.
- Emergency storage calculation based on 8-hour duration of dry weather flow.
- Attenuation storage based on 4-hour duration and attenuating the incoming foul flows to restricted pump rate.
- Dry weather flow estimated by omitting the peak factor from the peak flow rates.
- Proposed foul pumping stations and primary foul drainage network intended to be offered for adoption similar to existing phase 1 pumping station.

Minutes

Meeting name North West Cambridge Anglian Water Liaison	Subject Emerging Foul Water Drainage Strategy	Attendees Maks Zdunek, Anglian Water Rob Morris, Anglian Water Sophie Butler, Planning, QUOD Stuart Guarniere, Engineering, AECOM Bimarsha Limbu, Drainage Lead, AECOM Dom Howgego, Project Manager, AECOM	Circulation List Guy Wilson, Planning Officer, CCC Matt Sherwood, Planning Lead, QUOD Gemma Bushell, Project Manager, Turner and Townsend.
Meeting date 12.11.24	Time 15.00 - 16.15		
Location MS Teams	Project name North West Cambridge Masterplan		
Document number 60732815	Prepared by Bimarsha Limbu		

Ref	Notes	Initial
01	Following introductions, the general scheme context was outlined. An initial project pre-application meeting has taken place and DH noted that there is some useful context and initial planning feedback available. The project was introduced through the attached slide pack. The site is allocated for 3,000 dwellings, alongside other uses and benefits from existing, although lapsed, planning permission. The proposals seek an uplift of dwellings between 4,500 and 6,000 dwellings with the final figure subject to testing of design typologies and infrastructure constraints. Phase 1 of the previously consented scheme including approximately 1,800 dwellings have been implemented. SG confirmed the uplift of between 4,500 and 6,000 dwellings is inclusive of the existing 1,800 dwellings constructed as part of Phase 1.	
02	The balance of the Masterplan at North West Cambridge is programmed to be submitted for an Outline Planning Application (OPA) in Q3 2025. The purpose of this initial introductory meeting with the Anglian Water is to provide an overview of the foul drainage proposals being developed to support the OPA.	
03	BL provided a summary of the previous foul water drainage strategy as part of the previous consented scheme including the phase 1 foul water drainage strategy which is now implemented. The key points are on the slide deck. SG highlighted that the foul discharge rates and point of connection to Anglian Water sewer from the site were agreed as part of Phase 1 works which have been implemented and the proposed development as part of the new OPA will be restricting the foul flow rates before discharging to the existing Phase 1 foul drainage network, therefore, not impacting to the previously agreed point of connection and foul discharge rate.	
04	BL noted that the existing phase 1 foul pumping station has been offered for adoption. Anglian Water team noted they'll query on the status of the adoption.	
05	Four key points were highlighted in respect of the planned foul drainage strategy for the balance of the Masterplan (also with reference to the slide deck). a) The principles of the foul drainage strategy are following the previously consented strategy. Foul flows from plots will discharge to a series of pumping stations before ultimately discharging to the existing Phase 1 foul drainage network and pumping station. The foul flows will be restricted within the proposed pumping stations to not exceed the discharge rates allowed in the existing Phase 1 foul drainage network and pumping station. Therefore, there will be no impact to the agreed discharge rate from Phase 1 pumping station to the 1200mm diameter Anglian Water trunk sewer. b) Foul flow rate by tenure is used to calculate the peak foul flow rates similar to the previously consented strategy. Details of the flow rate calculation methodology is included in the attached slides. c) Proposed pumping station will include emergency and attenuation storage volumes. Emergency storage is based on 8-hour duration of dry weather flow where the dry weather flow has been estimated by omitting the peak factor from peak flow rates. Attenuation storage is based on 4-hour duration.	

Minutes
North West Cambridge Anglian Water Liaison

Ref	Notes	Initial
	d) Proposed foul pumping stations and the primary foul drainage network is intended to be offered for adoption at a later stage. SG noted that the proposed foul drainage network as part of the new OPA and the existing Phase 1 foul drainage network will be under the same ownership i.e. University of Cambridge until adopted by Anglian Water.	
06	RM/MZ noted that the overall volume of foul discharge from the uplift in total number of dwellings also need to be assessed along with the discharge rates.	DH/BL
07	RM requested a build out phase plan of the proposed development. DH noted that an indicative phase plan can be provided which will be subject to development as the project progresses. This was acceptable to RM.	
08	RM queried on the approach to trade effluent application/licenses for non-residential plots where applicable. SG highlighted that any there currently isn't information on the plots which would require trade effluent license, however, it is expected that individual plots will need to make allowance for the application as well as measures to meet the requirements of trade effluent license prior to discharge to the foul drainage network.	
09	RM queried on the application of dosing for septicity control within the pumping stations. SG noted that this will be implemented similar to existing Phase 1 foul pumping station.	
10	MZ confirmed receipt of the pre-planning enquiry in relation to the development and are awaiting payment. DH/BL advised payment is being looked at to complete the application process. Post meeting note – A purchase order has been raised to allow Anglian Water to issue invoice for the application fee (PO number: 1683717). The PPE reference is PPE-0217160.	BL
11	The proposals were well received in the meeting by RM and MZ. MZ/RM noted that the pre-planning enquiry will be assessed based on the information provided in this meeting as well and a response will be provided within 21 days from receipt of the application fee. MZ/RM also noted that the assessment and acceptability of the scheme is likely to be an ongoing process and considered alongside Anglian Water's own strategic plan process. The formal planning submission would also be a key point in the process when Anglian Water would further assess the implications of the project.	

Appendix: Water Resource, Flood Risk and Drainage

Annex 1: Legislation, Planning Policy and Other Relevant Standard and Guidance

Annex 2: Foul Drainage Sketches

Annex 3: Anglian Water Correspondences

Annex 4: Flood Risk Assessment and Surface Water Drainage Strategy

Annex 5: Cambridge Water Correspondence



Flood Risk Assessment and Surface Water Drainage Strategy

North West Cambridge Masterplan

The University of Cambridge

Project number: 60732815
NWC-MP2024-ACM-SW-RP-00019 P02
16th May 2025

Delivering a better world

Flood Risk Assessment and Surface Water Drainage Strategy

Project number: 60732815

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
P01	16 th May 2025	FOR PLANNING	David Smith	David Smith	Director
P02	24 th July 2025	Updated with Quod Comments	David Smith	David Smith	Director

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Glossary

Acronym	Description
AEP	Annual Probability of Exceedance
AOD	Above Ordnance Datum
BGS	British Geological Survey
EA	Environment Agency
FRA	Flood Risk Assessment
LLFA	Lead Local Flood Authority (i.e. LBBD)
m	metres
ha	hectare
mAOD	meter Above Ordnance Datum
LPA	Local Planning Authority
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
SFRA	Strategic Flood Risk Assessment
SoP	Standard of Protection
SPZ	Source Protection Zones
SuDS	Sustainable (urban) Drainage System
SWMP	Surface Water Management Plan
FAS	Flood Alleviation Scheme
NWCM	North West Cambridge Masterplan
SWDS	Surface Water Drainage Strategy
OPA	Outline Planning Application
OPP	Outline Planning Permission
SPD	Supplementary Planning Document
REFH	Revitalised Flood Hydrograph method
PIMP	Percentage Impermeable

Executive Summary

This Flood Risk Assessment (FRA) has been prepared in accordance with the National Planning Policy Framework (NPPF), the accompanying Planning Practice Guidance including relevant planning policies. The FRA has assessed the Site in terms of topography, geology, hydrogeology and climate change by reviewing the available information and aims to identify the potential sources of flooding and how residual flood risk will be managed without causing flood risk elsewhere.

The Site is predominantly within Flood Zone 1 with a small area in the north-west corner located in Flood Zone 2. All residential units will be located within Flood Zone 1. The Site is classified as ‘More Vulnerable’ and as such the Exception Test is not required. Climate change impacts have been accounted for using the latest Environment Agency allowances, including a 40% uplift in rainfall intensity and 9% in river flow.

As part of the original consented scheme (2013), the Proposed Development was deemed to cause a potential increased risk of fluvial flooding to the downstream village of Girton. To address this, a Flood Alleviation Scheme (FAS) was designed and implemented during Phase 1 of the development. The FAS comprises a two-stage channel and flow control structure, which runs parallel to the existing watercourse, the Washpit Brook, within the Site and provides additional online storage during peak flows. This arrangement successfully reduces the volume of water passed downstream and mitigates flood risk both to and from the Site. The fluvial hydraulic modelling has been updated since to incorporate higher climate change allowances and ReFH2 rainfall-runoff method and the results confirm that the FAS continues to provide effective protection and ensures that the completed development in its entirety does not increase flood risk.

Other sources of flood risk have also been assessed. Surface water flood risk is concentrated in low-lying areas near the Washpit Brook; however, it will be managed through sustainable drainage systems (SuDS) in line with best practice and Environment Agency guidance. Groundwater flood risk is considered low, with some potential in localised areas that will be addressed through appropriate design measures. The Site is considered to be at low risk of sewer flooding. The Site is located outside the extent of potential reservoir flooding.

The SWDS proposes Sustainable Drainage Systems (SuDS) in line with the original consented scheme, maintaining the principle of discharging to the Washpit Brook at greenfield runoff rates. Surface water runoff from individual plots will be attenuated and restricted to greenfield runoff rates before discharging into the sitewide drainage network. Surface water attenuation will be provided on-plot and across the sitewide drainage network to limit the surface water run-off up to 1 in 100-year storm event plus 40% climate change allowance. Design parameters have been developed in consultation with the Lead Local Flood Authority (LLFA) and are based on FEH rainfall data. Pollution control will be delivered through two stages of treatment using SuDS features or proprietary petrol interceptors. The LLFA has confirmed agreement in principle with the proposed strategy.

1. Introduction

AECOM has been commissioned by The University of Cambridge (“the Applicant”) to prepare a site-specific Flood Risk Assessment (“FRA”) and a Surface Water Drainage Strategy (“SWDS”) to support the Outline Planning Application (“OPA”) for the North West Cambridge Masterplan (“NWCM”) for a phased mixed-use development, including demolition of existing buildings and structures. Outline Planning Permission for Eddington was originally granted (application references 11/1114/OUT and S/1886/11) in February 2013 for a residential led mixed use development, and approximately 1,848 residential units (key workers and market homes) and 325 student accommodation units have been approved/delivered as part of the Phase 1 development under the original consented scheme. The ability to bring forward further residential dwellings under the original Outline Planning Permission (“OPP”), through Reserved Matters Applications, expired in 2023. As a result, the Applicant is seeking OPP for the future phases of the North West Cambridge Masterplan.

This FRA has assessed the Site in terms of topography, geology, hydrology and climate change by reviewing available information and aims to identify potential sources of flooding to and from the proposed development and how residual flood risk will be managed without causing flooding elsewhere.

2. Site Description

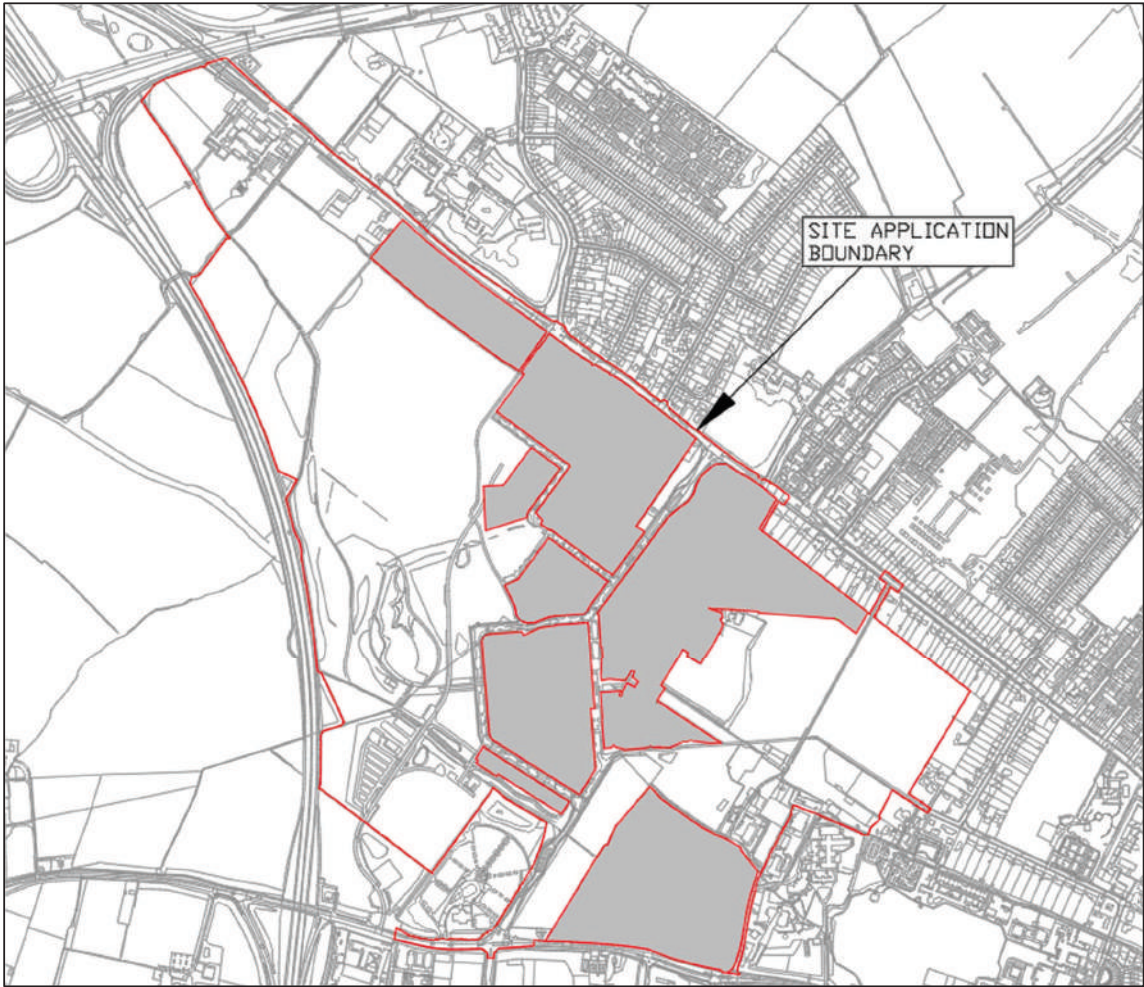
Site Location

The Site is located at Eddington on the north-western edge of the City of Cambridge, to the south and west of the village of Girton. The Site is bound by:

- a small portion of the A14 to the north, and Girton College, residential properties and agricultural fields which front onto Huntingdon Road (A1307) to the north and north-east;
- residential properties located along Huntingdon Road, Ascension Parish Burial Ground, Trinity Hall (University of Cambridge student accommodation) and Trinity Hall sports grounds to the east of the Site;
- Madingley Road Park and Ride, Madingley Road (A1303), and residential properties and buildings associated with the University of Cambridge to the south; and
- the M11 motorway to the west, beyond which lies agricultural fields.

Cambridge City Centre is located approximately 2km to the south-east of the Site at its nearest point. The Site forms part of the emerging settlement of Eddington. The total Site area is approximately 114 hectares (ha), with the red line boundary extent shown in Figure 1. Areas shown in grey hatch are excluded from the application as they are existing built development, and no material changes are proposed as part of this application.

Figure 1 Site Application Boundary



Topography

A site-specific topographical survey was initially carried out in August 2012 by Survey Operations (Drawing Ref: 12F126). This was subsequently updated in May 2017 by ASC (Surveys) Limited (Drawing Ref: ASC.17.283) to more accurately reflect existing Site levels and to capture localised spoil heaps across the Site. The two surveys have been combined into a single drawing, which is included in **Appendix A** of this report.

The topography of the development, located west of Phase 1 shows levels ranging from approximately 21m AOD at the eastern end to around 12m AOD along Brook Leys. There are localized spoil heaps with elevations reaching 30mAOD which do not cause blockages at the Site as it maintains to have a general fall towards Brook Leys – these spoil heaps are temporary in nature and will be removed as part of any future development. Levels on the eastern side of Phase 1 have high points around the central area of approximately 25.5mAOD and fall towards both the west and east, reaching low points of approximately 21m AOD on either side.

Proposed Development

The proposed development will comprise of:

- Living Uses, comprising residential floorspace (Class C3/C4, up to 3,800 dwellings), student accommodation (Sui Generis), Co-living (Sui Generis) and Senior Living (Class C2);
- Flexible Employment Floorspace (Class E(g) / Sui Generis research uses);
- Academic Floorspace (Class F1); and

- Floorspace for supporting retail, nursery, health and indoor sports and recreation uses (Class E (a) – E (f)).
- Public open space, public realm, sports facilities, amenity space, outdoor play, allotments and hard and soft landscaping works alongside supporting facilities;
- Car and cycle parking, formation of new pedestrian, cyclist and vehicular accesses and means of access and circulation routes within the Site;
- Highway works;
- Site clearance, preparation and enabling works;
- Supporting infrastructure, plant, drainage, utilities, earthworks and engineering works.

The illustrative masterplan of the proposed development can be found in an **Appendix B** of the report.

Geology

The British Geological Survey (BGS) holds mapping of geology across the UK. The mapping indicates the vast majority of the Site to be underlain by a bedrock of Gault Formation – Mudstone with a small portion located on the southeast side of the Site to be underlain by West Melbury Marly Chalk Formation – Chalk (see Figure 2). BGS map also shows the parts of the Site to be overlaid by superficial Head deposits – clay, silt sand and gravel, with River Terrace Deposits present east of the Site (see Figure 3).

Figure 2 Bedrock Geology

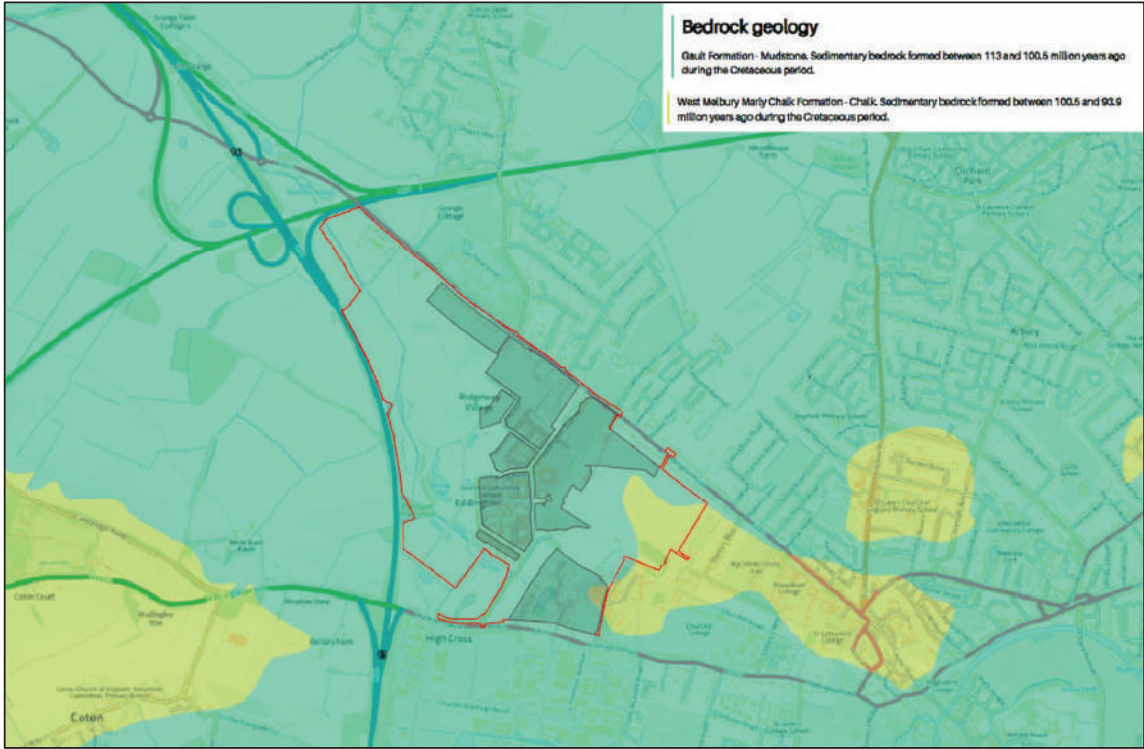
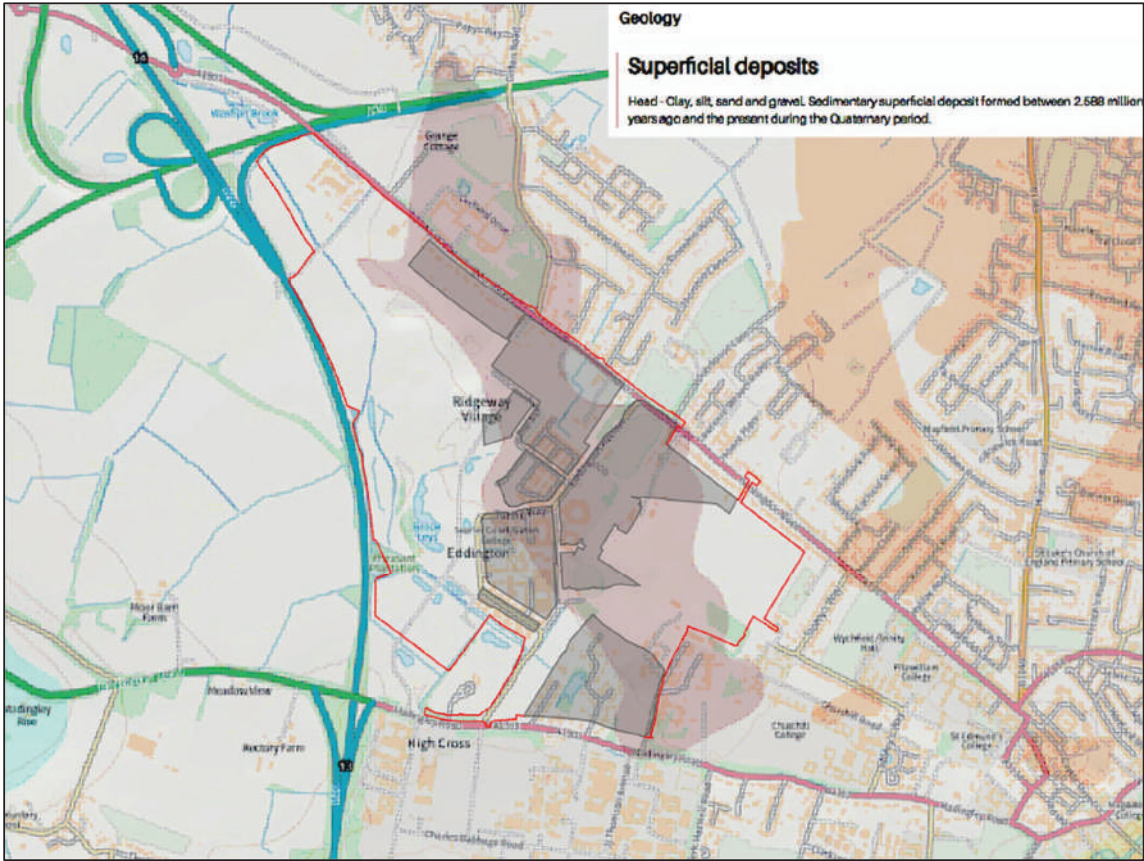


Figure 3 Superficial Deposit Geology



Hydrogeology

Groundwater used for drinking water is protected by the Environment Agency (EA). The EA classifies zones known as Source Protection Zones (SPZ) around potable groundwater abstraction points, designed to limit potentially polluting activities. The EA website shows that the Site does not overlay an SPZ.

The Head superficial deposits are classified as Secondary (undifferentiated) aquifers and the River Terrace Deposits located to the east of the Site are classified as Secondary A aquifers. The Gault Formation bedrock present is classified as an unproductive aquifer, while the West Melbury Chalk Formation is classified as a Principal aquifer.

The EA groundwater vulnerability maps show the vulnerability of groundwater to a pollution discharged at ground level based on hydrological, geological, hydrogeological and soil properties within a one-kilometre square grid. The EA classifies the areas into five risk categories; High, Medium-High, Medium, Medium-Low and Low which is based on the likelihood of a pollutant reaching the groundwater (i.e., vulnerability), the type of aquifers present, and the potential impact (i.e., the aquifer designation). The EA groundwater vulnerability map indicates eastern extent of the Site in an area of Medium – Low risk whilst the southwestern extent of the Site is in an area of Medium - High risk with soluble rock risk.

Hydrology

The Washpit Brook is the closest watercourse to the Site which runs through the Site from southeast to the northwest. The extent of the Brook that runs across the Site is classed as ordinary watercourse with downstream section of the brook beyond the Site classed as EA main river. Towards the upstream limit of the Washpit Brook, there is no single fixed channel, but a number of small field drains and/or local water bodies that eventually form the Washpit Brook.

As part of the Phase 1 works, a flood alleviation scheme comprising of two-stage channel structure running parallel to the Washpit Brook, approved under the original consented scheme, has been implemented within the Site to

ensure the completed development in its entirety does not result in increased flooding. The scheme includes a flow control structure (a weir and a low flow pipe) and a two-stage channel upstream of the flow control structure to store excess floodwater during peak flow events. The two-stage channel falls towards a low flow channel along the undeveloped northern sections of Brook Leys to allow drainage of any stored floodwater back to the Washpit Brook.

Public Sewers

Anglian Water sewer record plans which can be found in an **Appendix C** of the report indicate that there are two separate foul drainage networks that fall in an easterly and westerly direction from the high point, which are situated adjacent to the Reston property on the west side of the Girton Road/Huntingdon Road junction. This existing sewer is formed using vitrified clay pipes with a diameter of 9". A 1200mm diameter foul trunk sewer is situated to the southeast of the Site, which accommodates the discharge from the 300mm diameter sewers situated below Madingley Road and Huntingdon Road. The existing drainage on the Site exists as part of the constructed Phase 1 works. The foul water drainage from previously constructed Phase 1 development drains to the publicly owned 1200mm foul trunk sewer in Madingley Road via an onsite foul pumping station. A copy of the Phase 1 onsite drainage can be found in **Appendix D**.

3. Planning Policy

The planning policies and guidance that are relevant to the proposed development with regard to flood risk and surface water management are outlined below.

National Policy and Relevant Legislation

- The 2024 revised National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG).
- Environment Agency Standing Advice.
- Environmental Planning Guidance: Flood Risk Assessments: Climate Change Allowances 2022.
- The Flood and Water Management Act 2010.
- Flood Risk Regulations 2009.

Regional Planning Policy

- Cam and Ely Ouse Management Catchment.
- Sustainable Design and Construction, Supplementary Planning Guidance (2014).

Local Planning Policy

- Cambridge Local Plan 2018
- South Cambridgeshire Local Plan 2018
- Cambridgeshire County Council Surface Water Management Plan
- Greater Cambridge Integrated Water Management Study Strategic Flood Risk Assessment I (July 2021).
- Cambridgeshire Flood Risk Management Strategy

Planning Policy Summary

Based on the above policies, the key requirements in relation to the flood risk assessment for the proposed development are considered to be as follows:

- National Planning Policy Framework (December 2024): “A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.”
- Environment Agency Standing Advice: “The surface water management needs to meet requirements set out in either your local authority’s Surface Water Management Plan (SWMP), Strategic Flood Risk Assessment (SFRA), SuDS guidance, Local flood risk management strategy and Building Regulations Part H. The emergency escape plans for any parts of a building that are below the estimated flood level is required”.
- Flood risk assessments: climate change allowances 2022: “This guidance is for developers and their agents preparing flood risk assessments for planning applications and development consent orders for nationally significant infrastructure projects. Climate change allowances are predictions of anticipated change for: peak river flow, peak rainfall intensity, sea level rise & offshore wind speed and extreme wave height. To increase resilience to flooding and coastal change, you should make allowances for climate change in your flood risk assessment. Increased rainfall affects surface water flood risk and how you need to design drainage systems.”
- The Cambridge Local Plan 2018 Policy 31: “Integrated water management and the water cycle. Development will be permitted provided that: surface water is managed close to its source and on the surface where reasonably practicable to do so; priority is given to the use of nature services; water is seen as a resource and is re-used where practicable, offsetting potable water demand, and that a water sensitive approach is taken to the design of the development; the features that manage surface water are commensurate with the design of the development in terms of size, form and materials and make an active contribution to making places for people; surface water management features are multi-functional wherever possible in their land use; any flat roof is a green or brown roof, providing that it is acceptable in terms of its context in the historic environment of Cambridge (see Policy 61: Conservation and Enhancement of Cambridge’s Historic Environment) and the structural capacity of the roof if it is a refurbishment. Green or brown roofs should be widely used in large-scale new communities; there is no discharge from the developed site for rainfall depths up to 5 mm of any rainfall event; the run-off from all hard surfaces shall receive an appropriate level of treatment in accordance with Sustainable Drainage Systems guidelines, SuDS Manual (CIRIA C753), to minimise the risk of pollution; development adjacent to a water body actively seeks to enhance the water body in terms of its hydro morphology, biodiversity potential and setting; watercourses are not culverted and any opportunity to remove culverts is taken; and all hard surfaces are permeable surfaces where reasonably practicable, and having regard to groundwater protection.
- The Cambridge Local Plan 2018 Policy 32 Flood risk: “ Potential flood risk from the development. Development will be permitted providing it is demonstrated that: the peak rate of run-off over the lifetime of the development, allowing for climate change, is no greater for the developed site than it was for the undeveloped site; the post-development volume of run-off, allowing for climate change over the development lifetime, is no greater than it would have been for the undeveloped site. If this cannot be achieved then the limiting discharge is 2 litre/s/ha for all events up to the 100-year return period event; the development is designed so that the flooding of property in and adjacent to the development would not occur for a 1 in 100 year event, plus an allowance for climate change and in the event of local drainage system failure; the discharge locations have the capacity to receive all foul and surface water flows from the development, including discharge by infiltration, into water bodies and into sewers; there is a management and maintenance plan for the lifetime of the development, which shall include the arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime; and the destination of the discharge obeys the following priority order: firstly, to ground via infiltration; then, to a water body; then, to a surface water sewer. Discharge to a foul water or combined sewer is unacceptable.

- South Cambridgeshire Local Plan 2018 Policy CC/9 Managing Flood Risk. “In order to minimise flood risk, development will only be permitted where a) the sequential and exception tests established by the National Planning Policy Framework demonstrate the development is acceptable; b) floor levels are 300mm above the 1 in 100 year flood level plus an allowance for climate change where appropriate and where appropriate and practicable also 30mm above adjacent highway levels; c) suitable flood prevention / mitigation measures are incorporated as appropriate to the level and nature of flood risk, which can be satisfactorily implemented to ensure safe occupation, access and egress. Management and maintenance plans will be required, including arrangements for adoption by any public authority or statutory undertaker and any other arrangement to secure the operation of the scheme throughout its lifetime; d) there would be no increase to flood risk elsewhere and opportunities to reduce flood risk elsewhere have been explored and taken (where appropriate) including limiting discharge of surface water (post development volume and peak rate) to natural greenfield rates or lower, and 3) the destination of the discharge obeys the following priority order: firstly to the ground via infiltration, then to a water body, then to a surface water sewer, discharge to a foul water or combined sewer is unacceptable. Site specific Flood Risk Assessments (FRAs) appropriate to the scale and nature of the development and the risks involved and which takes account of future climate change will be required for the following, f) development proposals over 1ha in size; h) any other development proposals in flood zones 2 and 3; any other development proposals in flood zone 1 where evidence, in particular the Strategic Flood Risk Assessment or Surface Water Management Plans, indicates there are records of historic flooding or other sources of flooding, and / or a need for more detailed analysis. FRAs will need to meet national standards and local guidance (including recommendations of the South Cambridgeshire and Cambridge City Strategic Flood Risk Assessment (2010) and the Phase 1 and 2 Water Cycle Strategy or successor documents).
- The Greater Cambridge Integrated Water Management Study Level 1 Strategic Flood Risk Assessment (July 2021): “ Site-specific flood risk assessments (FRAs) are carried out by or on behalf of developers to assess the flood risk to and from a proposed development site from all sources. These assessments are submitted with planning applications and must demonstrate how flood risk will be managed over the development’s lifetime, taking into account climate change and the vulnerability of users. FRAs are required for any development proposals that meet the following criteria: all new developments, including minor developments and changes of use, in Flood Zones 2 and 3; proposals of 1 hectare or greater in Flood Zone 1; proposals of less than 1 hectare in Flood Zone 1 where there is a change of use to a more vulnerable class, or where the development could be affected by sources of flooding other than rivers and the sea (such as surface water); and proposals of less than 1 hectare in Flood Zone 1 located in areas with a critical drainage problem, as identified by the Local Planning Authority in consultation with the Environment Agency. Site-specific FRAs may also be required in the following situations: if the site may be at risk from the breach of a local flood defence, even if it is in Flood Zone 1; where the site is intended to discharge surface water runoff into the catchment or assets of a Risk Management Authority requiring an FRA; where the site could impact an Internal Drainage Board system; where the Local Planning Authority is aware of evidence of historical or recent flood events; or where the site is located in an area with significant surface water flood risk. All site-specific FRAs must adhere to the guidelines set out in the National Planning Policy Framework (NPPF), Planning Practice Guidance (PPG), Environment Agency, and Risk Management Authority guidance, including the Cambridgeshire Flood and Water Supplementary Planning Document (SPD). This guidance outlines a flood risk management hierarchy that focuses on assessing, avoiding, substituting, controlling, and mitigating flood risk.”
- The Greater Cambridge Integrated Water Management Study Level 1 Strategic Flood Risk Assessment (July 2021): “The development must provide wider sustainability benefits to the community that outweigh the flood risk. Additionally, the development must ensure safety for its lifetime, taking into account the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, should aim to reduce flood risk overall.”

4. Sequential Test

The NPPF aims to ensure that flood risk is considered at all stages of the planning process. To avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk, the Sequential Test encourages Local Planning Authorities (LPAs) to steer development to areas of lowest flood risk on a borough/district-wide level and only develop in flood risk areas where necessary.

The LPA should apply the Sequential Test based on the information presented in their Strategic Flood Risk Assessment (SFRA). According to the National Planning Policy Framework (NPPF) and its associated Flood Risk and Coastal Change Planning Practice Guidance, the proposed Site has a vulnerability classification of “More vulnerable” classification as it mainly comprises of residential units and non-residential spaces for health services, nurseries and educational establishments. The vast majority of the Site is located within Flood Zone 1 (Low Probability) with only a small area in the northwest corner shown to be within Flood Zone 2 (Medium Probability). All residential units will be located within Flood Zone 1. Based on the Vulnerability and Flood Zone Compatibility shown in Figure 4, the proposed use of the Site is appropriate within this flood zone and an Exception Test is deemed not required. The site is already consented for residential development via the extant planning permission.

Figure 4 Flood Risk Vulnerability and Flood Zone Compatibility

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗

(Source: Ministry of Housing, Communities & Local Government (2022): Planning Practice Guidance: <https://www.gov.uk/government/collections/planning-practice-guidance>)

Climate Change

The “Flood Risk Assessments: Climate Change Allowances Guidance” published in February 2016 (updated in May 2022) by the EA indicates that climate change is currently expected to result in increased peak rainfall and rising sea levels.

According to the Environment Agency’s climate change guidance, a minimum design lifetime of 100 years should be assumed for residential developments. The proposed development comprises of residential units and therefore, assumed to have a minimum lifetime of 100 years. As the proposed development has a lifetime beyond 2100, climate change allowances for peak rainfall intensity should be used for both the 1% and 3.3% annual exceedance probability events for the 2070s epoch (2061 to 2125). The development should be designed so that for the upper end allowance in the 1% annual exceedance probability event:

- there is no increase in flood risk elsewhere
- the development will be safe from surface water flooding

Therefore, according to this latest guidance, the upper end allowances of 40% have been assessed.

Table 1 and Table 2 show anticipated changes in peak rainfall intensity within Cam and Ely Ouse Management Catchment where the Site falls within.

Table 1 Cam and Ely Ouse Management Catchment Peak Rainfall Allowances - 3.3% annual exceedance rainfall event

Cam and Ely Ouse Management Catchment peak rainfall allowances category	Total potential change anticipated for ‘2050s (2022 to 2060)’	Total potential change anticipated for ‘2070s (2061 to 2125)’
Upper End Allowance	35%	35%
Central Allowance	20%	20%

Source: Government Website [Climate change allowances for peak rainfall \(data.gov.uk\)](#)

Table 2 Cam and Ely Ouse Management Catchment Peak Rainfall Allowances - 1% annual exceedance rainfall event

Cam and Ely Ouse Management Catchment peak rainfall allowances category	Total potential change anticipated for ‘2050s (2022 to 2060)’	Total potential change anticipated for ‘2070s (2061 to 2125)’
Upper End Allowance	40%	40%
Central Allowance	20%	25%

Source: Government Website [Climate change allowances for peak rainfall \(data.gov.uk\)](#)

Table 3 presents the anticipated changes in peak river flow for the Cam and Ely Ouse Management Catchment. The river flow allowance is determined based on both the Flood Zone classification and the vulnerability category of the proposed development. The Site is primarily located within Flood Zone 1, with a small portion in Flood Zone 2. As the proposed development falls within both zones and is classified as "More Vulnerable," the central allowance is applied in accordance with the guidance. Given that the development’s lifespan extends beyond 2100, the 2080s epoch is the most relevant for assessment. Consequently, the appropriate peak river flow allowance is 9%.

Table 3 Cam and Ely Ouse Management Catchment Peak River Flow Allowance

Cam and Ely Ouse Management Catchment peak river flow allowance category	Total potential change anticipated for ‘2020s’	Total potential change anticipated for ‘2050s	Total potential change anticipated for ‘2080s
Upper End Allowance	21%	22%	45%
Higher Central Allowance	7%	5%	19%
Central Allowance	2%	-2%	9%

Source: Government Website <https://environment.data.gov.uk/hydrology/climate-change-allowances>

5. Flood Risk

This section of the report identifies the existing risks from all sources of flooding.

Categories of risk have been qualitatively defined as:

- ‘High’ Risk: flooding is likely to result in significant damage to property and pose a significant risk to life.
- ‘Medium’ Risk: flooding may result in possible minor damage to property, but flood progress would allow adequate time for residents to be warned and safely evacuated to higher ground or appropriate places of safety.
- ‘Low’ Risk: flooding is unlikely to result in any damage to property and pose little or no risk to life.
- ‘Very Low’ Risk: flooding is very unlikely to occur.

The following sections summarise the significant potential sources of flooding identified from a desk-based appraisal and inform of further actions or mitigations to be undertaken.

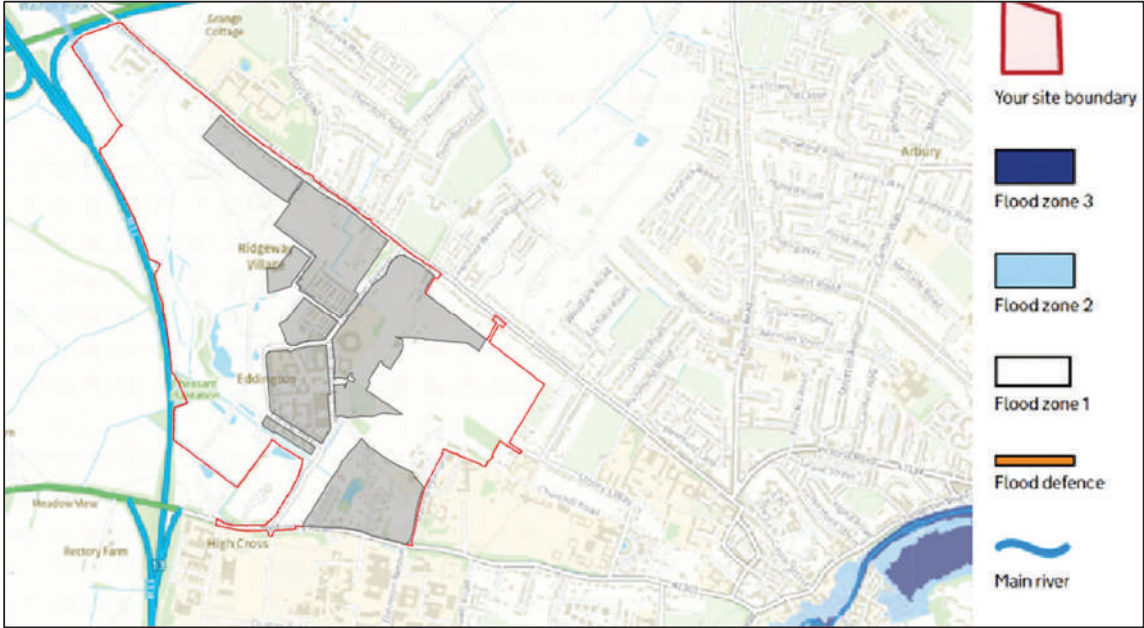
Fluvial and Tidal

In line with the Standing Advice from the EA, the estimated flood level is whatever is higher of

- A river flood level with a 1 in 100 or greater annual probability plus an allowance for climate change
- A tidal flood level with a 1 in 200 or greater annual probability plus an allowance for climate change

The NPPF and EA online flood risk guidance defines different flood zones depending on the probability of river and sea flooding, ignoring the presence of defences. The nearest watercourse to the Site is the Washpit Brook running from the south east to the north west of the Site and is the main source of fluvial flood risk. The EA flood map for planning indicates the vast majority of the Site to be in Flood Zone 1 (low probability) with a small area in the northwest corner to be in Flood Zone 2 (medium probability), see Figure 5 below. All habitable buildings are located within Flood Zone 1.

Figure 5 EA Flood Map for Planning



As part of the original consented scheme, hydraulic modelling of the Washpit Brook was undertaken to establish the baseline flood extents and flood levels and assess the impact from the development on the flood risk. Due to

the size of the development, the assessment found that the proposed development could potentially alter the level of flood risk from Washpit Brook, increasing downstream risk to the village of Girtton. A flood alleviation scheme (FAS) was proposed to reduce the flood risk to and from the Site which comprised of a two-stage channel with flow control structure, running parallel to the original Washpit Brook, providing additional online storage during peak flow events. The FAS also sought to reduce the amount of pass forward flow transmitted downstream of the Site, to reduce flood risk to the village of Girtton. The FAS was implemented in full as part of the Phase 1 works to ensure the completed development in its entirety does not result in increased flooding.

The hydraulic model has been updated since to incorporate higher climate change allowance and ReFH2 rainfall-runoff method. Table 4 and Table 5 below include a summary of the peak flow estimates for the whole catchment to the downstream model limit and the individual inflow boundary locations. Location of the inflows (in blue) and sub-catchment extent (in green) are shown in Figure 6 below.

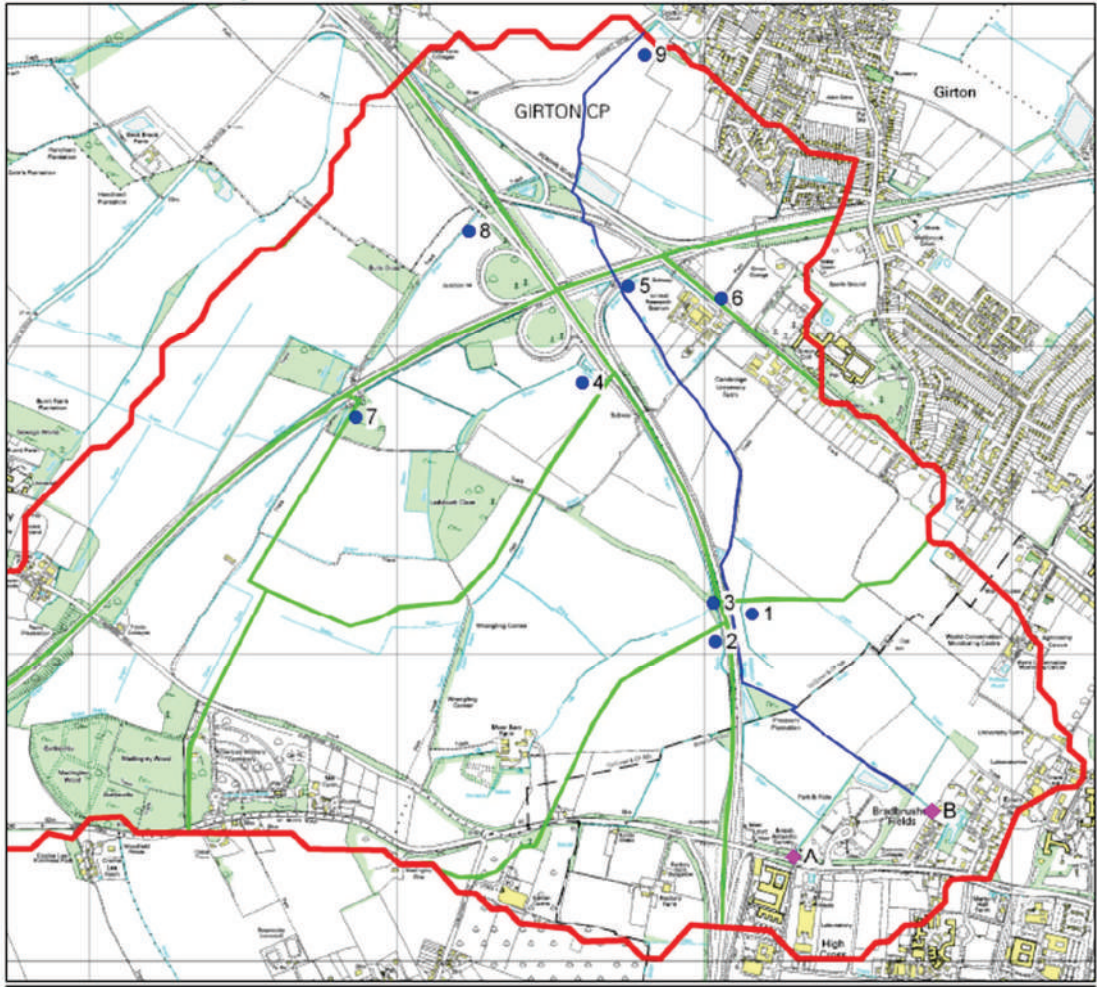
Table 4 ReFH2 peak flow estimates and sub-catchment distribution

Peak Flow Estimation Method	Peak Flows (m3/s)				
	5% AEP	1% AEP	1% AEP + 20% CC	1% AEP + 25% CC	0.1% AEP
ReFH2	4.38	6.85	8.22	8.22	12.08

Table 5 ReFH2 peak flow estimates and sub-catchment distribution

Model Boundary	Area (km²)	Fraction	ReFH2 Peak Flows (m3/s)			
			5% AEP	1%AEP	1% AEP + 25% CC	0.1% AEP
Downstream BDY	7.16	1.00	4.38	6.85	8.57	12.08
1A	1.01	0.14	0.61	0.96	1.20	1.70
1B	0.10	0.02	0.06	0.10	0.12	0.18
2	0.53	0.07	0.32	0.50	0.63	0.89
3	1.38	0.19	0.85	1.32	1.65	2.33
4	0.68	0.09	0.41	0.65	0.81	1.14
5	0.70	0.10	0.43	0.67	0.84	1.18
6	0.14	0.02	0.08	0.13	0.16	0.23
7	0.80	0.11	0.49	0.77	0.96	1.35
8	1.11	0.15	0.68	1.06	1.32	1.87
9	0.73	0.10	0.45	0.70	0.87	1.23

Figure 6 Distribution of inflows within the catchment boundary



The model includes an allowance of 25% climate change which is higher than 9% climate change allowance required for the Site as discussed in the Climate Changes section of the report. Table 6 below includes a summary of the water level at key locations along the Washpit Brook based on the updated ReFH2 and 25% climate change parameters. The Table represents the existing (pre implementation of FAS) scenario versus scenario with the implementation of the FAS (with scheme). The results show that the FAS is still shown to provide reduction in downstream water levels and flood extent (See **Appendix E** of the report for flood extents).

Table 6 Impact of Updated Climate Change allowances on Water Levels along Washpit Brook during the 1% AEP plus CC event

Node	ReFH2 - 1% AEP + 25% CC (mAOD)	ReFH2 - 1% AEP + 25% CC (mAOD)
WSH-3018	15.73	15.71
WSH-2598	13.88	13.78
WSH-2505	13.63	13.19
WSH-2437	13.44	13.02
WSH-2195	13.02	13.01
WSH-2150	13.01	13.01
WSH-2060	13	13.01
WSH-1744	13	13
WSH-1606	12.99	12.74
WSH-1036	12.67	12.64
WSH-0808	11.99	11.99
WSH-0000	10.56	10.54

The results from the updated assessment demonstrate that even with this increased allowance, the proposed development does not contribute to any increase in downstream flood risk and the implemented FAS continues to provide improvements in managing downstream flood risk. Therefore, fluvial flood risk is considered to be **low**.

Given the Site's inland location, tidal flooding is not considered a risk to the proposed development and has not been further assessed in this report.

Surface Water

The EA map for Surface Water flooding indicates that certain portions of the Site are varying from low chance (between 0.1% and 1% chance each year) to high chance (more than 3.3% chance each year) in any given year, see Figure 7. The highest risk of surface water flooding is around Washpit Brook, where flood depths could reach up to 900mm. However, these depths are associated with a very low chance of flooding (less than 0.1% chance each year). There are several localized low-lying areas across the Site which may experience surface water flooding up to 900mm, but these areas are generally small in size.

The Surface Water EA mapping climate change allowance shows the period between 2040 to 2060. As the development's lifetime is beyond 2060, it is anticipated that the flood extent could increase due to ongoing climate change effects.

The proposed drainage strategy aims to restrict the surface water runoff to greenfield rates by implementing Sustainable Drainage System (SuDS) as agreed with the Lead Local Flood Authority (LLFA). Based on the above, the Site is considered to be in **low risk** of surface water flooding.

Figure 7 EA Surface Water Flood Map



Sewer Flooding

The Greater Cambridge Integrated Water Management Study Level 1 SFRA notes that information from the Anglian Water DG5 register has been used to map incidents of sewer flood risk by postcode. The postcode ‘CB3’ has 3 recorded sewer flood incidents. **Appendix F** of the report shows sewer mapping incidents.

The proposed foul water drainage from the Site remain as per the previously consented strategy where foul water is proposed to discharge to a pumping station within the Site which has been constructed as part of Phase 1 works before being pumped to the 1200mm diameter trunk sewer located in Madingley Road. The discharge rate from the Phase 1 foul pumping station is as per the previously agreed rate with Anglian Water and the foul drainage from the proposed development as part of the new OPA will be restricted to comply with the discharge rates allowed for the future phases of the development within Phase 1 foul drainage network. The proposals would therefore not impact the previously agreed point of connection and discharge rates. Additionally, a preplanning application was submitted to Anglian Water which confirmed proposed pumped conveyance was still acceptable and there was capacity within the 1200mm diameter trunk sewer to serve the proposed development (**see Appendix G**). Based on above, the Site is considered to be in **low risk** of sewer flooding.

Groundwater Flooding

Groundwater flooding is most likely to occur in the lower lying areas of the Site. This flooding occurs when water emerges through the ground due to a high-water table following prolonged periods of heavy rain.

The British Geological Survey (BGS) holds mapping of geology across the UK. The mapping indicates the vast majority of the Site to be underlain by a bedrock of Gault Formation – Mudstone with a small portion located on the

southeast side of the Site to be underlain by West Melbury Marly Chalk Formation – Chalk. BGS map also shows the parts of the Site to be overlaid by superficial Head deposits – clay, silt sand and gravel, with River Terrace Deposits present east of the Site.

The Head superficial deposits are classified as Secondary (undifferentiated) aquifers and the River Terrace Deposits located to the east of the Site are classified as Secondary A aquifers. The Gault Formation bedrock present is classified as an unproductive aquifer, while the West Melbury Chalk Formation is classified as a Principal aquifer.

The hydrogeology aquifer classification suggests that the Site has Gault Formation Class 3 which comprises of rocks with essentially no groundwater.

The Greater Cambridge Integrated Water Management Study Level 1 SFRA notes that the groundwater flood risk map is based on the British Geological Survey Areas Susceptible to Groundwater Flooding. The mapping which can be found in **Appendix F** of the report, suggest that eastern portion of the Site has potential for groundwater flooding of properties situated below ground level with a very small section shown to have limited potential for groundwater flooding to occur. The current illustrative masterplan does not propose basement within the plots. Should basements be proposed in the future, appropriate waterproofing measures would be required.

Based on the above information, the Site is assessed to be in **low risk** of groundwater flooding. An increase in the likelihood of groundwater flooding as a result of the development is generally related to changes in sub-surface flow paths as a result of underground structures, such as basements or sheet piling.

Artificial Flooding i.e. Reservoirs

The EA Flood map for Reservoirs indicates that the Site sits outside of reservoir flooding for both wet day (when there is also flooding from rivers) and dry day (when river levels are normal).

The provision of the reservoir inundation map is a legal requirement under the Flood and Water Management Act (2010). The risk of reservoir flooding is extremely low with current and historic reservoir legislation ensuring reservoirs are properly maintained.

Due to the strict maintenance requirements of reservoirs, the likelihood of reservoir breach is extremely low. Therefore, the flood risk posed by a reservoir flooding to the Site is considered to be **very low**.

6. Surface Water Drainage Strategy

Existing Surface Water Drainage

The Site is currently predominantly greenfield with an approximate existing impermeable area of approximately 6.2ha. The surface water runoff is currently expected to partly infiltrate into the ground and partly overflow to Washpit Brook via overland flow following site topography.

Greenfield runoff rates have been calculated using the HR Wallingford method for the area of 36.53 hectares refer to the **Appendix I** of the report. The calculation was undertaken for various storm return periods including Qbar, 1 in 1 year, 1 in 30 year and 1 in 100-year events as shown in the Table 7 below. These values have been prorated to 1 hectare.

Table 7 Greenfield Runoff Rates

Area	Qbar (l/s)	1 in 1 year (l/s)	1 in 30 year (l/s)	1 in 100 year (l/s)
36.53 ha	72.67	63.22	258.71	305.95
1 ha	1.98	1.73	7.08	8.38

Proposed Surface Water Drainage

Surface water drainage for the Site is proposed to follow the same design intent as per the original consented scheme where the surface water runoff from individual plots and external areas are proposed to discharge into a network of SuDS features and ultimately to the undeveloped northern section of Brook Leys where the runoff is restricted to greenfield rate prior to discharge to the Washpit Brook. There are a number of competing demands for external space within the Site, including balancing drainage objectives with landscape and amenity provision. The masterplan landscaping proposals include ‘shared gardens’ across the Site which will function as surface water drainage conveyance routes as per the historic green finger solution. The exact forms of these shared gardens are to be determined at Reserved Matters Application stage and are expected to take form of either a network of conveyance swales or oversized pipes. For both scenarios, the surface water runoff is still proposed to be restricted at Brook Leys prior to discharge to the Washpit Brook at greenfield runoff rate with individual plots also restricted at greenfield runoff rate prior to discharging to the sitewide drainage network.

The strategy is eventually envisaged to be a combination of the two to balance the SuDS requirement and space required for landscaping/amenity areas. The surface water drainage network including attenuation volume requirements have been assessed for both options which will be developed further at detailed design stage. Additional SuDS features such as permeable paving will be considered as the strategy is developed and as part of the future plot detailed design. Consultation with the Lead Local Flood Authority (LLFA) has been undertaken to discuss the above design proposals and design parameters which was accepted in principle. **Appendix H** includes details of the correspondence with the LLFA.

Surface water runoff from external areas including highways and other paved areas outside of the Building Development Zone boundaries will discharge unrestricted into the sitewide drainage network. As part of the original application, it was determined through dialogue with the LLFA that surface water runoff from the development would be required to pass through two stages of treatment prior to discharging to the Washpit Brook. Two stages of treatment are required to ensure no pollution in terms of hydrocarbons or heavy particulates reaches the watercourse. A SuDS pollution cleansing chain uses planted swales to extract hydrocarbons from the runoff, and then the detention areas along the northern sections of Brook Leys double as settlement areas removing the heavy particulates from the runoff. Should there be no swales as part of the ultimate shared garden all runoff from vehicular hardstanding areas and highways will need to be passed through petrol interceptors prior to entering the conveyance pipework leading to Brook Leys.

The outline surface water drainage strategy can be found in **Appendix J**. The strategy provides a broad indication of the key features proposed for the Site and will be subject to further detailed design and detailed hydraulic modelling at next stage. A SuDS Proforma, outlining compliance with the Cambridgeshire County Council surface water drainage requirements, is included in **Appendix L** of the report.

Design Criteria

The surface water design incorporates the following design criteria:

- FEH rainfall data obtained for the Site from the UK Centre for Ecology & Hydrology’s Flood Estimation Handbook Web Service. The use of FEH data is in accordance with the Cambridgeshire County Council Surface Water Planning Guidance;
- FEH rainfall data used and therefore, a return period of 2 year is used as a minimum;
- 40% climate change uplift has been applied for a 1 in 100-year and 35% for 1 in 30-year rainfall event in line with the Flood Risk Assessments: Climate Change Allowances Guidance;
- Plot and sitewide discharge rates restricted to greenfield runoff rate of 2 l/s/ha for up to 1 in 100-year + 40% CC rainfall event. Discharge rate and attenuation calculation are based on developable area only.
- Percentage impervious area (PIMP values) assigned per plot is based on qualitative assessment of the extent of soft landscape and hardstanding areas within the updated masterplan.
- An allowance for urban creep has only been considered for plots consisting of residential townhouses/terraces. In this instance, an urban creep allowance of 10% has been applied (in accordance with the Cambridgeshire County Council Surface Water Planning Guidance (refer to Table 8).

Table 8 Urban Creep Allowance

Unit Type	Urban Creep Allowance
Residential Blocks	N/A
Commercial/Academic	N/A
Sports/Recreation Facilities	N/A
Residential Townhouses/Terraces	10%

Attenuation Volumes

Surface water attenuation will be provided for up to 1 in 100 year + 40% climate change rainfall event over a 24-hour duration to limit the proposed surface water runoff to the 2 l/s/ha greenfield runoff rate prior to discharge to the Washpit Brook. Sitewide attenuation will be provided via network of swales or oversized pipes across the Site and detention basins along Brook Leys. On-plot attenuation is assumed to be in the form of buried tanks, the exact form of the on-plot attenuation will be developed further at detailed design stage. The detention basins will be generally dry, save during storm events. Attenuation depths within plots and along Brook Leys would be subject to the development of sitewide levels.

An outline hydraulic modelling of the surface water drainage network has been undertaken to assess the attenuation volume requirements (**Appendix K**) and Table 9 below provides a summary of the estimated attenuation volumes required within the detention basins. Additional volumes are accommodated within the sitewide drainage network in the form of swales or oversized pipes. Outline surface water drainage proposal can be found in **Appendix K**.

Table 9 Surface Water Attenuation Volumes

Outfall	Catchment Area (ha)	Discharge Rate (l/s)	Attenuation Volume for Swale Option(m³)	Attenuation Volume for Oversized Pipes Option(m³)
Outfall 1	7.7	15.4	2370	2150
Outfall 2	15.4	30.8	3115	2780

Individual plots are proposed to restrict the surface water runoff to 2 l/s/ha and provide on-plot attenuation prior to discharge to the sitewide drainage network. Assumption on the extent of permeable and impermeable area along with urban creep has been made based on the illustrative masterplan and quick storage estimate has been used

to estimate the attenuation volume requirements for each plot, summarised in Table 10 below. The impermeable area is based on the extent of impermeable hardstanding area within the plot, 30% runoff contribution from the soft landscaping area. An additional 10% to account for urban creep allowance has been added to the impermeable area for plots with residential townhouses which include plots B2, C1, C2, D1, D2, E1, E2, F1, F3, G, H1, H2 and H3. This will need to be developed further at Reserved Matters Application stage following development of plot masterplan and detailed hydraulic model.

Table 10 On-plot surface water attenuation volumes (Illustrative Masterplan)

Plot Ref.	Plot Area (ha)	Impermeable Area (ha)	Plot Discharge Rate (l/s)	Attenuation Volume (m³)
A	5.55	2.56	11.10	2,614
B1	0.38	0.15	0.76	339
B2	3.24	1.51	6.48	1,534
B3	2.63	1.32	5.26	1,348
C1	2.62	1.32	5.24	1,339
C2	2.36	1.05	4.72	1,070
D1	3.35	2.86	6.71	2,918
D2	3.17	1.35	6.34	1,363
E1	3.20	2.75	6.40	2,808
E2	1.09	0.60	2.17	609
F1	2.77	1.46	5.54	1,491
F2	0.84	0.46	1.68	465
F3	0.74	0.35	1.47	357
G	1.65	0.91	3.31	933
H1	3.97	1.62	7.94	1,655
H2	4.46	1.53	8.91	1,567
H3	2.97	1.08	5.95	1,106
J	7.37	4.38	14.74	3,055

7. Residual Flood Risk

Table 11 Summary of Existing and Residual Flood Risk to the Site

Flood Hazard	Flood Mechanism and Possible Consequence	Existing Assessment of Risk	Mitigation Measures	Residual Risk
Fluvial / Tidal	Washpit Brook	Low	Implementation of a two-stages channel as part of the flood alleviation scheme at Washpit Brook	Low
Groundwater	The impermeable nature of the underlying bedrock formation of Gault Formation limits groundwater infiltration, reducing the likelihood of groundwater flooding.	Low	N/A	Low
Surface Water (Pluvial)	Intense rainfall could lead to surface water pooling in low-lying areas due to insufficient infiltration caused by the general impermeability of the Site's area.	Low	The Site includes a surface water drainage system that will attenuate surface water runoff on plots as well as within the sitewide drainage strategy restricting the runoff rate to 2l/s/ha reducing the risk of flooding to downstream sites.	Low
Surface Water and Foul Water Sewers	Anglian Water drainage systems	Low	N/A	Low
Reservoir and Artificial Sources	Grafham Water	Very Low	N/A	Very Low

8. Conclusion

AECOM has been commissioned to prepare a site-specific FRA and a SWDS to support the OPA for the North West Cambridge Masterplan for a phased mixed-use development, including demolition of existing buildings and structures.

The FRA and SWDS has assessed the Site in terms of topography, geology, hydrogeology and climate change by reviewing the available information and aims to identify the potential sources of flooding and how residual flood risk will be managed without causing flood risk elsewhere.

The Site is predominantly within Flood Zone 1 with a small area in the north-west corner located in Flood Zone 2. The proposed development is categorised as "More Vulnerable". All residential units will be located within Flood Zone 1. The FAS implemented as part of the Phase 1 works continue to provide reduction in flood risk to and from the Site in its entirety. Therefore, the fluvial flood risk considered to be low.

Surface water runoff from individual plots and external areas will discharge into the sitewide drainage network before entering Washpit Brook at a restricted greenfield runoff rate. Runoff will be restricted and treated within plots before connecting to the wider drainage system. The surface water design has been updated to reflect the latest masterplan layout and sitewide levels. Sitewide drainage conveyance via network of swales and oversized pipes were assessed. The strategy is eventually envisaged to be a combination of the two to balance the SuDS requirement and space required for landscaping/amenity areas.

The flood risk assessment and surface water drainage proposals have been discussed with the LLFA who have accepted these proposals in principle. The drainage proposals are expected to be conditioned and further discussion with the LLFA is envisaged during Reserved Matters Application stage as the design is developed and detailed hydraulic modelling is undertaken.

Appendix A Topographical Survey

Appendix D Phase 1 Onsite Drainage



- GENERAL NOTES:
- DO NOT SCALE FROM DRAWING, USE FIGURED DIMENSIONS ONLY.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS & ENGINEERS DRAWINGS AND SPECIFICATIONS.
 - WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE STATUTORY REQUIREMENTS.
 - APPROPRIATE MEASURES SHOULD BE TAKEN FOR WORKING IN CLOSE PROXIMITY TO DEEP EXCAVATIONS.
 - EVERYDAY OR LOW RISK HAZARDS THAT SHOULD BE OBVIOUS TO A COMPETENT CONTRACTOR.

- DRAINAGE NOTES:
- ALL WORKS TO COMPLY WITH SEWERS FOR ADOPTION 7th EDITION AND ANGLIAN WATER'S REQUIREMENTS.
 - ALL MANHOLE COVERS WITHIN TRAFFICKED AREAS TO BE CLASS D400.
 - ALL PIPE BEDDING TYPE 'S'.
 - ALL MANHOLES WILL BE CONSTRUCTED TO CONFORM TO THE SFAT7 DOCUMENT PART B3 AND FIGURE B1.
 - AN APPROPRIATE ROOT BARRIER IS TO BE INSTALLED WHERE REQUIRED TO PROTECT THE DRAINAGE SYSTEM. SEE TYPICAL SECTIONS.
 - ALL TREE CANOPIES TO CONFORM TO THE REQUIREMENTS WITHIN SFAT7 DOCUMENT PART B3.1.13.
 - REFER TO FOUL WATER DRAINAGE SCHEDULE NWC1-HYD-SW-050-XX-SCH-CE-0002-P26 FOR DETAILS OF PIPES AND CHAMBERS.

KEY

FOUL SEWER ADOPTABLE NETWORK

FOUL WATER ADOPTABLE MANHOLE

FOUL SEWER NETWORK NOT ADOPTABLE UNDER THIS CONTRACT. FOR DETAILS REFER TO TABLE BELOW.

THESE MANHOLES & SPURS ARE CURRENTLY NOT PART OF THE SECTION 104 WORKS.

FW_MH76 & Spur 28.000

FW_MH 79 & Spur 30.000

FW_MH 83 & Spur 32.000

SPURS AND MANHOLES TO FORM PART OF LOT CONTRACTORS 104 APPLICATION.

Spur Pipe935 Spur Pipe938

Spur Pipe942 Spur FW_10.000

Spur Pipe940 Spur FW_36.000

Spur Pipe936 Spur FW_26.00

Spur FW_4.000 FW_MH73

Spur FW_5.000 FW_MH92

HAZARD WARNING

THE EXACT POSITION OF BURIED SERVICES SHALL BE CONFIRMED ON SITE PRIOR TO THE USE OF ANY MECHANICAL PLANT.

FOR MORE DETAILED INFORMATION PLEASE REFER TO THE DESIGNERS HAS HAZARD RECORD.

SHOULD ANY ADDITIONAL HAZARDS BE IDENTIFIED THE CONTRACTOR SHOULD NOTIFY ALL THE RELEVANT PROJECT TEAM MEMBERS.

KEY PLAN



AS BUILT INFORMATION SHOWN ON THIS LAYOUT IS AS PROVIDED BY SKANSKA VIA ACONEX

ALL CONCRETE TO BE SULPHATE RESISTANT:

TO ACEC CLASS D54-AC4 WITHIN GAULT CLAY

TO ACEC CLASS D52-AC2 WITHIN GRAVEL AREAS

TO ACEC CLASS D51-AC1 IN MADE GROUND

FOR CONTINUATION
SEE SHT 2

MATCH LINE

Z02	AS BUILT - KEY REVISED	12-09-18
Z01	AS BUILT ISSUE	03-07-17
C05	SITE LAYOUT UPDATED	26-09-16
C04	DRAINAGE ANNOTATION REVISED AND NOTES ADDED	22-04-16
C03	ADDED SHEET S TO SHOW NEW EXTENT OF FOUL NETWORK	10-12-15
C02	CONSTRUCTION ISSUE	01-12-15
Issue	Description	Date

Client

UNIVERSITY OF CAMBRIDGE

SKANSKA NORTH WEST CAMBRIDGE DEVELOPMENT

Scales	1:500	Current Issue Signatures
Original Size	A1	Author M.GRIFFITHS
Height Datum	DATUM	Checker P.JOHNSON
Grid	GRID	Approver S.A.DAVIES
Filename	NWC1-HYD-SW-050-XX-DRG-CE-0048-0052-Z02-SECTION 104 FOUL_WATER_DRAINAGE_LAYOUT.dwg	

Status	AS BUILT
Project	NORTH WEST CAMBRIDGE

Title	FOUL WATER DRAINAGE SECTION 104 AGREEMENT (SHEET 1 OF 5)
Project No.	UA006967

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Drawing Number	NWC1-HYD-SW-050-XX-DRG-CE-0048
Issue	Z02

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