

Norwich Western Link

Environmental Statement Chapter 13: Geology and Soils

Appendix 13.1: Interpretative Environmental Desk Study Report

Sub Appendix E: BGS Borehole Logs

Author: WSP

Document Reference: 3.13.01e

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Date: March 2024





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Contents

1	Introduction	. 3	3
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Document Reference: 3.13.01e

1 Introduction

- 1.1.1 WSP UK Ltd was commissioned by NCC to complete a Preliminary Risk Assessment to inform the baseline assessment for the Environmental Statement: Chapter 13: Geology & Soils. This appendix contains historical borehole logs available on the British Geological Survey's website which are relevant to the report.
- 1.1.2 We have included a summary of key information shown in this document in an accessible format in section 1.1.1. However, some users may not be able to access all technical details that are included in the rest of this document. If you require this document in a more accessible format, please contact norwichwesternlink@norfolk.gov.uk

NORFOLK PARTNERSHIP LABORATORY

BOREHOLE

LO©tish Geological Survey

Sheet 1 of 3



Sche	eme I	Norwich Northern Distributor Road	Job	No. F	TPK1	000ii		Bore	ehole	No.	.	3HF	W1	Α	
Carri	ied ou	ut for Norfolk County Council	Dat	te Star	ted 2	29/03/	2007	Date	Fini	ishe	d	30/0)3/2	007	
Rem	arks:		Тур	e of R	ig										
		British Geological Survey	De	oth 2	0:45:	logical Si	Heigh	t 22.	067 ı	mA(/レト	_ogged	\rightarrow		eological Surv
			Co-	ords	61	4337E	- 315	519N				Orawn b Checked	-	otp	
ackfill	Water	Description	Legend	Depth	Sa	mple	Field			Labo	ratory [*]				
ackiiii	vvalei	·	Legend	(m)	Туре	No.	Tests	MC% ρ _s	SO ₃	CI-	pН	Org.	CBR	Other	
		MADE GROUND : Orange silty fine sand with some fine and medium flint gravel (MADE GROUND)			•	001									
Billing	h Geolo	gical Survey Bri	_	Survey 1.00	•		N=17			Brit	sh Ge	ologic	al Sui	vey	
		Very soft brown very clayey very sandy SILT with some fine and medium flint gravel (COVER SILT)	× × × × × × × × × × × × × × × × × × ×	×	•	002									
	-	Orangey brown silty fine SAND with laminae of grey sandy silt (CRAG_SAND)	× × × ×		•	003	N=21								
		British Geological Survey	××	.₩ Br	it sh Geo	logical S	ırvey							British 0	eological Sur
			× × × × × × ×	3.00	•	003 004	N=21								
Billia	h Geolo	Laminated grey very clayey sandy SILT (CRAG_SILT) great Survey	X X X X X X X X X X	HI	•	004 005	N=21			Brit	sh Ge	ologic	al Sui	vey	
		Thin bed of brown fine and medium sand	- x x - x x	5.00	•	005	N=25								
	-	Very soft brown very sandy very clayey	× × ×	×	•	006									
	-	SILT (CRAG_SILT) Brown clayey silty fine SAND with much	- × ×	6.00	ě	006	50/250mm								
		fine and medium flint gravel (CRAG_SAND)	× × × × × × ×	Br	it sh Geo	logical S 007	arvey							British 0	eological Sur
Britis	h Geolo	gical Survey Bri	× × × × × × × × × × × × × × × × × × ×	7.00	•	007	N=9			Briti	ish Ge	ologic	al Sui	vey	
		Off white silt sized comminuted CHALK with a little fine intact chalk. Very weak. GradeVI.Dm. (UPPER CHALK)		9.00	•		N=17								
		British Geological Survey		r Br	itsh Geo	logical S	ırvey							British 0	eological Sur
		Continued next sheet	1 1	THL											

NORFOLK PARTNERSHIP LABORATORY

BOREHOLE

LO©tish Geological Survey

Sheet 2 of 3

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		Norwich Northern Distributor Road			No. P					ehole				PW1		
	ied ou	,					29/03/2	2007	Dat	te Fir	iishe	d	30/0)3/2(JU/	
≺em	arks:			<u> </u>	of Ri		Т							-		
		British Geological Survey					logical Su			.067	mA(ノレ ト	Logged Drawn I	by E	British 0	eological Surv
				Со-о	rds	614	4337E	- 315	519N			- H	Checke			
ackfill	Water	Description		Legend	Depth (m)	Sar Type	mple No.	Field Tests	MC% P.	SO.		pH	Tests Org.	CBR	Other	
		Off white silt sized comminuted CHALK with a little fine intact chalk. Very weak. GradeVI.Dm. (UPPER CHALK)				Туре	NO.		WC 78 P.	303	01-	pri	Oig.	OBIC	Other	
Britis	h Geold	Off white silt sized comminuted CHALK with a little fine intact chalk. Very weak with some flint gravel. GradeVI.Dm. (UPPER CHALK)	Britis	Sedlogita	Survey 11.00	•	1 000	√ =8			Brit	ish Ge	ologic	al Surv	rey	
	-	Off white silt sized comminuted CHALK with a little fine intact chalk. Very weak. GradeVI.Dm. (UPPER CHALK)			12.00	•	010	N=6								
		British Geological Survey			Brit 13.00		ogical Su	rvey							British 0	eological Sur
			ן . רו רו		14.00	•	011	N=7								
3148	150 15.00	gical Survey	Britis p		Survey 15.00	•	012	N=10			Brit	sh Ge	ologic	al Sun	ey	
	-	British Geological Survey	7		16.00 Brit		ogical Su								British 0	eological Sur
		Off white silt sized comminuted CHALK with some fine and medium intact chalk gravel. Very weak. GradeVI.Dm. (UPPER CHALK)			17.00											
jk:	h Geold	gical Survey	Britis 17	Peqiodipa	38.00	•	014	N=18			Brit	ish Ge	ologic	al Sun	rey	
		British Geological Survey Continued next sheet	ָר. קר קר קר		19.00 Brit	sh Geol	ogical Sµ	rvey							British ઉ	eological Sur

NORFOLK PARTNERSHIP LABORATORY

BOREHOLE

LO©tish Geological Survey

Sheet 3 of 3



										ات	iee		JI 3			AGS	
Sche	eme l	Norwich Northern Distributor Road		Job	No. P7	ΓPK1	000ii		E	Bore	ehole	No		BHF	PW1		
Carr	ied ou	ut for Norfolk County Council		Date	Date Started 29/03/2007			2007	Date Finished					30/0	03/2		
Rem	arks:			Туре	of Rig	g											
		British Geological Survey		Dept		45 eol	ogical S	Heig	ht	22.	067	mA(DD	Logged Drawn	d by	BA British O ptp	eological Surve
				Co-c	ords	614	1337E	= - 315	5519	N				Checke		r·r	
Backfill	Water	Description		Legend	Depth (m)	San Type	nple No.	Field Tests	MC%	ρ _s	SO ₃	Labo	pH	Tests Org.	CBR	Other	
		Off white silt sized comminuted CHALK with some fine and medium intact chalk gravel. Very weak. GradeVI.Dm. (UPPER CHALK) End of Borehole at 20.45 m				● ↑		N=16	IVIC 76	, P ₃	303	OI-	рп	Oig.	CBR	Other	
Britis	h Geolo	gical Survey	Britis	n Geologica	Survey 21.00							Brit	ish G	eologia	al Sui	nrey	
					22.00												
		British Geological Survey			Brit -23.00	sh Geol	ogical S	urvey								British 0	eological Surve
Britis	h Genic	gical Survey	Britis	n Geologica	24.00							Brit	ish Gi	eologic	al Su	ntev	
Dilus	in Georg	gicai Suivey	БПИЗ	roeniogica	25.00							DIII	,511 01	sorogic	ai oui	ey	
		British Geological Survey			26.00 Brit	sh Geol	ogical S	urvey								British (eological Surv
					27.00												
Britis	h Geold	gical Survey	Britis	n Geologica	28.00							Brit	ish G	eologia	al Sui	ntey	
					29.00												
		British Geological Survey			Brit	sh Geol	ogical S	urvey								British 0	eological Surve

Star Covert, Honingham

British Geological Survey

Surface level (+43.0 m) +141 ft Water not struck Wirth B1, 8 inch diam. October 1969

Overburden (5.5 m) 18 ft Mineral (11.0 m) 36 ft Bedrock (0.9 m+) 3 ft+

				Thickn		Depth	
				(m)	ft	(m)	ft
Boulder Clay	Geologica Soil y and from 9	brown c to 12 ft	halky clay, with sandy seam (2.7 to 3.7 m).	(5. 5)	18	(5. 5)	Geological Survey 18
Glacial Sand and Gravel	from lo Gravel: o in uppe rounded	ower 12 coarse v r 9 ft (2 d, main)	sand. Gravel almost absent ft (3,7 m). Chalky near base. with fine (coarse predominant (.7 m)), subangular with sub- ly flint.	(11.0)	36	(16.5)	54
British Geological Survey	to oran	edium a ge.	nd fine, subangular; brown British Geological Survey		British Geo	logical Survey	
Upper Chalk	Chalk.			(0.9+)	3+	(17.4) 5	57
			Depth below				
%	mm	%	surface (ft)	Fines	Sand	Gravel	
	+64	: 0	18 - 21	15	70	15	
Gravel 13		: 8	21 - 24	11	54	35	
British (Geologica T31 6 5 4	: 5	B 2 % h-≎e 2 7 gical Survey	1	66		Geological Survey
	,		27 - 30	16	75	9	
	-4 +1	: 5	30 - 33	24	68	8	
Sand 73	-1+ 1	: 35	33 - 36	20	70	10	
	$-\frac{1}{4}+1/16$: 33	36 - 39	24	63	13	
			39 - 42	1	70	29	
Fines 14	-1/16	: 14	42 - 45	48	50	2 2	
			45 - 48	2	98	0	
			48 - 51	4	91	5	

British Geological Survey British Geological Survey British Geological Survey

British Geological Survey - British Geological Survey British Geological Survey

Institute of Geological Sciences & Cades

Mineral Assessment Unit
Sand and Gravel Survey

BOREHOLE RECORD SHEET

Borehole Reg. No.: TG 11: SW/3: at Survey

Temporary designation:

Nat. Grid Ref.: 1057 1234.

Locality: Slar Covert, Honighan-

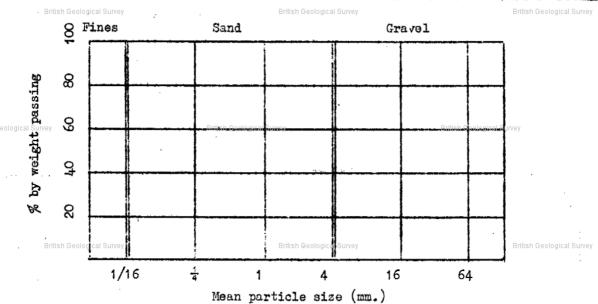
Date: 21-10-69.

Recorded by: AR. Clayla.

Drilled by: Fitzpatrick Drill Type: Wirth Bl	Horizon	Thickn m ft.	Nature
Hole diameter: 8"	Overburden	19	Soil & Boulder clay
Ground level (0.D.):	Mineral	45	Sand & Gravel with 6' B. C.
Water struck at (0.D.): 7-4 British Geological Survey	Baserock tish Geological Survey	3	Chalk British Geological Survey

Remarks 833 chay Swiegard . 12.3 to

			<u></u>	······································
Grading Curve (from Sampling	Grading	Fines	Sand	Gravel
Analysis Sheet)	percentages:			



Description of Strata British Geological Survey British Geological Survey	Depth to base ft.	Thickn. British Geological Su	Sample
Papsoil Di. compr. file - allegood	1.5	1,5	-
Brown chalky boulder clay	9	7.5	-
Clayey med. sand w. fine-med. gravel Sand med. SA. tr. chalk brown clayey mmm Gravel fine-med. SA flint occ. co. SA flint Clay orange-brown chalky	12	3	N 833
Brown chalky boulder clay w. flint cobble	18	6	-
Med. sand tr. clay & tr. fine-med. gravel Sand Med. SA w. tr. co. hard chalk & soft of Gravel Med. & fine SA w. SR irreg. flint LE	27 halk brov S 30	9 m	N 834-836
British Geological Survey Med. sand w. fine & med. gravel Sand Med. SA w. tr. co. SA chalk orange-brow Gravel Med. w. fine & tr. co. SA & SR irreg	n occ. to	British Gological Su • clay & • cc• fine	soft chalk
V	•		

British Geological Survey

British Geological Survey

British Geological Survey

Description of Str	ata (continued)	Depth to base ft.	Thickn. ft.	Sample Nos.
Med. chalky sand w Sand Med. SA & m Gravel Med. SA f flints LE	ed. chalk sand w. co. chal lint w. fine SA flint & ha	45 cream ard chalk	9 hitish Geological St & tr. eC	i .
Med. chalky sand w Sand as N842 w. Gravel as N842	tr. co. chalk	54	9	N843-845
Chalk British Geological Survey	British Geological Survey	57	3	British Georgical Survey
sh Geological Survey	British Geological Survey		ritish Geological Si	rvey
British Geological Survey	British Geological Survey			British Geological Survey
		1		

British Geological Survey

British Geological Survey

1 4

Gravel Pit Plantation, Ringland

Survey British Geological Sur

Surface level (+33.8 m) +111 ft Water not struck Wirth B1, 8 inch diam. October 1969

Overburden (0.3 m) 1 ft Mineral (14.3 m) 47 ft Waste (3.4 m) 11 ft Bedrock (0.9 m+) 3 ft+

						Thickr (m)	ess ft	Dep (m)	th ft
	British Geologic	al Svil y.			British Geological Survey	(0.3)	1	(0.3) ^{iis}	h Geq j ogical Survey
Glacial and Gr	avel	18 ft (5 (5.8 to (2.4 m Gravel: flint. Sand: m	6. 5 10). fi	om), a 0.4 m) ne to d	avel concentrated in upper besent from 19 to 34 ft . Clayey in lower 8 ft oarse, subangular, mainly ith fine and traces of coarse,	(14.3)	47 British Geol	(14.6)	48
Dillion ocological	241707	aubang	uı	ar, mg	It died with great carry		Dittion ooon	ogical carroy	
Boulder	· Clay	Grey ch	alk	y clay		(3.4)	11	(18, 0)	59
Upper (Chalk	Chalk.				(0.9+)	3+	(18. 9)	62
					Depth below		Percent	age	
	%	mm		%	surface (ft)	Fines	Sand	Grav	rel
	British Geologic	al -8-6-4 ey	:	0	Britis L Gaological Survey	0	88	132 tis	h Geological Survey
Gravel	14	-64+16	;	8	4 - 7	0	98	2	
		-16+4	:	6	7 - 10	4	60	36	
					10 - 13	3	26	71	
		-4+1		12	13 - 16	5	43	52	
Sand	79	$-1+\frac{1}{4}$			16 - 19	8	79	13	
		$-\frac{1}{4}+1/16$:	25	19 - 22	2	98	0	
					22 - 25	0	100	0	
Fines	7	-1/16	:	7	25 - 28	0	100	0	
British Geological S	Survey				British Geological Survey 28 - 31	1	Britis 9 9 eol	ogical Surve ()	

British Geological Survey

British Geological Surve

31 - 34

34 - 37

37 - 40

40 - 43

43 - 46

46 - 48

0

1

5

32

26

22

100

96

83

63

64

72

British Geological Survey

0

3

12

5

10

6

British Geological Survey

British Geological Survey

Institute of Geological Sciences

Mineral Assessment Unit Sand and Gravel Survey BOREHOLE RECORD SHEET

Borehole Reg. No.: TG -1-SW/11

Temporary designation:

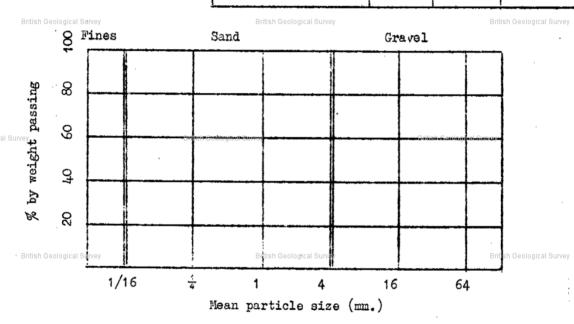
Nat. Grid Ref.: 1253 14445

Locality: Gravel Pit Plantin. Ringland Date: 30-10-69 Recorded by: Al. Claylan.

Drilled by: Fitzpatrick Drill Type: Wirth Bl	Horizon	Thi m	ckn. ft.	
Hole diameter: 8"	Overburden		1	Soil.
Ground level (0.D.): (120.	Mineral		47	Sand and Gravel.
Water struck at (0.D.):	Baserock ological Survey		14	· Clay and Chalk.

Remarks

Grading Curve (from Sampling Analysis Sheet)	Grading percentages:	Fines	Sand	Gravel
		•		l .



Description of Strata n Geological Survey British Geological Survey	Depth to base ft.	Thickn. In Geological Survey	Sample Nos.
Topsoil.	1	1	_
Clayey medco. sand & fine-med. gravel. Sand Med. & co. SA-A (flint) w. brown clay. Gravel Fine w. granule & med. SA-A flint w. occ. SA-SR fine qtz. LPS 35.	16 co. SA-A	15 flint t	N932-936
Med. sand w. co. & med. gravel. Sand Med. SA light brown occ. tr. cay. Gravel Co. w. med. & tr. fine SA flint w. tr	19 • SA fli	3 nt cobbl	N937
Med. sand w. co. & med. gravel. Sand)) Gravel) AS N937 but no cobbles.	25	6	N9 38-9 39
Med. sand w. co. & med. gravel. Sand) Gravel AS N937 LPS 150.	28	h Geological Survey 3	N9 40
	*		→

British Geological S

British Geological Survey

British Geological Survey

British Geological Survey

Description of Strata (cor	tinued)	Depth to base ft.	Thickn.	Sample Nos.
Med. sand w./tr. medc Sand Med. SA tr. co.	40 cc. SA f	12 British Seological int cok	N941-944	
Med. sand w. med. gravel. Sand med. w. tr. co. SA Gravel Med. & fine w. o		18	ρ	NO 45-047
Grey chalky boulder clay.		59	11	-
Chalk British Geological Survey	British Geological Survey	62	3	British Geological Survey
ritish Geological Survey	British Geological Survey		British Geological:	Survey
British Geological Survey	British Geological Survey			British Geological Survey
itish Geological Survey	British Geological Survey		British Geological	

British Geological Survey

British Geological Survey

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British Geological Survey

British Geological Survey

TG 11 SW 16 1350 1467

Royal Hill, Ringland

British Geological Survey

Surface level (+36.2 m) +119 ft Water not struck Wirth B1, 8 inch diam. October 1969 Overburden (0.3 m) 1 ft Mineral (11.9 m) 39 ft Waste (5.5 m) 18 ft Mineral (1.8 m) 6 ft Bedrock (0.9 m+) 3 ft+

						Thickn (m)	ess ft	Depth (m) ft	
	British Geol	ogical Sun	Soil		British Geological Survey	(0.3)	1	British Geological Sur (0, 3) 1	vey
	ial Sand I Gravel	(a)	(2.7 m). Gravel: o Sand: fin	oarse v	avel mainly in upper 9 ft with fine, subangular flint. nedium and traces of coarse, nt brown.	(11.9)	39	(12.2) 40	
British Geological S Boul	der Clay	4	'Very cla brown c	yey' sai lay and	nd. Traces of gravel, light hard chalk.	(5.⊟5) sh	d.8 logical	s(1.7.7) 58	
	ial Sand d Gravel		rounded Sand: fin	ine wit flint. e and n	bbly sand. h coarse, subangular to sub- nedium, subangular, with light clay; light grey.	(1.8)	6	(19. 5) 64	
Upp	er Chalk	ogical Sun	^{/ey} Chalk.		British Geological Survey	(0. 9+)	3+	(20is14)eologic617sur	vey
		%	mm	<i>o</i> / ₀	Depth below surface (ft)	P Fines	ercent Sand		
(a)	Gravel	16	+64 -64+16 -16+4	; 0 : 11 : 5	$ \begin{array}{r} 1 - 4 \\ 4 - 7 \\ 7 - 10 \\ 10 - 13 \end{array} $	0 0 0 1	38 62 32 99	62 38 68 0	
British Geological S	urvey Sand	82	$-4+1$ $-1+\frac{1}{4}$ $-\frac{1}{4}+1/16$: 29	13 - 16 16 - 19 19 - 22 22 - 25	13 ritish 1 7 9	Geolo 99 al 99 93 91	0 0 0	
	Fines	2	-1/16	: 2	25 - 28 28 - 31 31 - 34 34 - 37 37 - 40	3 2 0 1 1	82 98 100 71 99	15 0 0 28 0	
	British Geol	ogical Sun			British Geological Survey 58 - 61	29	66	British Geological Sur	vey
(b)	Gravel	. 5	+64 -64+16 -16+4	: 0 : 1 : 4	61 - 64	20	74	6	
	Sand	70	$-4+1$ $-1+\frac{1}{4}$ $-\frac{1}{4}+1/16$: 2 : 16 : 52					
British Geological S	urv Fines	25	-1/16	: 25 Brit	ish Geological Survey	British	Geological	Survey	

tute of Geological Sciences

neral Assessment Unit Sand and Gravel Survey

BOREHOLE RECORD SHEET

Borehole Reg. No.: TG 11 SW/16

Temporary designation;

Nat. Grid Ref.: 135/1468 7

Locality: Royal Hill, Ringland

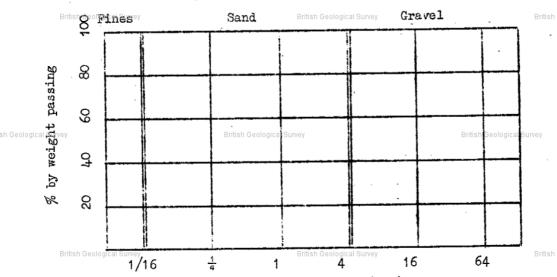
Date: 30-10-69

Recorded by: A. R. Clayton.

Drilled by: Fitzpatrick Drill Type: Wirth Bl	British H orizon	Thi m	ft.	Nature	British Geological Survey
Hole diameter: 8" Ground level (0.D.): 125 Water struck at (0.D.): Dry	Overburden Mineral Baserock	હન્ડ	1 #8 3	Soil Sand & 15' Clay Chalk	 :
British Geological Strivey	British Geological Survey	<u> </u>		British Geological Sun	vey

Remarks

Grading Curve (from Sampling Analysis Sheet)	Grading percentages:	Fines	Sand	Gravel
		•		
			·	



Mean particle size (mm.)

Description of Strata	Depth to base ft.	Thickn.	Sample Nos.
tish Geological Survey Popsoil •	1	British Geological S	ırvey
Clayey medco. sand & fine & med. gravel. Sand Med. SA-Co. SA & A (flint) tr. clay da Gravel Fine & med. w. co. SA-A flint LPS 40	10 rk brown	9	N948-950
Med. Sand tr. medco. gravel. Sand Med. SA light brown. Gravel Medco. w. fine SA flint LPS 30.	22	12	N951-954 British Geological Survey
Med. & fine sand tr. medco. gravel. Sand Med. & fine SA tr. brown clay. Gravel Medco. w. fine SA flint LPS 30.	25	3	N955
Med. sand tr. medco. gravel. SandumMed. SA light brown and the SA & W. SR-SA irreg	31 flint	6 copples	N956-957 LPS 70.
Med. & co. sand w. tr. fine-med. grayel. Sand Med. SA & co. SA-A (w. chalk) light br Grayel Fine & med. SA flints LPS 25.	wn: 40	9	N958-960



British Geological Survey

British Geological Survey

British Geological Survey

Description of Strata (continued)	Depth to base ft.	Thickn. ft.	Sample Nos.
Clayey Med. & co. sand w. tr. fine-med. grave Sand Med. & co. SA w. Light brown sl. chall Gravel Fine & med. SA flints LPS 25.		h Geological Surve	x 961
Light brown clay w. tr. chalk.	- 58	15 ·	-
Very clayey medco. sand w. medco. gravel. Sand Med. co. SA w. dark brown (stoney) cla Gravel Med. & co. SA-SR irreg flints LPS 70	y.	3	N 962
Med. sand w. tr. med. & fine gravel and tr. clay. Sand Med. w. fine SA light grey w. tr. light gravel Fine & med. SA-SR irreg. flint.	64 it grey	3 clay.	N963
Chalk ittisk Geological Survey British Geological Survey	67 Briti	3	
<u>U. E. A. Samples</u> UEA 168			
British Geological Survey British Geological Survey		. В	itish Geological Survey
			• · · · · · · · · · · · · · · · · · · ·
itish Geological Survey British Geological Survey	Briti	sh Geological Surve	y

British Geological Survey

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British Geological Surve

British Geological Survey

British Genlagical Survey

British Genlagical Survey

British Geological Survey

British Geological Survey