



# **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

Version Number: 00

Date: March 2024



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## **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](mailto:norwichwesternlink@norfolk.gov.uk)



Scheme Norwich Northern Distributor Road

Job No. PTPK1000ii

Borehole No. BHPW1A

Carried out for Norfolk County Council

Date Started 29/03/2007

Date Finished 30/03/2007

Remarks:

Type of Rig

British Geological Survey

Depth 20.45

Height 22.067 mAOD

Logged by

BA

Drawn by

ptp

Co-ords 614337E - 315519N

Checked by

Backfill	Water	Description	Legend	Depth (m)	Sample		Field Tests	Laboratory Tests									
					Type	No.		MC%	P <sub>s</sub>	SO <sub>3</sub>	Cl-	pH	Org.	CBR	Other		
		MADE GROUND : Orange silty fine sand with some fine and medium flint gravel (MADE GROUND)		1.00	●	001											
		Very soft brown very clayey very sandy SILT with some fine and medium flint gravel (COVER SILT)		1.00 - 2.00	●	001 N=17 002											
		Orangey brown silty fine SAND with laminae of grey sandy silt (CRAG_SAND)		2.00 - 3.00	●	002 N=21 003											
		Laminated grey very clayey sandy SILT (CRAG_SILT)		3.00 - 4.00	●	003 N=21 004 005											
		Thin bed of brown fine and medium sand		4.00 - 5.00	●	005 N=25											
		Very soft brown very sandy very clayey SILT (CRAG_SILT)		5.00 - 6.00	●	006											
		Brown clayey silty fine SAND with much fine and medium flint gravel (CRAG_SAND)		6.00 - 7.00	●	006 50/250mm 007											
		Off white silt sized comminuted CHALK with a little fine intact chalk. Very weak. Grade VI.Dm. (UPPER CHALK)		7.00 - 8.00	●	007 N=9 008											
				8.00 - 9.00	●	008 N=17											

Continued next sheet



Scheme Norwich Northern Distributor Road Job No. PTPK1000ii Borehole No. BHPW1A

Carried out for Norfolk County Council Date Started 29/03/2007 Date Finished 30/03/2007

Remarks: Type of Rig

British Geological Survey

Depth 20.45 Height 22.067 mAOD

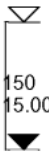
Logged by BA

Drawn by ptp

Co-ords 614337E - 315519N

Checked by

Backfill	Water	Description	Legend	Depth (m)	Sample		Field Tests	Laboratory Tests										
					Type	No.		MC%	P <sub>s</sub>	SO <sub>3</sub>	Cl-	pH	Org.	CBR	Other			
		Off white silt sized comminuted CHALK with a little fine intact chalk. Very weak. GradeVI.Dm. (UPPER CHALK)				●	009 N=8											
		Off white silt sized comminuted CHALK with a little fine intact chalk. Very weak with some flint gravel. GradeVI.Dm. (UPPER CHALK)		11.00														
		Off white silt sized comminuted CHALK with a little fine intact chalk. Very weak. GradeVI.Dm. (UPPER CHALK)		12.00		●	010 N=6											
				13.00														
				14.00		●	011 N=7											
				15.00		●	012 N=10											
				16.00														
		Off white silt sized comminuted CHALK with some fine and medium intact chalk gravel. Very weak. GradeVI.Dm. (UPPER CHALK)		17.00		●	013 N=17											
				18.00		●	014 N=18											
				19.00														



Continued next sheet

**NORFOLK PARTNERSHIP LABORATORY**

**BOREHOLE**

**LOG**

Sheet 3 of 3



Scheme **Norwich Northern Distributor Road** Job No. **PTPK1000ii** Borehole No. **BHPW1A**

Carried out for **Norfolk County Council** Date Started **29/03/2007** Date Finished **30/03/2007**

Remarks: Type of Rig  
 Depth **20.45** Height **22.067 m AOD** Logged by **BA**  
 Co-ords **614337E - 315519N** Drawn by **ptp**  
 Checked by

Backfill	Water	Description	Legend	Depth (m)	Sample		Field Tests	Laboratory Tests									
					Type	No.		MC%	P <sub>s</sub>	SO <sub>3</sub>	Cl-	pH	Org.	CBR	Other		
		Off white silt sized comminuted CHALK with some fine and medium intact chalk gravel. Very weak. Grade VI.Dm. (UPPER CHALK) End of Borehole at 20.45 m		20.45	●	015	N=16										
				21.00													
				22.00													
				23.00													
				24.00													
				25.00													
				26.00													
				27.00													
				28.00													
				29.00													

TG 11 SW 3 1057 1234

Star Covert, Honingham

British Geological Survey

British Geological Survey

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+

		Thickness (m) ft	Depth (m) ft
Boulder Clay	Soil and brown chalky clay, with sandy seam from 9 to 12 ft (2.7 to 3.7 m).	(5.5) 18	(5.5) 18
Glacial Sand and Gravel	'Clayey' pebbly sand. Gravel almost absent from lower 12 ft (3.7 m). Chalky near base. Gravel: coarse with fine (coarse predominant in upper 9 ft (2.7 m)), subangular with sub-rounded, mainly flint. Sand: medium and fine, subangular; brown to orange.	(11.0) 36	(16.5) 54
Upper Chalk	Chalk.	(0.9+) 3+	(17.4) 57

British Geological Survey

British Geological Survey

British Geological Survey

	%	mm	%	Depth below surface (ft)	Gravel		
					Fines	Sand	Gravel
Gravel	13	+64	: 0	18 - 21	15	70	15
		-64+16	: 8	21 - 24	11	54	35
		-16+4	: 5	24 - 27	1	66	33
Sand	73	-4+1	: 5	27 - 30	16	75	9
		-1+1/4	: 35	30 - 33	24	68	8
		-1/4+1/16	: 33	33 - 36	20	70	10
				36 - 39	24	63	13
Fines	14			39 - 42	1	70	29
				42 - 45	48	50	2
				45 - 48	2	98	0
				48 - 51	4	91	5
				51 - 54	5	95	0

British Geological Survey

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British Geological Survey

British Geological Survey

British Geological Survey

Mineral Assessment Unit

Temporary designation:

Sand and Gravel Survey

Nat. Grid Ref.: 1057 1234.

BOREHOLE RECORD SHEET

Locality: *Star Court, Homighan*

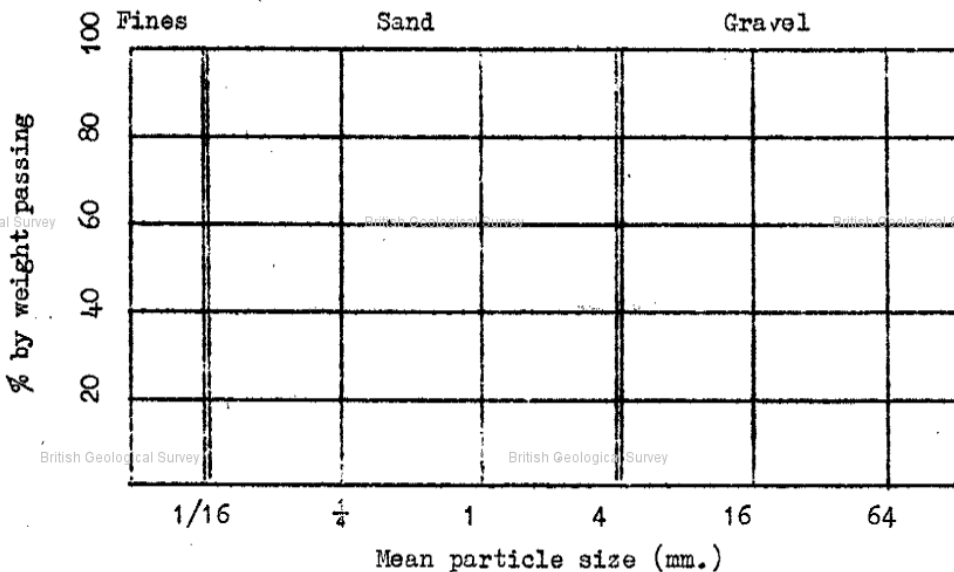
Date: 21-10-69.

Recorded by: *AR. Clayton*

Drilled by: Fitzpatrick Drill Type: Wirth Bl Hole diameter: 8" Ground level (O.D.): Water struck at (O.D.): <i>Dry</i>	Horizon	Thickn. m ft.	Nature
	Overburden	9	Soil & Boulder clay
	Mineral	45	Sand & Gravel with 6' B. C.
	Baseroack	3	Chalk

Remarks: *833 clay diverged. 1234*

Grading Curve (from Sampling Analysis Sheet)	Grading percentages:	Fines	Sand	Gravel
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Description of Strata	Depth to base ft.	Thickn. ft.	Sample Nos.
Topsoil	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 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 chalk brown Gravel Med. & fine SA w. SR irreg. flint LPS 30	27	9	N 834-836
Med. sand w. fine & med. gravel Sand Med. SA w. tr. co. SA chalk orange-brown occ. tr. clay & soft chalk Gravel Med. w. fine & tr. co. SA & SR irreg. flint occ. fine SR qtz LPS 50	36	9	N837-839



Description of Strata (continued)	Depth to base ft.	Thickn. ft.	Sample Nos.
Med. chalky sand w. med. gravel Sand Med. SA & med. chalk sand w. co. chalk cream Gravel Med. SA flint w. fine SA flint & hard chalk & tr. co. SR irreg. flints LPS 60	45	9	N840-842
Med. chalky sand w. med. gravel Sand as N842 w. tr. co. chalk Gravel as N842	54	9	N843-845
Chalk	57	3	

TG 11 SW 11 1253 1445

Gravel Pit Plantation, Ringland

British Geological Survey

British Geological Survey

British Geological Survey

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+

Soil.		Thickness (m) ft	Depth (m) ft
Glacial Sand and Gravel	Pebbly sand. Gravel concentrated in upper 18 ft (5.5 m), absent from 19 to 34 ft (5.8 to 10.4 m). Clayey in lower 8 ft (2.4 m). Gravel: fine to coarse, subangular, mainly flint. Sand: medium with fine and traces of coarse, subangular; light brown.	(14.3) 47	(14.6) 48
Boulder Clay	Grey chalky clay.	(3.4) 11	(18.0) 59
Upper Chalk	Chalk.	(0.9+) 3+	(18.9) 62

	%	mm	%	Depth below surface (ft)	Percentage		
					Fines	Sand	Gravel
Gravel	14	+64	: 0	1 - 4	0	88	12
		-64+16	: 8	4 - 7	0	98	2
		-16+4	: 6	7 - 10	4	60	36
				10 - 13	3	26	71
Sand	79	-4+1	: 12	13 - 16	5	43	52
		-1+1/4	: 42	16 - 19	8	79	13
		-1/4+1/16	: 25	19 - 22	2	98	0
Fines	7	-1/16	: 7	22 - 25	0	100	0
				25 - 28	0	100	0
				28 - 31	1	99	0
				31 - 34	0	100	0
				34 - 37	1	96	3
				37 - 40	5	83	12
				40 - 43	32	63	5
				43 - 46	26	64	10
				46 - 48	22	72	6

Mineral Assessment Unit

Temporary designation:

Sand and Gravel Survey

Nat. Grid Ref.: 125314465

BOREHOLE RECORD SHEET

Locality: Gravel Pit Plantin, Ringland

Date: 30-10-69

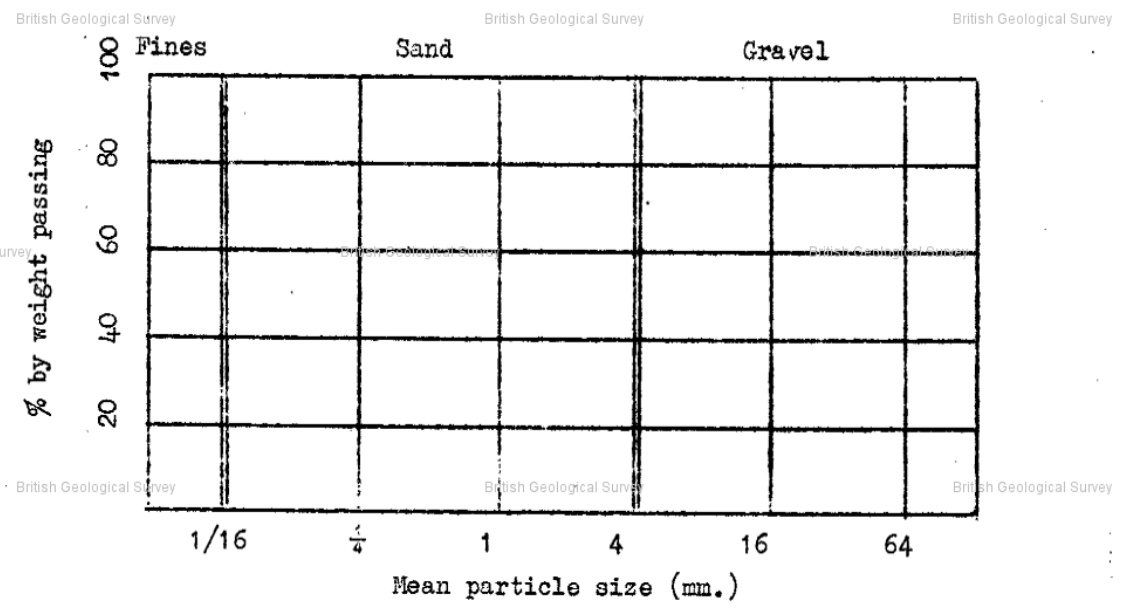
Recorded by:

A.R. Clayton

Drilled by: Fitzpatrick Drill Type: Wirth Bl Hole diameter: 8" Ground level (O.D.): c120. Water struck at (O.D.): Dry	Horizon	Thickn. m ft.	Nature
	Overburden	1	Soil.
	Mineral	47	Sand and Gravel.
	Baseroack	14	Clay and Chalk.

Remarks

Grading Curve (from Sampling Analysis Sheet)	Grading percentages:	Fines	Sand	Gravel
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Description of Strata	Depth to base ft.	Thickn. ft.	Sample Nos.
Topsoil.	1	1	-
Clayey med.-co. sand & fine-med. gravel. Sand Med. & co. SA-A (flint) w. brown clay. Gravel Fine w. granule & med. SA-A flint w. co. SA-A flint tr. chalk & occ. SA-SR fine qtz. LPS 35.	16	15	N932-936
Med. sand w. co. & med. gravel. Sand Med. SA light brown occ. tr. clay. Gravel Co. w. med. & tr. fine SA flint w. tr. SA flint cobbles LPS 80.	19	3	N937
Med. sand w. co. & med. gravel. Sand) } AS N937 but no cobbles. Gravel)	25	6	N938-939
Med. sand w. co. & med. gravel. Sand) } AS N937 LPS 150. Gravel)	28	3	N940
			➔

Description of Strata (continued)	Depth to base ft.	Thickn. ft.	Sample Nos.
Med. sand w./tr. med.-co. gravel. Sand Med. SA tr. co. SA brown. Gravel Fine & med. w. co. SA & A flints occ. SA flint cobbles LPS 70.	40	12	N941-944
Med. sand w. med. gravel. Sand med. w. tr. co. SA (occ. chalk) tr. brown chalky clay. Gravel Med. & fine w. co. SA flint tr. med. & fine chalk.	48	8	N945-947
Grey chalky boulder clay.	59	11	-
Chalk	62	3	-

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+

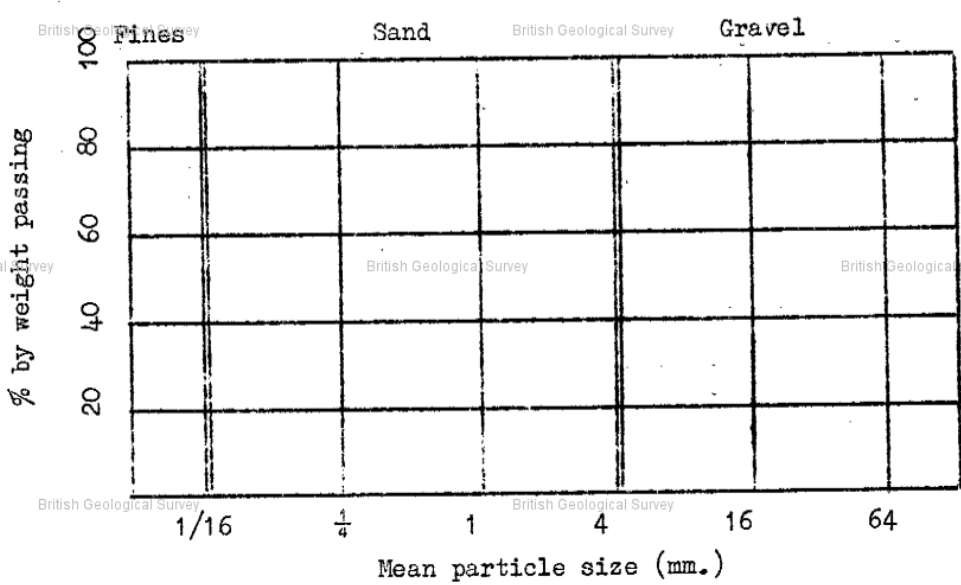
		Thickness		Depth	
		(m)	ft	(m)	ft
Soil		(0.3)	1	(0.3)	1
Glacial Sand and Gravel	(a) Pebbly sand. Gravel mainly in upper 9 ft (2.7 m). Gravel: coarse with fine, subangular flint. Sand: fine with medium and traces of coarse, subangular; light brown.	(11.9)	39	(12.2)	40
Boulder Clay	'Very clayey' sand. Traces of gravel, light brown clay and hard chalk.	(5.5)	18	(17.7)	58
Glacial Sand and Gravel	(b) 'Very clayey' pebbly sand. Gravel: fine with coarse, subangular to sub-rounded flint. Sand: fine and medium, subangular, with light brown and grey clay; light grey.	(1.8)	6	(19.5)	64
Upper Chalk	Chalk.	(0.9+)	3+	(20.4)	67

	%	mm	%	Depth below surface (ft)	Percentage			
					Fines	Sand	Gravel	
(a) Gravel	16	+64	: 0	1 - 4	0	38	62	
		-64+16	: 11	4 - 7	0	62	38	
		-16+4	: 5	7 - 10	0	32	68	
				10 - 13	1	99	0	
				13 - 16	1	99	0	
				16 - 19	1	99	0	
				19 - 22	7	93	0	
				22 - 25	9	91	0	
				25 - 28	3	82	15	
				28 - 31	2	98	0	
(b) Gravel	5	+64	: 0	58 - 61	29	66	5	
		-64+16	: 1	61 - 64	20	74	6	
		-16+4	: 4					
				-4+1	: 2			
				-1+1/4	: 16			
				-1/4+1/16	: 52			
Fines	25	-1/16	: 25					

Drilled by: Fitzpatrick Drill Type: Wirth B1 Hole diameter: 8" Ground level (O.D.): 125 Water struck at (O.D.): Dry	Horizon	Thickn. m ft.	Nature
	Overburden	1	Soil
	Mineral	6.3 10	Sand & 15' Clay
	Baseroack	3	Chalk

Remarks

Grading Curve (from Sampling Analysis Sheet)	Grading percentages:	Fines	Sand	Gravel
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Description of Strata	Depth to base ft.	Thickn. ft.	Sample Nos.
Topsoil.	1	1	-
Clayey med.-co. sand & fine & med. gravel. Sand Med. SA-Co. SA & A (flint) tr. clay dark brown. Gravel Fine & med. w. co. SA-A flint LPS 40.	10	9	N948-950
Med. Sand tr. med.-co. gravel. Sand Med. SA light brown. Gravel Med.-co. w. fine SA flint LPS 30.	22	12	N951-954
Med. & fine sand tr. med.-co. gravel. Sand Med. & fine SA tr. brown clay. Gravel Med.-co. w. fine SA flint LPS 30.	25	3	N955
Med. sand tr. med.-co. gravel. Sand Med. SA light brown. Gravel Med.-co. w. fine SA & w. SR-SA irreg. flint cobbles LPS 70.	31	6	N956-957
Med. & co. sand w. tr. fine-med. gravel. Sand Med. SA & co. SA-A (w. chalk) light brown. Gravel Fine & med. SA flints LPS 25.	40	9	N958-960

Description of Strata (continued)	Depth to base ft.	Thickn. ft.	Sample Nos.
Clayey Med. & co. sand w. tr. fine-med. gravel. Sand Med. & co. SA w. light brown sl. chalky clay. Gravel Fine & med. SA flints LPS 25.	43	3	N 961
Light brown clay w. tr. chalk.	58	15	-
Very clayey med.-co. sand w. med.-co. gravel. Sand Med. co. SA w. dark brown (stoney) clay. Gravel Med. & co. SA-SR irreg flints LPS 70.	61	3	N 962
Med. sand w. tr. med. & fine gravel and tr. clay. Sand Med. w. fine SA light grey w. tr. light grey clay. Gravel Fine & med. SA-SR irreg. flint.	64	3	N963
Chalk	67	3	-
<u>U. E. A. Samples</u> UEA 168 ..... 45' UEA 169 ..... 58'			