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Phase 2 (site investigation) report
Land off Cob Gate, Whaplode

Client: Alan Finch of MLP

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Report number: 1059/4540/P/P2

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1 Introduction

The client, Alan Finch of Moulton Land and Planning (MLP), on behalf of the developer, has engaged Humberside Materials Laboratory Limited (HML) to undertake a Phase 2 geo-environmental investigation report for a proposed development on land off Cobgate, Whaplode, Lincolnshire. The land will be hereinafter described as *the site*.

1.1 Aims

The aim of the investigation is to assess relevant geo-environmental aspects of the site in relation to the proposed development works. This includes an evaluation of encountered ground conditions and geotechnical issues.

1.2 Scope

The scope of the investigation includes:

- trial pit intrusive investigation with in-situ strength tests
- in-situ percolation testing
- geotechnical and geochemical laboratory testing
- an assessment of geo-environmental issues

1.3 Conditions and Limitations

This report is produced solely for the above client(s) and should only be copied in full. When transmitted electronically, the definitive copy of the report is held by Humberside Materials Laboratory Ltd.

This report is prepared on the assumption that all facts have been disclosed.

The comments given in this report and the opinions expressed assume that conditions do not vary beyond the range revealed by this study and the information provided in the production of this report is complete and reliable.

2 Review of desk study information

2.1 Sources of Site Information

Various sources of desk study information have been reviewed. These are detailed in the HML Phase 1 (desk study) report (HML report number: 1059/4540/P/P1), dated May 2018. Notably, the Phase 1 report contains a Landmark Envirocheck report for the site with historical maps.

2.2 Site Description and Topography

2.2.1 *Location and size*

The site is situated in agricultural fields in the western outskirts of the village of Whaplode, Lincolnshire. The site is to the north side of Cob Gate and is centred around national grid reference (NGR) 531960, 324000. The site access is via Cob Gate.

The site occupies a rectangular parcel of land which is about 100m wide by about 220m long.

A site location plan is included in Appendix A.

2.2.2 *Site features*

The site is essentially a farmer's field. It is mostly bare earth. There are some shallow land drains running around most of the north and west boundaries.

A survey of underground services is beyond the scope of this report. However, it is understood that there is a pumped water main running just inside and parallel to the east boundary of the site.

Views of the site and a site features plan are presented in Appendix A.

2.2.3 *Evidence of potential contamination*

No evidence of potential contamination has been found at the site. No unusual odours have been detected and no oil sheen observed. No irregular vegetation growth was found. No evidence of any existing or former tanks, barrels or other liquid storage containers was seen. The site appears entirely consistent with a field which has been used exclusively for arable farming.

2.2.4 *Site topography*

The site is generally very flat and level. The average ground level is estimated to be about 3m above Ordnance Datum.

2.2.5 *Surrounding land use*

The site is bound by the following:

- North: agricultural fields
- East: rear gardens to residential properties
- South: rear gardens to residential properties and Cob Gate (road).
- West: agricultural fields.

There is a pumping station situated near to the southeast corner of the site. This is evidenced by the large concrete slab with metal grates with an above-ground lifting frame and electrical control units.

2.2.6 *Local topography*

The local topography beyond the site is flat. The site is within The Fens, a geographical area which is traditionally flat and low-lying.

2.2.7 *Proposed development*

It is proposed to develop the site by constructing residential properties across most of the site. These will be accessed via a new link road network that extends off Cob Gate.

Much of the site is expected to become soft landscape or private gardens. It is assumed that the residential gardens may be used to cultivate homegrown produce for human consumption.

Plans of the proposed works are available from the client.

2.3 **Site History**

Evidently, the site has never experienced any significant development. It has been used as an agricultural field since at least as early as 1887. The only site changes have been alterations to the land drains around the edges of the site.

There has only been limited industrial activity near the site. Some large works buildings are shown as close as about 180m to the east of the site.

2.4 Geology, Hydrogeology and Hydrology

2.4.1 Geology

No made ground is anticipated on site.

The whole site is expected to be underlain by a significant thickness of tidal flat deposits, which might have previously been referred to as Fen Beds. Tidal flat deposits typically consist of loosely deposited silts, clays and sands possibly with some bands of peat and (basal) gravel.

Locally, the tidal flat deposits might be about 15m in thickness and comprised predominantly of silty fine sand and sandy silt. BGS historical borehole records nearby the site (located about 1.4km – 2.1km away) suggest that sandy silt or silty sand might be encountered to a depth of about 12m bgl. Little or no peat or organic / peaty material is recorded.

In terms of relative density, the tidal flat deposits beneath the site might be loose or medium dense, becoming medium dense or dense with depth. Previous SPTs (i.e. standard penetration tests) in the local tidal flat deposits have varied from 5 blows to 16 blows at shallower depths (approximately 1.5m – 3.05m bgl). The blow count increases to between 24 blows and 58 blows at greater depths (approximately 6.1m – 12.2m bgl).

Glacial deposits are likely beneath the tidal flat deposits, possibly at a depth of about 15m bgl. These could be present as boulder clay.

The soil deposits on site are expected to be underlain by the West Walton Formation of mudstone and siltstone, present at significant depth (e.g. >20m bgl). This might be encountered initially (at shallower depths) as silts and clays.

2.4.2 Mining and quarrying

There are no reported *BGS recorded mineral sites* within 1km of the site.

Mining is not expected to affect the site. According to the Coal Authority, the site is in an area that might not be affected by coal mining. With respect to non-coal mining activity, a designation of no hazard is given.

2.4.3 Hydrogeology

The groundwater table beneath the site is anticipated to be about 1.5m to 2.0m bgl. This is based on BGS historical borehole records near the site (~1.5km away) and the observed water level in land drains around the site.

2.4.4 Hydrology

There are land drains adjacent to the north, west and east boundaries of the site. The flat topography means the water flow within them is likely to be slow. The drains are reported to be part of the River Nene catchment, the River Nene being about 15km to the southeast of the site.

2.4.5 Anticipated ground conditions

Based on the reviewed desk top information, the anticipated ground conditions are as shown below (in Table 1).

Table 1: Anticipated geology (subject to site confirmation)			
<i>Strata</i>	<i>Possible description</i>	<i>Possible thickness (m)</i>	<i>Possible depth of base of stratum (m bgl)</i>
Topsoil	Organic soil	0.3 – 0.5	0.3 – 0.5
Tidal flat deposits	(Loose to medium dense becoming dense) silty SAND or sandy SILT.	12	12
	Bands of clay and gravel	3	15
Glacial till	Boulder clay possibly with bands of (water-bearing) sands and gravels	7	22
West Walton Formation	Mudstone and siltstone; possibly initially encountered as silts/clays	~15	37
Notes: anticipated groundwater table: 1.5-2.0m bgl			

2.5 Environmental Data

No evidence has been found of any significant industry near the site. No mineworkings, quarries or factories have been identified near the site.

The only identified source of pollution near the site is the Anglian Water Pumping Station situated adjacent to the southeast corner of the site, which appears to involve a discharge consent into a stream/river. However, there are no reported pollution incidents associated with this pumping station.

The site is at risk of flooding. However, a complete flood risk assessment is beyond the scope of this report.

2.6 Contamination and gas risk assessment

A conceptual site model of potential relevant contamination linkages has been developed. However, no plausible sources of contamination and, therefore, no

potentially significant contamination linkages have been identified. Consequently, the preliminary risk assessment cannot find any significant contamination risk.

RB17, A Pragmatic Approach to Ground Gas Risk Assessment by CL:AIRE (authored by Card et al., 2012) outlines a procedure for evaluating the risks of ground gas. As only natural soils are anticipated at the site (that do not produce methane and carbon dioxide), no ground gas monitoring is recommended at this stage. Further, it was anticipated that CS1 conditions could be appropriate for the site, subject to site confirmation of ground conditions.

3 Site Investigation Works

The procedures adopted for this site investigation are based on BS 5930 (2015) – Code of Practice for Site Investigations. The soils and rocks encountered have been described with reference to BS5930 (2015), BS EN ISO 14688-1 (2002) and BS EN ISO 14689-1 (2003).

3.1 Fieldwork

All fieldwork took place on Thursday 15th March 2018.

A total of eight trial pits – (TP1 to TP5) and (SA1 to SA3) – were carried out to explore the ground conditions around the proposed development. The pits were dug using a tracked backacter to depths of up to 2.1m below ground level (bgl) under the supervision of an HML engineer who also logged the ground conditions and collected samples. The samples were returned to the HML laboratory for further testing.

In-situ testing included Mackintosh probing, which is a dynamic cone penetration test. This employs a 4.5kg hammer which is dropped 300mm. The load is transferred to the soil via a 27.9mm diameter cone. The Mackintosh probing was generally performed within the trial pit when the pit had advanced to 1.0m bgl. The probing was carried out until depths of 3.5m bgl. The number of blows to penetrate 100mm was recorded successively. The results are presented later (in Appendix B).

The positions of all exploratory holes were established relative to existing site features and using GPS locating equipment. The depths to sub-strata and groundwater were measured from ground level. Approximate locations of all site works are shown in the exploratory hole location plan (in Appendix A).

Three trial pits (SA1, SA2 & SA3) were used for percolation (i.e. soakaway) tests. These were dug to shallower depths (1.1m to 1.4m bgl) than the other trial pits (TP1 – TP5). The calculation results are presented later (in Appendix C).

3.2 Laboratory Testing

Geotechnical and materials testing was undertaken at HML's UKAS-accredited soils laboratory. The scope of geotechnical testing comprised:

- 4 number remoulded CBR tests
- 5 number particle size distribution tests (using the wet sieving method)
- 2 number linear shrinkage tests

Geochemical testing was undertaken by CLS, a UKAS and MCERTS accredited laboratory. The scope of geochemical testing comprised:

- 3 number sulphate, pH and soil organic matter (SOM) tests

Results for all the testing undertaken are included later in this report (in Appendix C).

4 Encountered Ground Conditions

4.1 Sequence of sub-strata

The encountered ground conditions were generally as expected and agreed with the anticipated site geology. A summary of the revealed ground in the eight trial pits (TP1 – TP5 and SA1 – SA3) are shown below (in Table 2).

Table 2: Summary of encountered ground conditions (during site works)				
Stratum	General description	Locations encountered	Depth to base of stratum (m bgl)	
			Min.	Max.
TOPSOIL	Dark brown silty fine SAND.	All TPs	0.3	0.3
TIDAL FLAT DEPOSITS	Loose brown very silty fine SAND (locally sandy SILT).	All TPs	1.0	1.0
	Medium dense brown very silty SAND. (Becoming loose at 1.8m bgl in TP4 and TP5)	All TPs	>1.1	>2.1
Notes: Sides of trial pits became unstable at about 1.6m to 2.0m bgl. Medium ingress of groundwater recorded at depths of 1.7m to 1.9m bgl				

The ground conditions were found to be relatively uniform. The ground conditions were dominated by brown very silty fine SAND (or brown sandy SILT) to depths of at least 2.0m bgl.

As anticipated in the Phase 1 report, no visual and olfactory evidence of soil contamination was reported. No unusual colouring, staining or odours were observed. No made ground or anthropogenic material was reported. Accordingly, no geochemical contamination testing was scheduled.

4.2 Topsoil

Topsoil was encountered across the site. It was revealed to a depth of about 0.3m bgl in all eight trial pits.

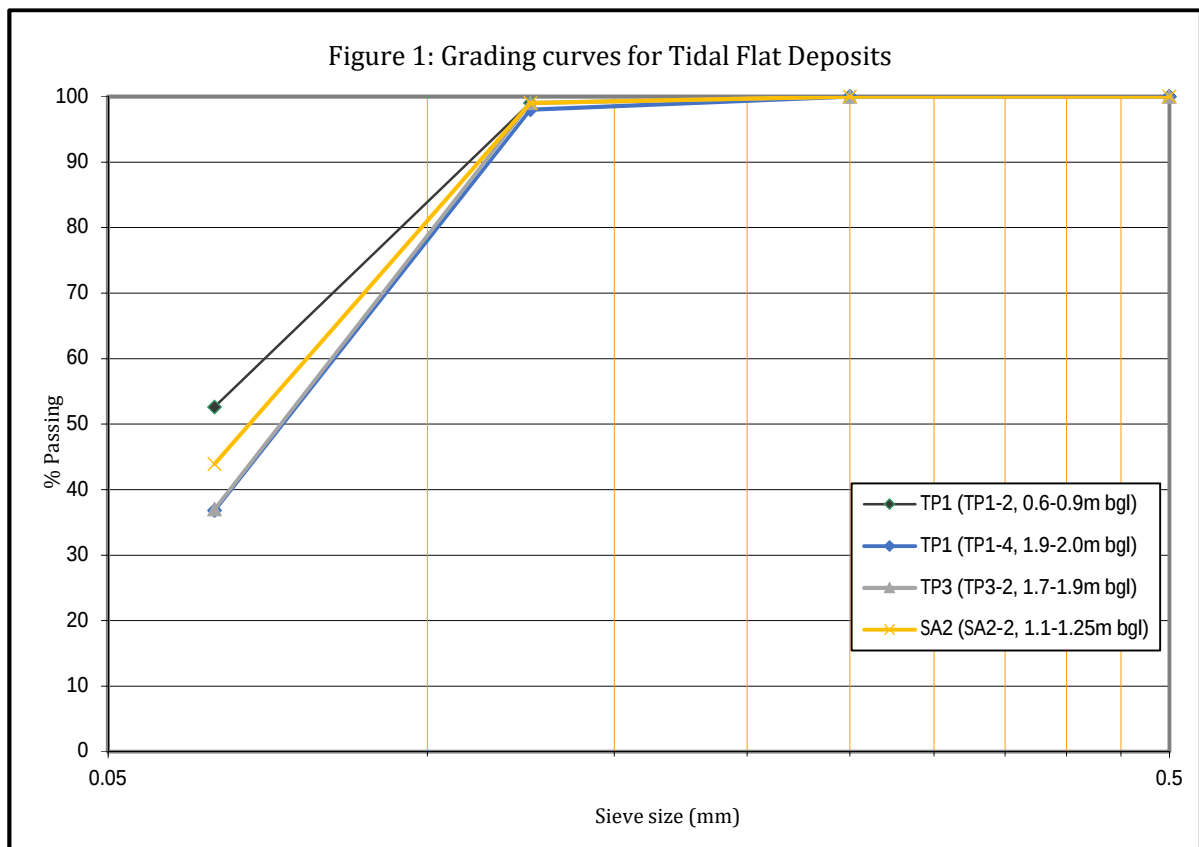
The topsoil was encountered as a dark brown silty fine SAND. No anthropogenic material (e.g. brick fragments) was reported.

4.3 Silts / Sands of the Tidal Flat Deposits

Tidal flat deposits were revealed across the site. They were encountered in all eight trial pits to the full depth of sampling (up to 2.1m bgl) and are inferred to be present to the full depth of probe exploration (up to 3.5m bgl).

The tidal flat deposits were consistently described as a brown very silty fine SAND or a sandy SILT, as shown later in the borehole logs (in Appendix B). The descriptions are largely supported by the results of particle size distribution tests (using wet sieving), as shown below in Figure 1. The percentage of fines (i.e. silt or clay particles less than 0.063mm in diameter) is between 35% and 53%, which shows the material is close to the borderline (of 35% fines) between a very silty SAND and a sandy SILT. A negligible mass of soil particles are greater than 0.25mm in diameter, which indicates the sand content is fine (i.e. fine-grained).

The revealed tidal flat deposits are not considered to constitute a shrinkable soil, i.e. a soil that could significantly swell or shrink due to respective wetting or drying, due to the presence of trees, for example. The results of linear shrinkage tests on two samples of tidal flat deposits, as shown later (in Appendix C), indicate linear shrinkage of 0%.



The absence of any detectable linear shrinkage also indicates that the engineering behaviour of the sampled tidal flat deposits is more likely to resemble that of a granular (i.e. cohesionless) soil (e.g. sand or gravel) than a cohesive material (e.g. silt or clay). This lack of cohesion and plasticity explains why the soil material has been logged in terms of *relative density* (i.e. loose, medium dense, etc.) rather than in terms of *consistency* (i.e. soft, firm, etc.) even when the main soil constituent has been SILT.

The permeability of the tidal flat deposits can be estimated from the results of particle size analyses and linear shrinkage tests as well as the descriptions in the trial pit logs. These would indicate permeabilities of about 10^{-5} to 10^{-7} m/s.

CBR tests were carried out on remoulded specimens formed from samples of the shallow tidal flat deposits. The results of these tests revealed CBR values of between 0.5% and 4.1%, as summarised below (in Table 3) and detailed later (in Appendix C).

Table 3: Summary of CBR test results					
Location:		TP1	TP5	TP2	SA2
Sample depth (m bgl):		0.6-0.9	0.5-0.9	0.6-0.9	0.55-0.95
CBR (%)	Top	0.5	1.1	0.8	0.8
	Bottom	2.2	4.1	1.2	0.5
Moisture content (%)	Top	24	25	24	26
	Bottom	23	23	25	25

The relative density of the encountered tidal flat deposits was found to typically vary between *loose* and *medium dense* (as per BS5930 terminology). The results of dynamic probe testing using a Mackintosh probe revealed values ranging between 16 and 164 blows per 300mm, as shown later in dynamic probe test result sheets (in Appendix B). Most probing values ranged between 30 and 80 blows per 300mm, which corresponds to a *medium dense* soil based on rule-of-thumb correlations. These findings are given credibility by previous BGS borehole records that have reported the local tidal flat deposits to be *loose* or *medium dense* at shallow depth (e.g. at 1.5m to 3.1m bgl) based on SPTs, as discussed previously (in Section 2).

Although the tidal flat deposits have only been revealed in the trial pits to a maximum depth of 2.1m bgl, it is inferred that tidal flat deposits are present to at least the full depth of probe exploration (3.5m bgl). This is based on the probing results, which indicate reasonably high blow counts, as shown later (in Appendix B), and the anticipated geology, as discussed previously (in Section 2).

The sides of the trial pits (TP1 – TP5) remained stable until excavations reached depths of about 1.6m to 2.0m bgl, as indicated in the logs (in Appendix B) and as shown in the trial pit photos (in Appendix A). Stability until such depths is consistent with a granular soil material that is *loose* to *medium dense* in relative density.

At shallow depths (up to 1.0m bgl), relative density was assessed by digging the sides and base of the trial pit with a hand trowel. The sands at this depth were judged to be *loose* or *loose to medium dense*.

The drained (or effective) angle of friction (ϕ') of the tidal flat deposits can be assessed from the relative density and the soil descriptions. Thus, the ϕ' value of the loose to

medium dense sandy silt (or silty sand) could range from about 29 to 40 degrees. A cautious estimate or characteristic value could be about 30 degrees.

The characteristic weight density, γ_k , (or unit weight) of the sands can also be assessed from the relative density. Thus, the γ_k of the loose or medium dense sandy/silty soil should be between about 14kN/m³ and 19kN/m³ (above the groundwater table) and between about 16kN/m³ and 21kN/m³ (below the water table), e.g. Bond (2001).

4.5 Groundwater observations

Groundwater was consistently encountered as medium ingresses in all five of the deeper trial pits (TP1 – TP5) at depths of about 1.7m to 1.9m bgl. Given the relatively cohesionless nature of the soil, this could represent the position of the groundwater table, although this position may vary, for instance, with weather changes.

4.6 Percolation tests

Percolation (i.e. soakaway) tests were undertaken within SA1, SA2 and SA3. These three pits were all excavated to shallow depths of about 1.1m to 1.4m bgl. The dimensions of the pits are as shown below (in Table 4). Water was quickly poured into the pit (to depths of 0.62m to 0.99m bgl) and the water level monitored against time until a 75% reduction in water level had been achieved. After this period, more water was added and the monitoring repeated.

Table 4: Dimensions of soakaway pits (SA1 – SA3)							
Determination:				1	2	1	2
Soakaway	Depth to base (m bgl)	Width (m)	Length (m)	Initial water level (m bgl)		Calculated soil infiltration rate (m/s x 10 ⁻⁶)	
SA1	1.2	0.67	1.7	0.80	0.99	3.0	2.5
SA2	1.4	0.33	1.7	0.64	0.99	3.9	3.0
SA3	1.1	0.33	2.0	0.62	0.64	3.1	2.2

The results of the test have been used to calculate a soil infiltration rate, as outlined in BRE Digest No. 365 (Garvin, 2016). The results range from about 2.2 x 10⁻⁶m/s to 3.9 x 10⁻⁶m/s, which are reasonably typical for a very silty fine sand (or sandy silt).

4.7 Geochemical properties

The results of soil organic matter, pH and sulphate testing are presented later (in Appendix C). These can be used to determine the aggressiveness of the ground conditions to buried concrete (discussed later).

5 Engineering Issues

5.1 Foundations

It is anticipated that the tidal flat deposits found on site should provide a suitable bearing stratum for the proposed low-rise buildings. In the loose to medium dense silty sands (or cohesionless sandy silts) allowable bearing pressures of at least 60kPa should be available to traditional shallow foundations (e.g. strip, pad or shallow trench fill footings). For example, it is calculated that no more than 25mm settlement should occur for 1.0m wide footings loaded to 75kPa at 0.5m bgl.

All foundations should be designed by a competent engineer with consideration to all factors and the information within this report.

5.2 Buried concrete

The results of two number sulphate (SO_4) and pH tests (included in Appendix C) provide information relevant to the durability of buried concrete within the ground conditions at the site. The buried concrete should be designed in accordance with BRE (2005) guidance using these results.

The results revealed low quantities of water-soluble sulphate of <0.05g/l, as shown below (in Table 5), with pH levels of between 8.5 and 8.8. Therefore, the classification for buried concrete should be DS-1 and AC-1s, based on BRE (2005).

Table 5: Soil sulphate content						
Stratum	Sampling location	Sample ref.	Depth (m bgl)	Water-soluble sulfate (mg/l)	Acid-soluble sulfate (%)	pH
Tidal flat deposits	TP5	S/48687	0.5-0.9	<50	0.01	8.8
	SA2	S/48692	1.1-1.25	<50	0.02	8.6
	SA1	S/48693	0.55-0.95	<50	0.02	8.5

5.4 Excavations and groundwater control

Conventional earth moving plant should be able to readily excavate the ground material on site. Based on the observations of the eight trial pits, shallow excavations (e.g. to 1.0m bgl) could retain steep sides for at least several hours.

Although the position of the groundwater table is subject to (seasonal) variations, the trial pit results suggest that the groundwater table might be present around depths of about 1.7m to 1.9m bgl. Therefore, excavations to shallower depths could remain free of groundwater ingress.

5.5 Soakaway design

From the results of the percolation testing in the three trial pits used for soakaway tests (SA1 – SA3), the soil infiltration rate in the tidal flat deposits at depths of around 0.7m to 1.3m bgl is expected to be about 2.2×10^{-6} m/s to 3.9×10^{-6} m/s.

5.6 Radon

Desk study information indicates that the site is not in an area that may be affected by radon. Therefore, radon protection measures are not required.

5.7 Gas protection measures

The results of desk study information and intrusive investigation works indicate there is no potentially significant source of hazardous ground gas at the site. A CIRIA C665 (see Card et al., 2007) classification of CS-1 or an NHBC traffic light classification (see Boyle and Witherington, 2007) of Green should be appropriate. Therefore, no special protection measures for hazardous ground gases should be required at the site, as detailed in BS8485 (2015).

5.8 Pavement design

Pavement design should consider the results of CBR testing, which, as mentioned, gave CBR values ranging between 0.5% and 4.1%, as shown above (in Table 3) and detailed later (in Appendix C). For road adoption, the design and construction should comply with the requirements of the relevant local authority.

6 Summary and Conclusions

6.1 Ground conditions

The findings of the investigation indicate the following general sequence of sub-strata at the site (in descending order).

- TOPSOIL: dark brown silty fine SAND *[to a depth of about 0.3m bgl]*
- TIDAL FLAT DEPOSITS: Loose to medium dense (becoming medium dense locally dense) brown very silty SAND (or sandy SILT) *[to depths of at least 3.5m bgl]*

The groundwater table is anticipated at depths of about 1.7m to 1.9m bgl.

6.2 Geotechnical properties

The geotechnical properties of the tidal flat deposits are summarised below (in Table 6). These are based on engineering evaluations and estimations and the results of testing, as described previously.

Table 6: Geotechnical properties of tidal flat deposits							
Depth (m bgl)	Relative density	Density index, I_D (%)	Unit weight (kN/m ³)		Angle of friction ϕ (°)		CBR %
			Below GW table	Above GW table	Range	Cautious estimate	
0.3 – 2.0	Loose (or/to) medium dense	15 - 65	16 - 21	14 – 19	28 - 35	30	-
0.5 – 0.95							0.5 – 4.1

6.3 Foundations

It is anticipated that the tidal flat deposits found on site should provide a suitable bearing stratum for the proposed low-rise buildings. In the loose to medium dense silty sands (or cohesionless sandy silts) allowable bearing pressures of at least 60kPa should be available to traditional shallow foundations (e.g. strip, pad or shallow trench fill footings). For example, it is calculated that no more than 25mm settlement should occur for 1.0m wide footings loaded to 75kPa at 0.5m bgl.

All foundations should be designed by a competent engineer with consideration to all factors and the information within this report.

6.4 Buried concrete

Test results indicate a BRE (2005) buried concrete specification for the site should be DS-1 with AC-1s.

6.5 Excavations and groundwater

Conventional earth moving plant should be able to readily excavate the ground material on site. Shallow excavations (e.g. to 1.0m bgl) could retain steep sides for at least several hours.

Although the position of the groundwater table is subject to (seasonal) variations, the groundwater table might be present around depths of about 1.7m to 1.9m bgl. Therefore, excavations to shallower depths could remain free of groundwater ingress.

6.6 Soakaway design

From the results of the percolation testing in the three trial pits used for soakaway tests (SA1 – SA3), the soil infiltration rate in the tidal flat deposits at depths of around 0.7m to 1.3m bgl is expected to be about 2.2×10^{-6} m/s to 3.9×10^{-6} m/s.

6.7 Radon and gas protection measures

The should not be affected by Radon. No Radon protection is required.

No potentially significant source of hazardous ground gas has been identified. Therefore, a CIRIA C665 classification (see Card *et al.*, 2007) of CS-1 or an NHBC traffic light classification (see Boyle and Witherington, 2007) of Green should be appropriate. Accordingly, no special protection measures for hazardous ground gases should be required at the site, as detailed in BS8485 (2015).

6.8 Pavement design

The results of CBR testing gave CBR values ranging between 0.5% and 4.1%, as shown above (in Table 3) and detailed later (in Appendix C). These results should inform the road pavement design.

6.9 Contamination assessment

As anticipated in the Phase 1 report, no visual and olfactory evidence of soil contamination was reported. No made ground or anthropogenic material was reported. Accordingly, no geochemical contamination testing was scheduled.

Nevertheless, any unforeseen contamination encountered during the development of the site should be reported to the local authority. Work should be halted in that area and the contamination investigated/assessed to the satisfaction of the local authority.

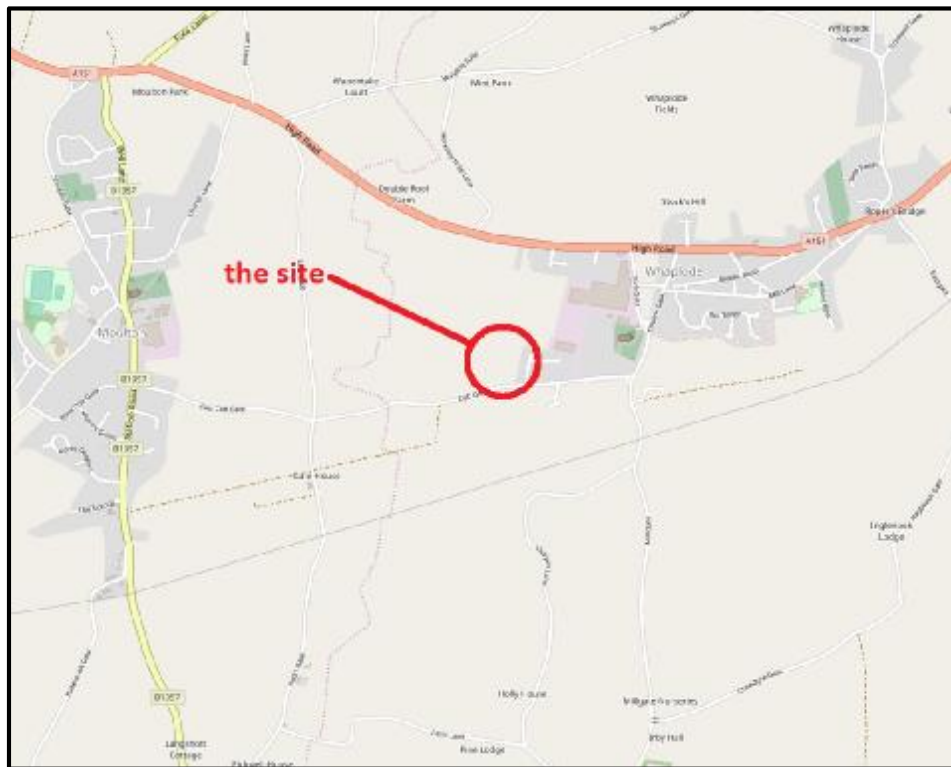
R M Lester MEng MSc

M J Green IEng FIHIE

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Appendix A



Site location



Aerial view of site (north is up page)



SITE PLAN - BOREHOLE / TRIAL PIT LOCATIONS



Humberside Materials Laboratory Ltd
Atherton Way, Brigg
North Lincs, DN20 8AR
Tel Fax 01652 652753

CLIENT :- Alan Finch of MLP

SITE :- Cob Gate, Whaplode



East side of the site (view towards north)



Centre of site (view towards northwest)



South part of site (view towards west)



Pumping station near to southeast corner of site (view towards east)



SA1 (view towards south)



Inside of TP2



Inside of TP3



Inside of TP3



Location of TP4 (view towards south)

Appendix B



HUMBERSIDE MATERIALS LABATORY Ltd.

Atherton Way, Brigg
North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

TRIAL PIT LOG

Trial pit
No
TP1

Client :- Alan Finch of MLP
Site :- Cob Gate, Whaplode
Project No :- 4540

Location :- see site plan
Date :- 18-May-18

Coordinates E: 531898 N: 323939
Elevation :-
Excavated by :- 360 backacter

Depth (m)	Lithology / Description / (thickness) / Depth	Elevation	Samples	Water level	Notes
0	Brown silty fine SAND (TOPSOIL) (0.3)	0			
0.2		0.2	1	D	
0.3		0.3			
0.4	Brown sandy SILT. Sand is fine. Assessed as loose using hand trowel. (TIDAL FLAT DEPOSITS) (0.65)	0.4			
0.6		0.6			
0.8		0.8	2	D	
0.95		0.95			
1	Medium dense brown very silty fine SAND. (TIDAL FLAT DEPOSITS) (1.05)	1	3	D	
1.2		1.2			
1.4		1.4			
1.6		1.6			
1.8		1.8			
2		2	4	D	
2.2		2.2			
2.4		2.4			
2.6		2.6			
2.8		2.8			
3		3			
3.2		3.2			
3.4		3.4			
3.6		3.6			
3.8		3.8			

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :- Sides became unstable at about 1.6m - 2.0m bgl

File Ref :- 1059 / 4540

Logged by :- R Lester



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TRIAL PIT LOG

Trial pit
No
TP2

Client :- Alan Finch of MLP
Site :- Cob Gate, Whaplode
Project No :- 1.6m

Location :- see site plan
Date :- at

Coordinates E: 531987 N: 323922
Elevation :-
Excavated by :- became

Depth (m)	Lithology / Description / (thickness) / Depth	Elevation	Samples	Water level	Notes
0	Brown silty fine SAND (TOPSOIL) (0.3)	0			
0.2		0.2			
0.3		0.3			
0.4	Brown very silty fine SAND. Assessed as loose using hand trowel. (TIDAL FLAT DEPOSITS) (0.8)	0.4			
0.6		0.6			
0.8		0.8	1	D	
1		1			
1.1	Loose to medium dense very silty fine SAND. (TIDAL FLAT DEPOSITS) (1.1)	1.1			
1.2		1.2			
1.4		1.4			
1.6		1.6			
1.8		1.8			
2		2			
2.1		2.1			
2.2		2.2			
2.4		2.4			
2.6		2.6			
2.8		2.8			
3		3			
3.2		3.2			
3.4		3.4			
3.6		3.6			
3.8		3.8			

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :- Sides became unstable at about 1.6m - 2.0m bgl

File Ref :- about / 1.6m
Logged by :- unstable



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TRIAL PIT LOG

Trial pit
No
TP3

Client :- Alan Finch of MLP
Site :- Cob Gate, Whaplode
Project No :- 4540

Location :- see site plan
Date :- 18-May-18

Coordinates E: 532013 N: 324075
Elevation :-
Excavated by :- 360 backacter

Depth (m)	Lithology / Description / (thickness) / Depth	Elevation	Samples	Water level	Notes
0	Brown silty fine SAND (TOPSOIL)	(0.3)			
0.2		0.3	1	D	
0.4	Brown very silty fine SAND. Assessed as loose using hand trowel. (TIDAL FLAT DEPOSITS)	(0.7)			
0.6					
0.8					
1		1			
1.2	Loose to medium dense brown very silty fine SAND. (TIDAL FLAT DEPOSITS)	(1)			
1.4					
1.6					
1.8			2	D	medium ingress
2		2			
2.2					
2.4					
2.6					
2.8					
3					
3.2					
3.4					
3.6					
3.8					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :- Sides became unstable at about 1.6m - 2.0m bgl

File Ref :- 1059 / 4540

Logged by :- R Lester



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TRIAL PIT LOG

**Trial pit
No
TP4**

Client :- Alan Finch of MLP
Site :- Cob Gate, Whaplode
Project No :- 4540

Location :- see site plan
Date :- 18-May-18

Coordinates E: 531939 N: 324088
Elevation :-
Excavated by :- 360 backacter

Depth (m)	Lithology / Description / (thickness) / Depth	Elevation	Samples	Water level	Notes
0	Brown silty fine SAND (TOPSOIL)	(0.3)			
0.2		0.3			
0.4	Brown very silty fine SAND. Assessed as loose using hand trowel. (TIDAL FLAT DEPOSITS)	(0.7)			
0.6					
0.8					
1	Medium dense brown very silty fine SAND. Becoming loose at 1.8m bgl. (TIDAL FLAT DEPOSITS)	1 (1)			
1.2					
1.4					
1.6					
1.8					
2		2.1			
2.2					
2.4					
2.6					
2.8					
3					
3.2					
3.4					
3.6					
3.8					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :- Sides became unstable at about 1.6m - 2.0m bgl

File Ref :- 1059 / 4540

Logged by :- R Lester



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TRIAL PIT LOG

Trial pit
No
TP5

Client :- Alan Finch of MLP
Site :- Cob Gate, Whaplode
Project No :- 4540

Location :- see site plan
Date :- 18-May-18

Coordinates E: 531968 N: 324002
Elevation :-
Excavated by :- 360 backacter

Depth (m)	Lithology / Description / (thickness) / Depth	Elevation	Samples	Water level	Notes
0	Brown silty fine SAND (TOPSOIL)	(0.3)			
0.2		0.3			
0.4	Brown very silty fine SAND. Becoming medium dense below 1.0m bgl and loose below 1.8m bgl. Assessed as loose down to 1.0m bgl using hand trowel. (TIDAL FLAT DEPOSITS)	(0.7)			
0.6			1	D	
0.8					
1	Medium dense brown very silty fine SAND. Becoming loose at 1.8m bgl. (TIDAL FLAT DEPOSITS)	1 (1)			
1.2					
1.4					
1.6					
1.8					medium ingress
2		2			
2.2					
2.4					
2.6					
2.8					
3					
3.2					
3.4					
3.6					
3.8					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :- Sides became unstable at about 1.6m - 2.0m bgl

File Ref :- 1059 / 4540

Logged by :- R Lester



HUMBERSIDE MATERIALS LABATORY Ltd.

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TRIAL PIT LOG

Trial pit
No
SA1

Client :- Alan Finch of MLP
Site :- Cob Gate, Whaplode
Project No :- 4540

Location :- see site plan
Date :- 18-May-18

Coordinates E: 531978 N: 323939
Elevation :-
Excavated by :- 360 backacter

Depth (m)	Lithology / Description / (thickness) / Depth	Elevation	Samples	Water level	Notes
0	Brown silty fine SAND (TOPSOIL) (0.3)	0			
0.2		0.2			
0.3		0.3			
0.4	Brown very silty fine SAND. Assessed as loose to medium dense using hand trowel. (TIDAL FLAT DEPOSITS) (0.9)	0.4			
0.6		0.6			
0.8		0.8	1	D	
1		1			
1.2		1.2			
1.4		1.4			
1.6		1.6			
1.8		1.8			
2		2			
2.2		2.2			
2.4		2.4			
2.6		2.6			
2.8		2.8			
3		3			
3.2		3.2			
3.4		3.4			
3.6		3.6			
3.8		3.8			

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1059 / 4540

Logged by :- R Lester



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TRIAL PIT LOG

Trial pit
No
SA2

Client :- Alan Finch of MLP
Site :- Cob Gate, Whaplode
Project No :- 4540

Location :- see site plan
Date :- 18-May-18

Coordinates E: 531941 N: 324055
Elevation :-
Excavated by :- 360 backacter

Depth (m)	Lithology / Description / (thickness) / Depth	Elevation	Samples	Water level	Notes
0	Brown silty fine SAND (TOPSOIL) (0.3)	0			
0.2		0.2			
0.3		0.3			
0.4	Brown sandy SILT. Assessed as loose to medium dense using hand trowel. (TIDAL FLAT DEPOSITS) (1.1)	0.4			
0.6		0.6			
0.8		0.8	1	D	
1		1			
1.2		1.2	2	D	
1.4		1.4			
1.6		1.6			
1.8		1.8			
2		2			
2.2		2.2			
2.4		2.4			
2.6		2.6			
2.8		2.8			
3		3			
3.2		3.2			
3.4		3.4			
3.6		3.6			
3.8		3.8			

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1059 / 4540

Logged by :- R Lester



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TRIAL PIT LOG

**Trial pit
No
SA3**

Client :- Alan Finch of MLP
Site :- Cob Gate, Whaplode
Project No :- 4540

Location :- see site plan
Date :- 18-May-18

Coordinates E: 531906 N: 323981
Elevation :-
Excavated by :- 360 backacter

Depth (m)	Lithology / Description / (thickness) / Depth	Elevation	Samples	Water level	Notes
0	Brown silty fine SAND (TOPSOIL)	(0.3)			
0.2		0.3	1	D	
0.4	Brown very silty fine SAND. Assessed as loose to medium dense using hand trowel. (TIDAL FLAT DEPOSITS)	(0.8)			
0.6					
0.8					
1		1.1			
1.2					
1.4					
1.6					
1.8					
2					
2.2					
2.4					
2.6					
2.8					
3					
3.2					
3.4					
3.6					
3.8					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1059 / 4540

Logged by :- R Lester

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DYNAMIC PROBE TESTING

Sample Ref S/48691/02

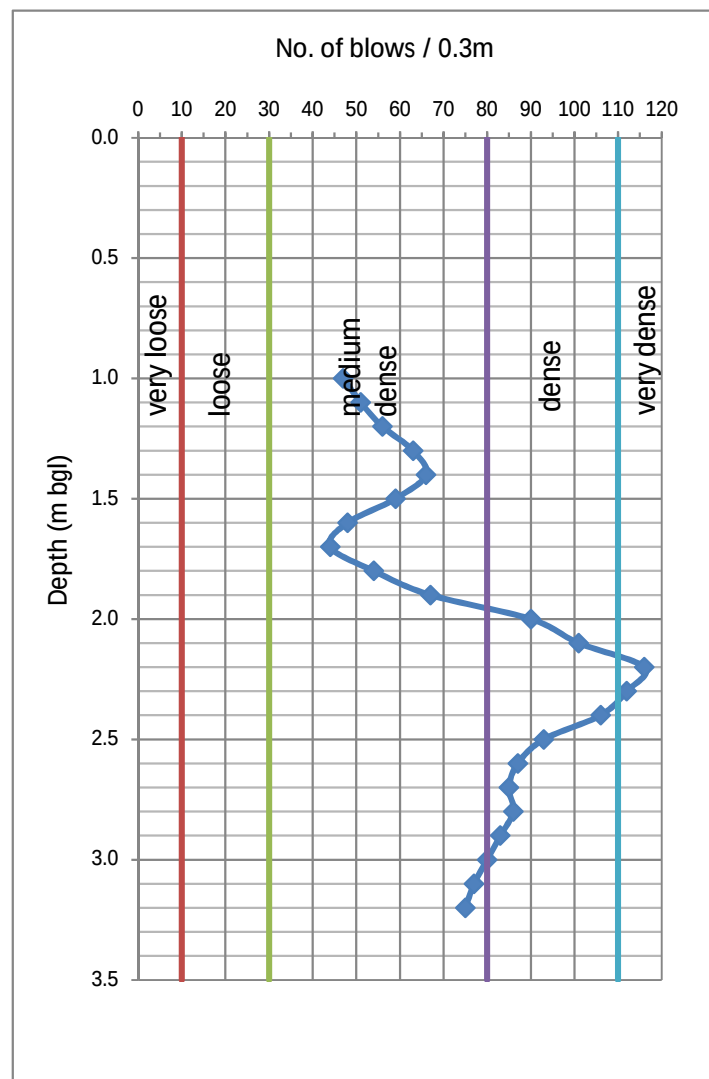
Client Alan Finch of MLP

Site Cobgate, Whaplode
Location TP1
Date Tested 10/05/2018
Tested by R Lester

Dynamic Probing results

Method - Mackintosh probe

Start depth (m bgl)	No. of blows (/0.1m)	No. of blows (/0.3m)
1.0	14	47
1.1	17	51
1.2	16	56
1.3	18	63
1.4	22	66
1.5	23	59
1.6	21	48
1.7	15	44
1.8	12	54
1.9	17	67
2.0	25	90
2.1	25	101
2.2	40	116
2.3	36	112
2.4	40	106
2.5	36	93
2.6	30	87
2.7	27	85
2.8	30	86
2.9	28	83
3.0	28	80
3.1	27	77
3.2	25	75
3.3	25	
3.4	25	



Note: relative densities are based on rule-of-thumb correlations

File ref: 1059/4540/P

Signed M.J. Green C. Driver
Director

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DYNAMIC PROBE TESTING

Sample Ref S/48691/03

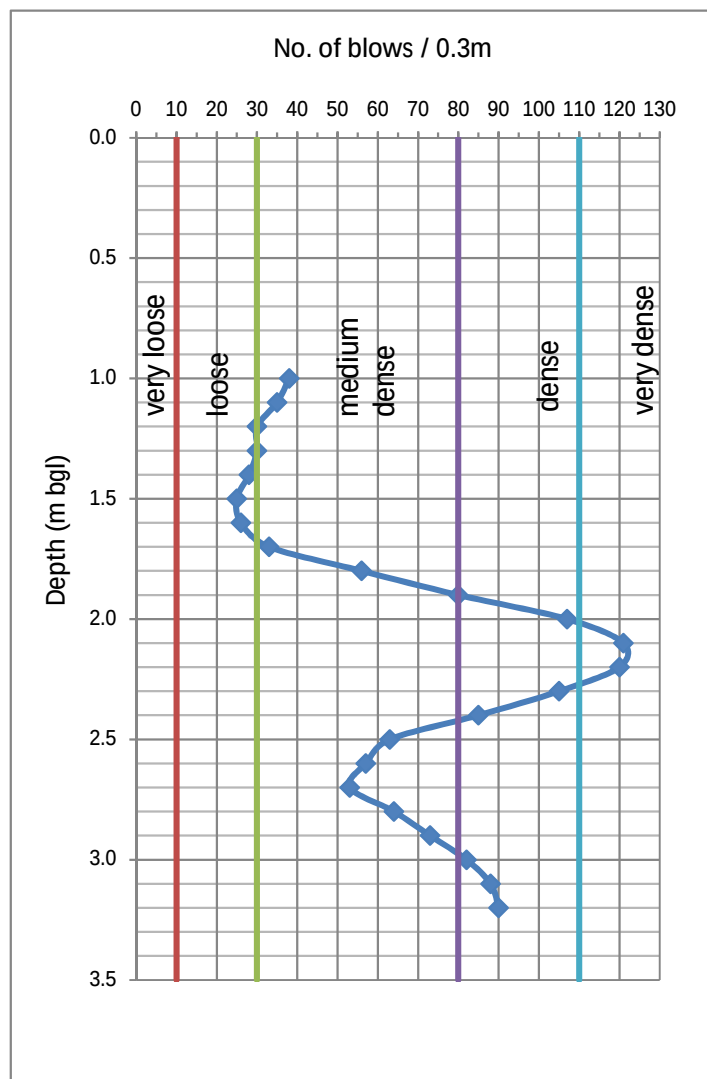
Client Alan Finch of MLP

Site Cobgate, Whaplode
Location TP2
Date Tested 10/05/2018
Tested by R Lester

Dynamic Probing results

Method - Mackintosh probe

Start depth (m bgl)	No. of blows (/0.1m)	No. of blows (/0.3m)
1.0	13	38
1.1	15	35
1.2	10	30
1.3	10	30
1.4	10	28
1.5	10	25
1.6	8	26
1.7	7	33
1.8	11	56
1.9	15	80
2.0	30	107
2.1	35	121
2.2	42	120
2.3	44	105
2.4	34	85
2.5	27	63
2.6	24	57
2.7	12	53
2.8	21	64
2.9	20	73
3.0	23	82
3.1	30	88
3.2	29	90
3.3	29	
3.4	32	



Note: relative densities are based on rule-of-thumb correlations

File ref: 1059/4540/P

Signed M.J. Green C. Driver
Director

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DYNAMIC PROBE TESTING

Sample Ref S/48691/04

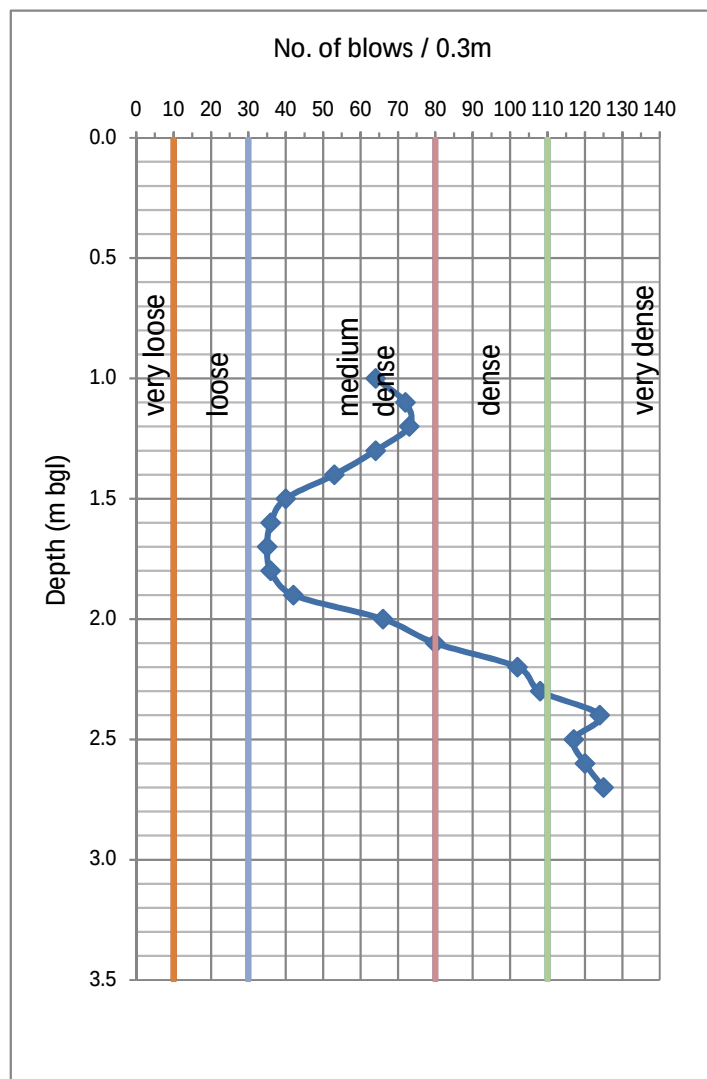
Client Alan Finch of MLP

Site Cobgate, Whaplode
Location TP3
Date Tested 10/05/2018
Tested by R Lester

Dynamic Probing results

Method - Mackintosh probe

Start depth (m bgl)	No. of blows (/0.1m)	No. of blows (/0.3m)
1.0	16	64
1.1	23	72
1.2	25	73
1.3	24	64
1.4	24	53
1.5	16	40
1.6	13	36
1.7	11	35
1.8	12	36
1.9	12	42
2.0	12	66
2.1	18	80
2.2	36	102
2.3	26	108
2.4	40	124
2.5	42	117
2.6	42	120
2.7	33	125
2.8	45	
2.9	47	



Note: relative densities are based on rule-of-thumb correlations

File ref: 1059/4540/P

Signed M.J. Green C. Driver
Director

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DYNAMIC PROBE TESTING

Sample Ref S/48691/05

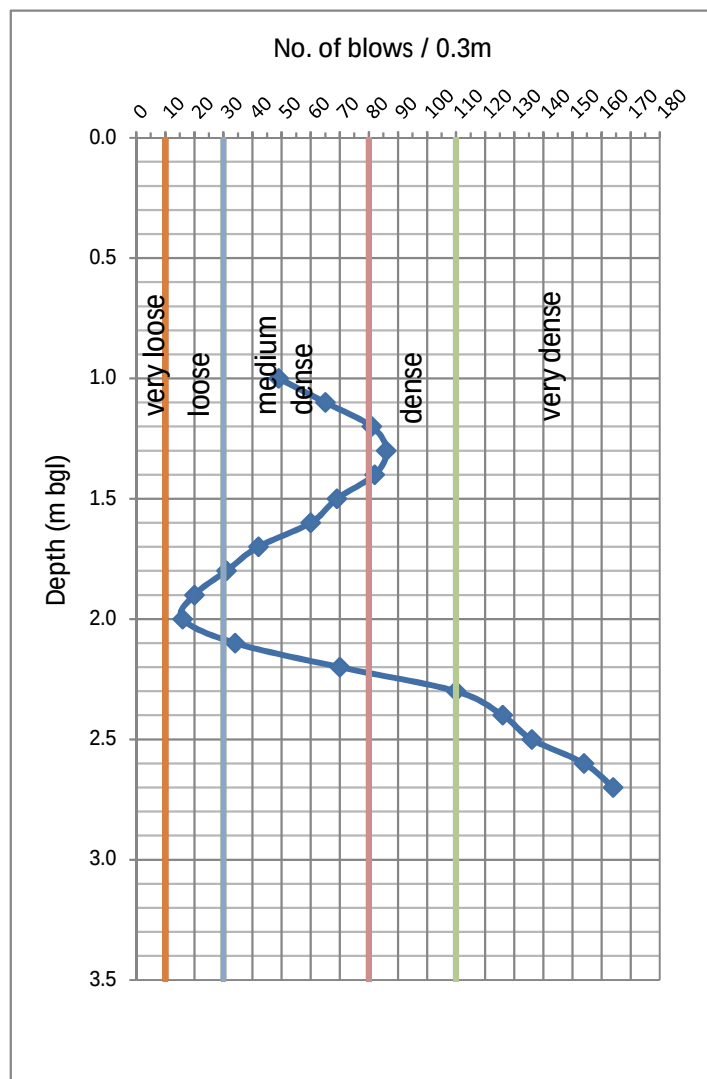
Client Alan Finch of MLP

Site Cobgate, Whaplode
Location TP4
Date Tested 10/05/2018
Tested by R Lester

Dynamic Probing results

Method - Mackintosh probe

Start depth (m bgl)	No. of blows (/0.1m)	No. of blows (/0.3m)
1.0	14	49
1.1	14	65
1.2	21	81
1.3	30	86
1.4	30	82
1.5	26	69
1.6	26	60
1.7	17	42
1.8	17	31
1.9	8	20
2.0	6	16
2.1	6	34
2.2	4	70
2.3	24	110
2.4	42	126
2.5	44	136
2.6	40	154
2.7	52	164
2.8	62	
2.9	50	



Note: relative densities are based on rule-of-thumb correlations

File ref: 1059/4540/P

Signed M.J. Green C. Driver
Director

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DYNAMIC PROBE TESTING

Sample Ref S/48691/06

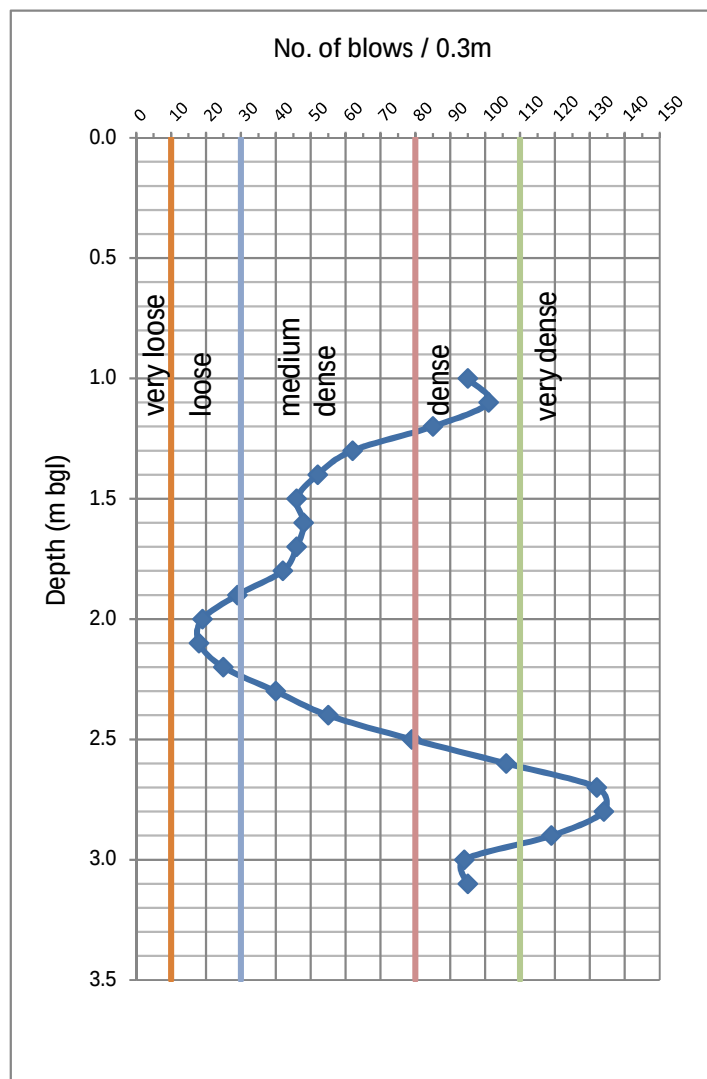
Client Alan Finch of MLP

Site Cobgate, Whaplode
Location TP5
Date Tested 10/05/2018
Tested by R Lester

Dynamic Probing results

Method - Mackintosh probe

Start depth (m bgl)	No. of blows (/0.1m)	No. of blows (/0.3m)
1.0	21	95
1.1	35	101
1.2	39	85
1.3	27	62
1.4	19	52
1.5	16	46
1.6	17	48
1.7	13	46
1.8	18	42
1.9	15	29
2.0	9	19
2.1	5	18
2.2	5	25
2.3	8	40
2.4	12	55
2.5	20	79
2.6	23	106
2.7	36	132
2.8	47	134
2.9	49	119
3.0	38	94
3.1	32	95
3.2	24	
3.3	39	



Note: relative densities are based on rule-of-thumb correlations

File ref: 1059/4540/P

Signed M.J. Green C. Driver
Director

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DYNAMIC PROBE TESTING

Sample Ref S/48693/02

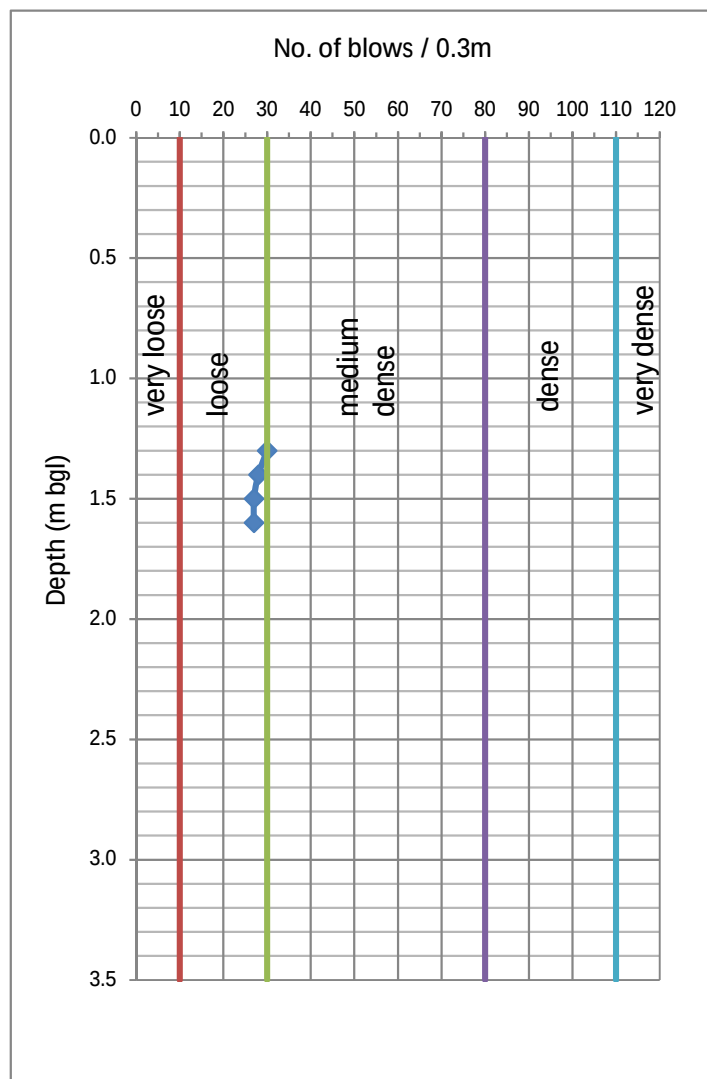
Client Alan Finch of MLP

Site Cobgate, Whaplode
Location SA1
Date Tested 10/05/2018
Tested by R Lester

Dynamic Probing results

Method - Mackintosh probe

Start depth (m bgl)	No. of blows (/0.1m)	No. of blows (/0.3m)
1.3	11	30
1.4	10	28
1.5	9	27
1.6	9	27
1.7	9	
1.8	9	



Note: relative densities are based on rule-of-thumb correlations

File ref: 1059/4540/P

Signed M.J. Green C. Driver
Director

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DYNAMIC PROBE TESTING

Sample Ref S/48693/03

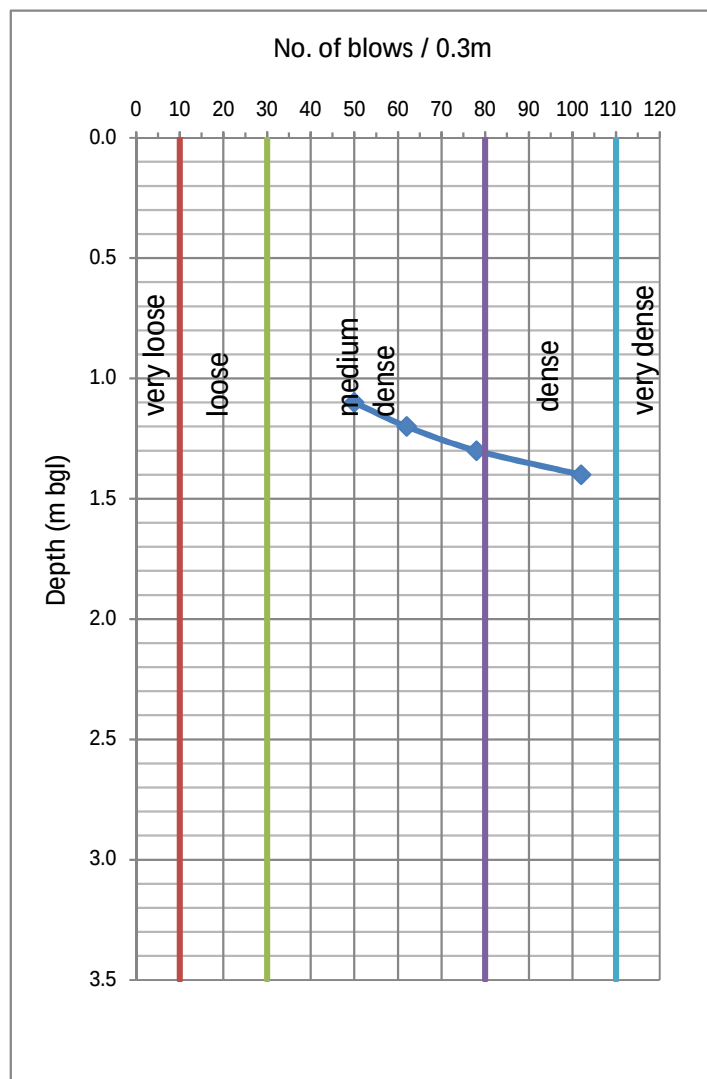
Client Alan Finch of MLP

Site Cobgate, Whaplode
Location SA3
Date Tested 10/05/2018
Tested by R Lester

Dynamic Probing results

Method - Mackintosh probe

Start depth (m bgl)	No. of blows (/0.1m)	No. of blows (/0.3m)
1.1	14	50
1.2	15	62
1.3	21	78
1.4	26	102
1.5	31	
1.6	45	



Note: relative densities are based on rule-of-thumb correlations

File ref: 1059/4540/P

Signed M.J. Green C. Driver
Director

Appendix C



Humberside Materials Laboratory

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North Lincolnshire, DN20 8AR

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DETERMINATION OF CALIFORNIA BEARING RATIO

Sheet 1 of 1

Sample Ref S/48685/01

Client

Finch

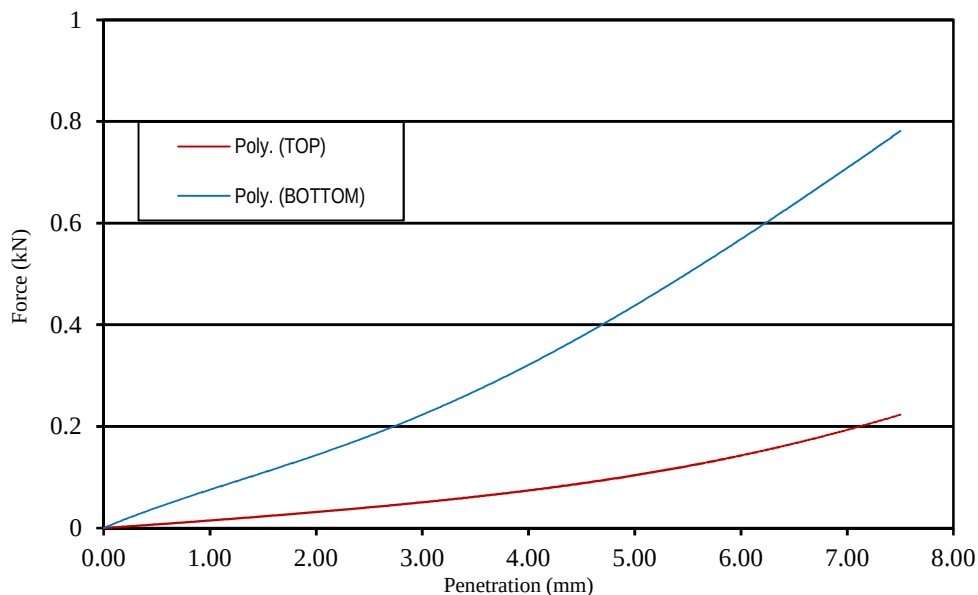
Site	Cob Gate, Whaplode		
Location	TP 1-2		
Date/Time sampled	10/05/2018	TP/BH	TP 1
Client sample No	2	Depth (m)	0.60-0.90
Sampled by	CD/RL	Sample Type	bulk

Determination of California Bearing Ratio

Test method BS 1377 Part 4 1990

Description Orange/Brown silty fine SAND with very occasional rootlets.

Compaction method	2.5kg rammer				
Surcharge wt.	12kg		Top	Bottom	Mean
Bulk density	1.86 Mg/m ³	Moisture (%)	24	23	
Dry density	1.51 Mg/m ³	C.B.R. (%)	0.5	2.2	



Comments

Percentage retained 20mm removed 0
Sample tested in unsoaked condition

File ref 1059/4540

Date tested 22/05/2018

Date reported 24/05/2018

Signed M.J. Green C. Driver
Director

Certificate of sampling when submitted is retained by the Laboratory and available upon request

Samples will normally be kept for 14 days from the date reported



Humberside Materials Laboratory

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DETERMINATION OF CALIFORNIA BEARING RATIO

Sheet 1 of 1

Sample Ref S/48687/01

Client

Finch

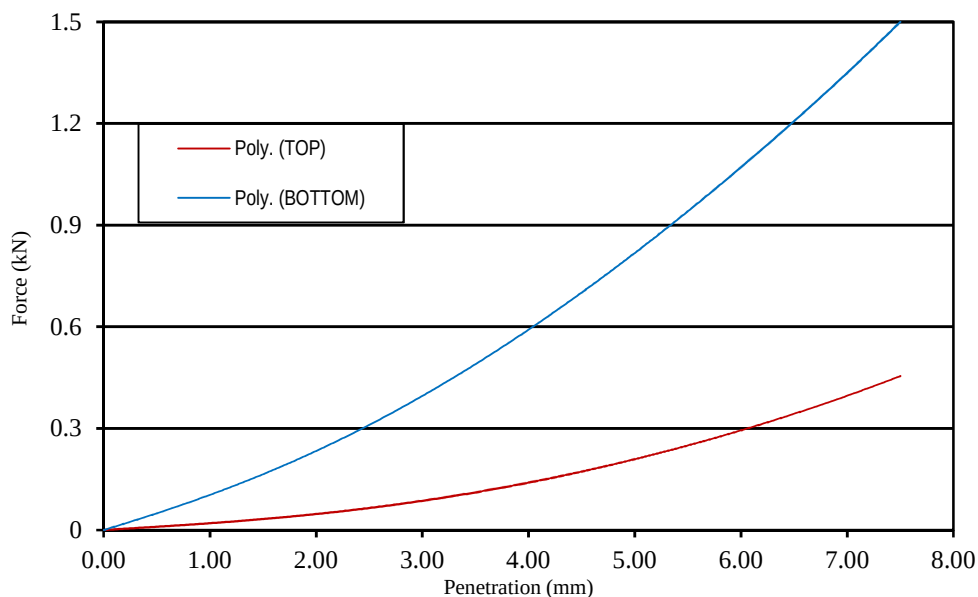
Site	Cob Gate, Whaplode		
Location	TP 5-1		
Date/Time sampled	10/05/2018	TP/BH	TP 5
Client sample No	1	Depth (m)	0.5-0.9
Sampled by	CD/RL	Sample Type	bulk

Determination of California Bearing Ratio

Test method BS 1377 Part 4 1990

Description Orange/Brown silty fine SAND.

Compaction method	2.5kg rammer				
Surcharge wt.	12kg		Top	Bottom	Mean
Bulk density	1.86 Mg/m ³	Moisture (%)	25	23	
Dry density	1.50 Mg/m ³	C.B.R. (%)	1.1	4.1	



Comments

Percentage retained 20mm removed 0
Sample tested in unsoaked condition

File ref 1059/4540

Date tested 22/05/2018

Date reported 24/05/2018

Signed M.J. Green C. Driver
Director

Certificate of sampling when submitted is retained by the Laboratory and available upon request

Samples will normally be kept for 14 days from the date reported



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North Lincolnshire, DN20 8AR

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DETERMINATION OF CALIFORNIA BEARING RATIO

Sheet 1 of 1

Sample Ref S/48686/01

Client

Finch

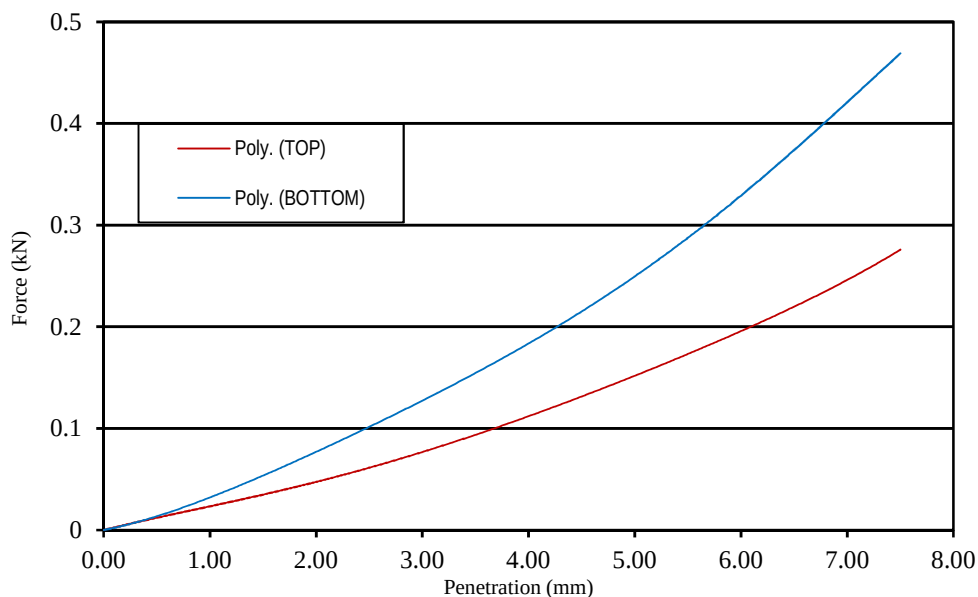
Site	Cob Gate, Whaplode		
Location	TP 2-1		
Date/Time sampled	10/05/2018	TP/BH	TP 2-1
Client sample No	1	Depth (m)	0.60-0.90
Sampled by	CD/RL	Sample Type	bulk

Determination of California Bearing Ratio

Test method BS 1377 Part 4 1990

Description Orange/Brown silty fine SAND with very occasional fine gravel.

Compaction method	2.5kg rammer				
Surcharge wt.	12kg		Top	Bottom	Mean
Bulk density	1.89 Mg/m ³	Moisture (%)	24	25	
Dry density	1.52 Mg/m ³	C.B.R. (%)	0.8	1.2	



Comments

Percentage retained 20mm removed 0
Sample tested in unsoaked condition

File ref 1059/4540

Date tested 16/05/2018

Date reported 17/05/2018

Signed M.J. Green C. Driver
Director

Certificate of sampling when submitted is retained by the Laboratory and available upon request

Samples will normally be kept for 14 days from the date reported



Humberside Materials Laboratory

Atherton Way, Brigg
North Lincolnshire, DN20 8AR

Humbersidematerials lab.co.uk



DETERMINATION OF CALIFORNIA BEARING RATIO

Sheet 1 of 1

Sample Ref S/48688/01

Client

Finch

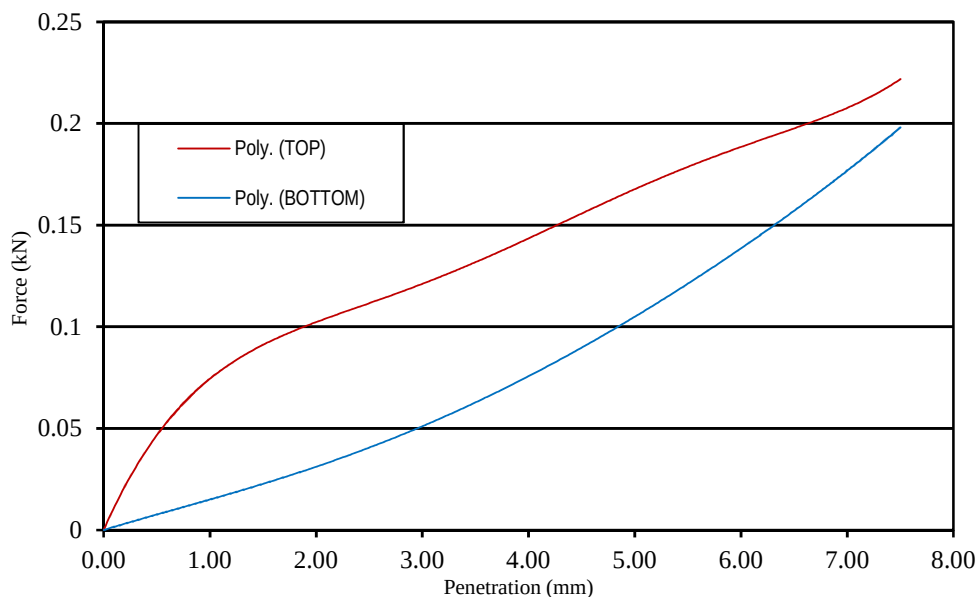
Site	Cob Gate, Whaplode		
Location	SA 2-1		
Date/Time sampled	10/05/2018	TP/BH	SA 2-1
Client sample No	1	Depth (m)	0.55-0.95
Sampled by	CD/RL	Sample Type	bulk

Determination of California Bearing Ratio

Test method BS 1377 Part 4 1990

Description Orange/Brown silty fine SAND

Compaction method	2.5kg rammer				
Surcharge wt.	12kg		Top	Bottom	Mean
Bulk density	1.87 Mg/m ³	Moisture (%)	26	25	
Dry density	1.49 Mg/m ³	C.B.R. (%)	0.8	0.5	



Comments

Percentage retained 20mm removed 0
Sample tested in unsoaked condition

File ref 1059/4540

Date tested 16/05/2018

Date reported 17/05/2018

Signed M.J. Green C. Driver
Director

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HUMBERSIDE MATERIALS LABORATORY LTD

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Page 1 of 1



Sample Ref S / 48691 / 01

Client Alan Finch

Site Cob Gate, Whaplode
Location TP 1-4
Material Soil / Sand Material

Supplier Not applicable

Date/Time sampled 10/05/18

Client sample No 4

Sampled by CD/RL

Delivery No

Sample point Trial pit

Determination of grading

Test method BS 1377 Part 2 1990

Wet Sieving method

Tested As recieved

Material Specification
Aggregate

n/a

Sieve Size mm	% Passing	Specification	Sieve Size mm	% Passing	Specification
125	100	0 0			0 0
90	100	0 0			0 0
63	100	0 0			0 0
40	100	0 0	1	100	0 0
31.5	100	0 0	0.5	100	0 0
20	100	0 0	0.25	100	0 0
16	100	0 0	0.125	98	0 0
8	100	0 0	0.063	36.8	0
4	100	0 0			
2	100	0 0			

Remarks

File ref 1059 / 4540 / P

Date Tested 14/05/18

Date reported 17/05/18

Date received 14/05/18

Signed :- M.J. Green C. Driver
Director

BS EN 933-1 1997 Test method includes sample reduction passing 20mm test sieve.

Certificate of sampling when submitted is retained by the Laboratory and available upon request

Samples will normally be kept for 14 days from the date reported

Appropriate methods and sieve sizes have been used where no instruction has been provided



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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Page 1 of 1



Sample Ref S / 48689 / 03

Client Alan Finch

Site Cob Gate, Whaplode
Location TP 3-2
Material Soil / Sand Material

Supplier Not applicable

Date/Time sampled 10/05/18

Client sample No 2

Sampled by CD/RL

Delivery No

Sample point Trial pit

Determination of grading

Test method BS 1377 Part 2 1990

Wet Sieving method

Tested As recieved

Material Specification
Aggregate

n/a

Sieve Size mm	% Passing	Specification	Sieve Size mm	% Passing	Specification
125	100	0 0			0 0
90	100	0 0			0 0
63	100	0 0			0 0
40	100	0 0	1	100	0 0
31.5	100	0 0	0.5	100	0 0
20	100	0 0	0.25	100	0 0
16	100	0 0	0.125	99	0 0
8	100	0 0	0.063	37.0	0
4	100	0 0			
2	100	0 0			

Remarks

File ref 1059 / 4540 / P

Date Tested 14/05/18

Date reported 17/05/18

Date received 14/05/18

Signed :- M.J. Green C. Driver
Director

BS EN 933-1 1997 Test method includes sample reduction passing 20mm test sieve.

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Page 1 of 1



Sample Ref s / 48692 / 03

Client Alan Finch

Site Cob Gate, Whaplode
Location SA 2-2
Material Soil / Sand Material

Supplier Not applicable

Date/Time sampled 10/05/18

Client sample No 2

Sampled by CD/RL

Delivery No

Sample point Trial pit

Determination of grading

Test method BS 1377 Part 2 1990

Wet Sieving method

Tested As recieved

Material Specification
Aggregate

n/a

Sieve Size mm	% Passing	Specification	Sieve Size mm	% Passing	Specification
125	100	0 0			0 0
90	100	0 0			0 0
63	100	0 0			0 0
40	100	0 0	1	100	0 0
31.5	100	0 0	0.5	100	0 0
20	100	0 0	0.25	100	0 0
16	100	0 0	0.125	99	0 0
8	100	0 0	0.063	43.9	0
4	100	0 0			
2	100	0 0			

Remarks

File ref 1059 / 4540 / P

Date Tested 14/05/18

Date reported 17/05/18

Date received 14/05/18

Signed :- M.J. Green C. Driver
Director

BS EN 933-1 1997 Test method includes sample reduction passing 20mm test sieve.

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Page 1 of 1



Sample Ref S / 48685 / 02

Client Alan Finch

Site Cob Gate, Whaplode
Location TP 1-2
Material Soil / Sand Material

Supplier Not applicable

Date/Time sampled 10/05/18

Client sample No 2

Sampled by CD/RL

Delivery No

Sample point Trial pit

Determination of grading

Test method BS 1377 Part 2 1990

Wet Sieving method

Tested As recieved

Material Specification
Aggregate

n/a

Sieve Size mm	% Passing	Specification	Sieve Size mm	% Passing	Specification
125	100	0 0			0 0
90	100	0 0			0 0
63	100	0 0			0 0
40	100	0 0	1	100	0 0
31.5	100	0 0	0.5	100	0 0
20	100	0 0	0.25	100	0 0
16	100	0 0	0.125	99	0 0
8	100	0 0	0.063	52.6	0
4	100	0 0			
2	100	0 0			

Remarks

File ref 1059 / 4540 / P

Date Tested 14/05/18

Date reported 17/05/18

Date received 14/05/18

Signed :- M.J. Green C. Driver
Director

BS EN 933-1 1997 Test method includes sample reduction passing 20mm test sieve.

Certificate of sampling when submitted is retained by the Laboratory and available upon request

Samples will normally be kept for 14 days from the date reported

Appropriate methods and sieve sizes have been used where no instruction has been provided



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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Page 1 of 1



Sample Ref S / 48690 / 03

Client Alan Finch

Site Cob Gate, Whaplode
Location TP 1-3
Material Soil / Sand Material

Supplier Not applicable

Date/Time sampled 10/05/18

Client sample No 3

Sampled by CD/RL

Delivery No

Sample point Trial pit

Determination of grading

Test method BS EN 933-1: 2012

Wet Sieving method

Tested As recieved

Material Specification
Aggregate

n/a

Sieve Size mm	% Passing	Specification	Sieve Size mm	% Passing	Specification
125	100	0 0			0 0
90	100	0 0			0 0
63	100	0 0			0 0
40	100	0 0	1	100	0 0
31.5	100	0 0	0.5	100	0 0
20	100	0 0	0.25	100	0 0
16	100	0 0	0.125	99	0 0
8	100	0 0	0.063	22.5	0
4	100	0 0			
2	100	0 0			

Remarks

File ref 1059 / 4540 / P

Date Tested 14/05/18

Date reported 17/05/18

Date received 14/05/18

Signed :- M.J. Green C. Driver
Director

BS EN 933-1 1997 Test method includes sample reduction passing 20mm test sieve.

Certificate of sampling when submitted is retained by the Laboratory and available upon request

Samples will normally be kept for 14 days from the date reported

Appropriate methods and sieve sizes have been used where no instruction has been provided

HUMBERSIDE MATERIALS LABORATORY

Atherton way, Brigg,
North Lincolnshire, DN20 8AR
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Linear Shrinkage

Sheet 1 of 1

Sample Ref **S/48692/01**

Client Finch

Site	Cob gate, Whaplode		
Location	SA 2-2		
Material	Sand		
Date sampled	10/05/2018		
Client sample no	2	Sampled by	CD / RL

Linear Shrinkage

Test method BS 1377

Description - Orange brown silty fine SAND

Passing 0.425mm (%) - **100%**

Linear Shrinkage - **0%**

Comments

File ref	1059/4540/P
Date tested	16/05/2018
Date reported	24/05/2018

Signed: - M.J. Green C. Driver
Director

*Certificate of sampling when submitted is retained by the Laboratory and available upon request
Samples will normally be kept for 14 days from the date reported*

HUMBERSIDE MATERIALS LABORATORY

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North Lincolnshire, DN20 8AR
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Linear Shrinkage

Sheet 1 of 1

Sample Ref **S/48689/01**

Client Finch

Site	Cob gate, Whaplode		
Location	TP 3-2		
Material	Sand		
Date sampled	10/05/2018		
Client sample no	2	Sampled by	CD / RL

Linear Shrinkage

Test method BS 1377

Description - Orange brown silty fine SAND

Passing 0.425mm (%) - **100%**

Linear Shrinkage - **0%**

Comments

File ref	1059/4540/P
Date tested	16/05/2018
Date reported	24/05/2018

Signed: - M.J. Green C. Driver
Director

*Certificate of sampling when submitted is retained by the Laboratory and available upon request
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HUMBERSIDE MATERIALS LABORATORY

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Linear Shrinkage

Sheet 1 of 1

Sample Ref **S/48685/03**

Client Finch

Site	Cob Gate, Whaplode		
Location	TP 1-2		
Material	Fine Sand/Silt		
Date sampled	10/05/2018		
Client sample no	2	Sampled by	CD / RL

Linear Shrinkage

Test method BS 1377

Description - Orange brown silty fine SAND

Passing 0.425mm (%) - **100%**

Linear Shrinkage - **0%**

Comments

File ref	1059/4540/P
Date tested	24/05/2018
Date reported	29/05/2018

Signed: - M.J. Green C. Driver
Director

*Certificate of sampling when submitted is retained by the Laboratory and available upon request
Samples will normally be kept for 14 days from the date reported*

HUMBERSIDE MATERIALS LABORATORY LTD

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DETERMINATION OF SOIL INFILTRATION RATE

Sample Ref S/48686/02

Client c/o A. Finch

Site	Cobgate, Whaplode
Location	SA1
Date tested	10/05/2018
Determined by	R. Lester
Soil type	Loose brown sandy to very sandy SILT

Calculation of Soil Infiltration Rate :- BRE Digest No. 365

Calculation Data			
Soakaway pit No	SA1		
Anticipated invert level	Not known		
Pit Dimensions (l x w x d) (m)	1.70	0.67	1.2
Effective Depth (75% - 25%)	Determination 1	0.200	m
	Determination 2	0.105	m
Effective volume (75% - 25%)	Determination 1	0.228	m ³
	Determination 2	0.120	m ³
Effective Surface Area (75% - 25%)	Determination 1	1.518	m ²
	Determination 2	1.067	m ²
Time for soakaway (75%-25% effective depth)	Determination 1	49800	Sec.
	Determination 2	44700	Sec.
Soil Infiltration Rate (m/s)	Determination 1	3.01E-06	m/s
	Determination 2	2.51E-06	m/s

Comments Determination 1, initial water fill level: 0.80m bgl
Determination 2, initial water fill level: 0.99m bgl

File ref 1059/4540

Signed M.J. Green C. Driver
Director

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North Lincolnshire DN20 8AR
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DETERMINATION OF SOIL INFILTRATION RATE

Sample Ref S/48686/03

Client A. Finch

Site	Cobgate, Whaplode
Location	SA2
Date tested	10/05/2018
Determined by	R. Lester
Soil type	Loose brown sandy SILT. Sand is fine.

Calculation of Soil Infiltration Rate :- BRE Digest No. 365

Calculation Data			
Soakaway pit No	SA2		
Anticipated invert level	Not known		
Pit Dimensions (l x w x d) (m)	1.70	0.33	1.4
Effective Depth (75% - 25%)	Determination 1	0.380	m
	Determination 2	0.205	m
Effective volume (75% - 25%)	Determination 1	0.213	m ³
	Determination 2	0.115	m ³
Effective Surface Area (75% - 25%)	Determination 1	1.823	m ²
	Determination 2	1.113	m ²
Time for soakaway (75%-25% effective depth)	Determination 1	30300	Sec.
	Determination 2	34500	Sec.
Soil Infiltration Rate (m/s)	Determination 1	3.86E-06	m/s
	Determination 2	3.00E-06	m/s

Comments Determination 1, initial water fill level: 0.64m bgl
Determination 2, initial water fill level: 0.99m bgl

File ref 1059/4540

Signed M.J. Green C. Driver
Director

HUMBERSIDE MATERIALS LABORATORY LTD

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North Lincolnshire DN20 8AR
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DETERMINATION OF SOIL INFILTRATION RATE

Sample Ref S/48686/04

Client A Finch

Site	Cobgate, Whaplode
Location	SA3
Date tested	10/05/2018
Determined by	R. Lester
Soil type	Loose to medium dense brown very silty fine SAND

Calculation of Soil Infiltration Rate :- BRE Digest No. 365

Calculation Data			
Soakaway pit No	SA3		
Anticipated invert level	Not known		
Pit Dimensions (l x w x d) (m)	2.00	0.33	1.1
Effective Depth (75% - 25%)	Determination 1	0.240	m
	Determination 2	0.225	m
Effective volume (75% - 25%)	Determination 1	0.158	m ³
	Determination 2	0.149	m ³
Effective Surface Area (75% - 25%)	Determination 1	1.448	m ²
	Determination 2	1.379	m ²
Time for soakaway (75%-25% effective depth)	Determination 1	35280	Sec.
	Determination 2	48300	Sec.
Soil Infiltration Rate (m/s)	Determination 1	3.10E-06	m/s
	Determination 2	2.23E-06	m/s

Comments Determination 1, initial water fill level: 0.62m bgl
Determination 2, initial water fill level: 0.65m bgl

File ref 1059/4540

Signed M.J. Green C. Driver
Director

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 737226-1 Interim

Date of Report: 25-May-2018

Customer: Humberside Materials Laboratory Ltd
Atherton Way
Brigg
North Lincolnshire
DN20 8AR

Customer Contact: Mr Mick Green

Customer Job Reference: 1059/4540/P

Customer Purchase Order: HML/PO3449

Customer Site Reference: Cob Gate, Whaplode

Date Job Received at Concept: 16-May-2018

Date Analysis Started: 18-May-2018

Date Analysis Completed:

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



Produced and
authorised by :
Alam Noor
Customer Service Advisor

Concept Reference: 737226

Project Site: Cob Gate, Whaplode

Customer Reference: 1059/4540/P

Soil

Analysed as Soil

TRL Standard Mcr

Concept Reference					737226 001	737226 002	737226 003
Customer Sample Reference					S/48687	S/48692	S/48693
Top Depth					0.5	1.1	0.55
Bottom Depth					0.9	1.25	0.95
Depth					0.5	1.1	0.55
Date Sampled					10-MAY-2018	10-MAY-2018	10-MAY-2018
Determinand	Method	Test Sample	LOD	Units			
Soil Organic Matter	T287	A40	0.1	%	0.3	0.7	0.5
pH	T7	A40			8.8	8.6	8.5
(Water Soluble) SO4 expressed as SO4	T242	A40	0.05	g/l	<0.05	<0.05	<0.05
(Acid Soluble) SO4—	T192	A40	0.01	%	0.01	0.02	0.02
Sulphur (total)	T1055	A40	0.01	%			
(Total Potential) SO4(Total) Expressed as SO4	T403	A40	0.03	%			
(Oxidisable) Sulphide Expressed as SO4	T194	A40	0.03	%			

Index to symbols used in 737226-1 Interim

Value	Description
A40	Assisted dried < 40C
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Please note interim results are considered preliminary and are subject to change.

Method Index

Value	Description
T194	Calc (TRL 447 T 4.11)
T192	HCl Extraction/ICP/OES (TRL 447 T2)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T7	Probe
T287	Calc TOC/0.58
T403	Calc (TRL 447 T4.13 ICP/OES)
T1055	ICP/OES (TRL 447 T4)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Soil Organic Matter	T287	A40	0.1	%	N	001-003
pH	T7	A40			U	001-003
(Water Soluble) SO ₄ expressed as SO ₄	T242	A40	0.05	g/l	U	001-003
(Acid Soluble) SO ₄ —	T192	A40	0.01	%	U	001-003
Sulphur (total)	T1055	A40	0.01	%	U	001-003
(Total Potential) SO ₄ (Total) Expressed as SO ₄	T403	A40	0.03	%	U	001-003
(Oxidisable) Sulphide Expressed as SO ₄	T194	A40	0.03	%	U	001-003