



BOSTON BARRIER ARCHAEOLOGICAL SURVEY

Archaeological monitoring of ground investigations

Boston, Lincolnshire

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Summary

Wessex Archaeology was commissioned by Mott MacDonald to undertake a programme of geoarchaeological monitoring work in support of geotechnical ground investigations in an area of land on the south side of the River Witham to the south of Port of Boston (PoB).

The Environment Agency (EA), in association with Lincolnshire County Council and Boston Borough Council are seeking to manage flood risk from the tidal River Witham in the town of Boston. The Project is required to improve the standard of protection from tidal flooding without affecting the existing fluvial flood protection provided upstream within the River Witham and South Forty Foot Drain (SFFD). As part of the Boston Barrier Project the area known as the Swinging Hole (or turning circle) requires dredging and a piled wall installed on the right bank of the river Haven in the area opposite the entrance to the Port of Boston.

As a result of the above mentioned works a programme of archaeological and geoarchaeological monitoring was undertaken on seven test pits and three boreholes. The deposits encountered were typical for the area, with the upper few metres consisting of estuarine silts, sands and clays overlying glacial deposits of stiff clay containing chalk gravels which in turn overlay bedrock consisting of Ampthill Clay.

There was little variation across the area monitored. With the exception of Test pits TP01, TP04, TP06 and TP07 located at the top of the intertidal zone, the uppermost 1.0 m – 1.4 m of the deposits exposed in the test pit sections was comprised of redeposited alluvium which had appeared to have been dredged from the river and deposited on the river bank to raise the ground level above the high tide line. A thin (0.15 m) layer of a black humified peat was recorded at 6.75 m below ground level (-1.69 m aOD) in RC01 and relates to a previous period of marine regression or sea level stability.

There were no significant archaeological finds or features encountered throughout the course of the GI monitoring.

Acknowledgements

Thanks are due to Mott MacDonald for commissioning the work and to Craig Bloodworth from Bam Nuttall for their assistance on Site.

The sediments were described and interpreted by ~~Stephanie Said and Richard Payne~~, with contributions from Stephanie Said and Lowri Roberts. ~~Richard Payne also compiled this report.~~ The project was managed on behalf of Wessex Archaeology by Danielle Wilkinson and Euan McNeill.



Boston Barrier Archaeological Survey

Archaeological monitoring of ground investigations

1 INTRODUCTION

1.1 Project background

- 1.1.1 The Environment Agency (EA), in association with Lincolnshire County Council and Boston Borough Council are seeking to manage flood risk from the tidal River Witham in the town of Boston. The Project is required to improve the standard of protection from tidal flooding without affecting the existing fluvial flood protection provided upstream within the River Witham and South Forty Foot Drain (SFFD). As part of the Boston Barrier Project the area known as the Swinging Hole (or turning circle) requires dredging and a piled wall installed on the right bank of the river Haven in the area opposite the entrance to the Port of Boston (PoB).
- 1.1.2 Ground investigations (GI) were proposed along the right bank of the River Witham in the landward area near the Swinging Hole. To understand the archaeological and geoarchaeological potential of the right bank in this area, a programme of archaeological/geoarchaeological monitoring and sampling was required on the GI works. The results of the archaeological/geoarchaeological works will be used to determine if further archaeological/geoarchaeological monitoring will be required to mitigate the design amendments at the Swinging Hole.
- 1.1.3 The monitoring of the GI works took place between the 7th and 18th October 2019. The works comprised seven trial pits and three boreholes.

1.2 Site location and geology

- 1.2.1 The Site is located on the south side of the River Witham opposite the entrance to Port of Boston docks and to the north of the Western Power Distribution Site. The height of the area is approximately 7 m aOD. The approximate boundary of the GI monitoring area is outlined in red in **Figure 1**.
- 1.2.2 The local geology is recorded as Amphill clays overlain by superficial deposits formed during the Quaternary (the last two million years). This period saw the formation of the fen basin which was carved out by glacial activity during a succession of ice ages. Pre-Holocene deposits of boulder clay, sands and gravels partly infilled the basin (Cope-Faulkner et al 2007, BGS 2019).
- 1.2.3 The geology of the wider fen basin following the last glacial period (in the Holocene) were formed by a mixture of riverine and estuarine silt deposits, peat deposits formed in fen carr conditions (wooded fen), fresh water meres and marine inundation. The available borehole information for the Project area indicates a sequence of deposits recording various environs from fresh water riverine silts, peat deposits, intertidal mud-flat deposits, river channel deposits to marine inundation (Cope-Faulkner et al 2013).
- 1.2.4 The changing courses of The Haven and the River Witham following the Last Glacial Period through to the channels linking up due to the River Haven breaking into the Haven (during the medieval period), means that the sequence of deposits within the Project area represent



many phases of sediment deposition, riverine down-cutting, erosion, gradual migration and potentially channel avulsion. This has created a complex sedimentary record across the Project area. The anthropogenic management of the Haven (including canalisation) and the construction of the PoB. This activity has also resulted in significant removal of the underlying geological deposits (particularly in-channel) and the creation of significant amounts of made ground. This in part has protected some of the prehistoric fen deposits under the flood defence banks of the Haven, as evidenced by the radiocarbon-dated Middle Neolithic peat deposits, which have been recorded in the scheme area (Cope-Faulkner et al 2013).

1.3 Summary of previous work

- 1.3.1 Various archaeological investigations have been undertaken, including over 1000 hours of monitoring on the south bank.
- 1.3.2 A UAV survey previously undertaken for the project, identified potential anthropological debris within the mud deposits of the right bank in the area of the swinging hole. These remains are most likely to represent debris from fairly modern activities of the port. Wessex Archaeology also conducted a programme of geoarchaeological auger survey totalling nine points and ranging from between >0.72 m and <1.89 m in depth (Wessex Archaeology 2017).
- 1.3.3 Following an historic map regression exercise of the GI area, both a Saltings and small harbour have been identified on the OS county series map 1889 (1:2,500), to the east and western areas respectively. On the 1905 OS county series map (1:2,500) the small harbour is shown to have become much reduced and the area recorded as Saltings has expanded further to the west.
- 1.3.4 It has also been identified that the square bank located within the right bank of the swinging hole area is a modern feature, dating to the late 20th century and is present on 1999 online aerial imagery of the area. The construction of this embankment may have resulted in ground disturbance in this location, such as removing, truncating or compressing archaeological remains.
- 1.3.5 Finds during initial dredging and monitoring as part of the project include; hulk timbers, thought to have been part of a Carvel-built wooden boat possibly a small vernacular fishing vessel. The remains include an incomplete bow assemblage, a separate timber indicating a possible keelson and unidentified separate timbers. Conclusions as to the original use of this boat are highly speculative, but it has been dated to the post-medieval period. Other finds include:
- *an almost complete and well-preserved leather hobnail working boot found in 5 pieces consisting of the sole, vamp (main front and sides) and the heel during dredging of the western section. It is thought to date from between 1900-1950; and,*
 - *an American three-mould glass decanter from the late 18th-early 19th century;*
 - *modern timber piles; and,*
 - *smears of peat.*



1.4 Scope of document

- 1.4.1 The GI works comprised of seven trial pits dug to a maximum depth of 4.5 m and three boreholes, two drilled to 19 m and one to 25 m.
- 1.4.2 The test pits and boreholes were monitored in case archaeological remains and/or deposits with geoarchaeological potential were encountered.
- 1.4.3 This report covers the undertaking of that work and reports on the results of the monitoring.

2 AIMS AND OBJECTIVES

2.1.1 The overarching aims of the archaeological/geoarchaeological works as set out in the WSI (Mott MacDonald 2019) was to mitigate the impact of the Project on the historic environment. This was to be done through preservation in situ or recording where this was not possible. All work was to be proportionate to the archaeological potential and significance of the archaeology likely to be encountered during construction works. These aims were addressed by achieving the following objectives:

- *Identify the archaeological/geoarchaeological potential within the area of the landwards Swinging hole area;*
- *Manage the risk of impact to the south bank;*
- *Inform the requirements for further archaeological/geoarchaeological works in the area of the proposed Project changes; and,*
- *Add to the deposit model for the Haven and the Project area.*

3 METHODOLOGY

3.1 Trial pits

3.1.1 The trial pits were monitored to allow for potential finds and features to be recorded and retrieved by the Archaeologist and the stratigraphy to be recorded. The spoil heaps were examined for archaeological material. If any archaeological features were encountered within the trial pits, excavation by the GI contractor was to be temporarily stopped if practicable/safe to do so until appropriate time was made available for the archaeologist to fully investigate. If complex features or deposits were encountered, where possible, the GI Contractor was to relocate the trial pit, so that the remains could be left in situ.

3.2 Boreholes

- 3.2.1 A qualified Geoarchaeologist undertook all the monitoring of the boreholes and collection of appropriate samples.
- 3.2.2 The Geoarchaeologist made standard descriptions of soils and sediments, following Hodgson (1997), to include information such as:
 - *Depth*



- *Texture*
- *Composition*
- *Colour*
- *Inclusions*
- *Structure (bedding, ped characteristics etc.)*
- *Contacts between deposits*

3.2.3 Interpretations were made regarding the probable depositional environments and formation processes of the deposits. Samples for radiocarbon dating of significant deposits were collected where appropriate.

3.2.4 This data was then tabulated by Test pit/borehole and depth to allow for later inclusion in the deposit model if required (**Appendix 1**).

3.3 Planning and recording

3.3.1 The location of each monitored test pit and borehole was recorded as a British National Grid Reference (BNG) using a dGPS.

Table 1 As dug locations (BNG) of test pits and boreholes

Location	Easting	Northing	Level (m aOD)
RC01	533382.51	342905.88	4.961
RC02	533464.41	342911.90	5.148
RC03	533546.50	342916.00	5.129
TP01	533365.99	342929.52	0.876
TP02	533392.48	342906.49	4.885
TP03	533434.56	342909.37	5.307
TP04	533446.57	342925.79	1.380
TP05	533498.85	342911.54	4.760
TP06	533498.36	342923.35	0.903
TP07	533546.26	342928.91	1.081

3.3.2 All layers and deposits were allocated unique context numbers and recorded on Wessex pro-forma test pit sheets.

3.3.3 A photographic record was made of all test pits and any significant deposits within the borehole cores.



4 RESULTS

4.1 Introduction

4.1.1 A total of three boreholes (RC01 to RC03, **Plate 2**) and seven test pits (TP01 to TP07, **Plate 1**) were completed. A further test pit (TP08) was abandoned due to its location within a protected area of saltmarsh to the east of the area of investigation.

4.2 Test Pits

4.2.1 The seven test pits were dug to a maximum depth of 4.5 m. Test pits TP01, TP04, TP06 and TP07 were dug within an area of vegetated tidal mud flats on the northern side of the area of investigation. The remaining test pits TP02, TP03, TP05 and the three boreholes RC01, RC02 and RC03 were located within a raised area of land between the river and the Western Power distribution Site.

4.2.2 The depositional sequence in Test pits TP01, TP04, TP06 and TP07 comprised 0.2 m thick well-rooted organic topsoil over a 0.2 m thick light brown sand subsoil, which in turn overlay a dark brown/black sand silt loam. The sand silt loam for the most part had no visible primary structure with faint banding visible at depth. The lack of horizontal lamination in such sediments is due to bioturbation occurring throughout the formation of the layer. The presence of a surface cover of vegetation (halophytic salt-marsh plants and reeds) traps the silts and clays on each tide and continues to grow through the deposited sediments. This creates a 'permanently immature soil' (Eyre 1963, 40).

4.2.3 The depositional sequence in Test pits TP02, TP03 and TP05 comprised dark red-brown silty clay loam 0.15m thick, well-rooted with a granular structure and gradual lower boundary.

4.2.4 The topsoil overlay a grey/brown firm silty clay/clayey sand with a blocky structure and occasional iron mottling up to 1.4 m in depth. There was no evidence of any surviving laminations or fine to coarse banding.

4.2.5 From 1.4 m in depth the deposits were recorded as a firm black clayey sand with abundant fine roots, becoming a grey silty sand with sandy clay patches and occasional laminations with increasing depth (**Plate 1**).

4.2.6 No stabilisation horizons, organic deposits or archaeological features were encountered in any of the test pits. As no significant deposits were encountered there was no requirement for any section drawings (Mott MacDonald 2019, paragraph 8.1)

4.3 Boreholes

4.3.1 Boreholes RC01 and RC03 were drilled to 19 m and RC02 to 26 m. The sediments were predominantly minerogenic and comprised estuarine alluvial silts, sands and clays over stiff glacial clay with chalk gravels over very stiff grey clay bedrock of the Ampthill Beds (**Plate 4**).

4.3.2 There were no stabilisation or organic deposits recorded within the boreholes with the exception of a thin (0.15 m) layer of black humified peat at 6.75 m (-1.79 m aOD) in RC01 (**Plate 3**). A small bag sample of the peat was taken and left on Site in the care of BAM Nuttall Ltd.



- 4.3.3 Organic rich deposits were only recorded in RC01. These localised occurrences are typical of environments that have undergone multiple phases of fluvial processes including erosion, migration and deposition.

5 DISCUSSION

- 5.1.1 There were few archaeological finds or palaeoenvironmental features of archaeological interest encountered during the course of the GI monitoring.
- 5.1.2 The sediments examined as part of the GI works are entirely typical for the area and represent glacial deposits of a stiff clay with chalk gravels overlaying a stiff shelly silty clay bedrock (Amphill Beds). The glacial deposits were in turn overlain by a sequence of Holocene estuarine alluvial clays. The upper part of this unit from 1.1m to 1.4m in Test pits TP02, TP03 and TP05 showed no evidence of deposition in a tidal estuarine environment resulting from the redeposition of material dredged from the river channel then redeposited to form a raised area of the south bank of the River Witham to the south of the Port of Boston.
- 5.1.3 The Holocene deposits are dominated by minerogenic sediments with localised layers of peat. These deposits within the study area reflect a range of freshwater riverine and tidal channel deposits, semi-terrestrial peats and intertidal mudflats. Estuarine sediments accumulated as a result of progressively rising post-glacial sea-levels, whilst the thin layer of peat reflects a period of stable and or falling sea-level during which semi-terrestrial peat forming plant communities encroached into the wetlands, followed by a period of renewed marine inundation.
- 5.1.4 During the GI monitoring a single occurrence of a thin (0.15 m) layer of black humified peat was recorded at 6.75 m to 6.9 m (-1.79 m aOD) in RC01. Previous investigations have recorded peat of between 0.1 m to 0.5 m thickness and at depths between -2 to -2.75 m OD (Mott McDonald, 2015). An earlier study relating to the Boston barrage revealed peat dating to 3020 to 2930 cal. BC, with other peats identified in locations around Boston (Cope-Faulkner et al 2013). The occurrences of organic deposits within the vicinity of the area of GI investigations are localised and indicate phases of sediment erosion and aggradation as a result of gradual channel migration, with a result that the Holocene deposits do not form consistent strata across the study area. Holocene sediments are also highly susceptible to auto-compaction, particularly the peats, and it is often the case that there is significant lateral and horizontal variation in sediments over short distances.

6 RECOMMENDATIONS

- 6.1.1 A thin peat deposit was recorded in borehole RC01 at depths between 6.75 and 6.9 m. The geoarchaeological and archaeological potential of peat deposits is high due to its potential to preserve organic material (e.g. pollen and plant microfossils) that is suitable for radiocarbon dating and can provide a record of past climate and palaeoenvironmental change. In line with recommendations made in the WSI, a small sub-sample of peat was taken to ensure material was secured for further palaeoenvironmental assessment or dating, if required.
- 6.1.2 Whilst the geoarchaeological potential of peat deposits is high, given the localised nature of the peat (only recorded in one borehole) and the disturbed nature of the sample (cable percussion), further work comprising radiocarbon dating or palaeoenvironmental



assessment is not recommended in this case. However, any future intrusive investigations in relation to this scheme should consider making provisions to acquire a dedicated geoarchaeological borehole to recover undisturbed samples of peat deposits.

- 6.1.3 No further work on the deposit model is to be undertaken as a result of this phase of investigations since the data gathered can not contribute to be valuable enough to include in the earlier model laid out by Cope-Faulkner et al (2013).

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APPENDIX 1

Test pit and borehole tables

Location:	533365.997 342929.523	Borehole ID:	Test Pit 1	Comments: 206951 Boston Barrier GI monitoring
Level (top):	4.96m aOD	Drg:		
Depth		Sediment description		Interpretation
Mbg	mOD			
0 – 0.8	4.96 – 4.88	Vegetated dark brown sandy silty clay		Upper part of intertidal zone only occasionally inundated
0.8 – 1.3	4.88 – 3.66	Dark grey silty clay, abundant roots, no visible structure. Modern Fe object heavily corroded found at 1.2m depth.		Reworked estuarine alluvial deposits
1.3 – 4.5	3.66 – 0.46	Dark grey, black mottled silt with occasional fine laminations and marine shell fragments		Estuarine alluvial deposits

Location:	533392.487 342906.497	Borehole ID:	Test pit 2	Comments: 206951 Boston Barrier GI monitoring
Level (top):	5.14m aOD	Drg:		
Depth		Sediment description		Interpretation
Mbg	mOD			
0 – 0.9	5.14 – 4.24	Dark brown Fe mottled clayey sand, well rooted. Granular structure		Topsoil formed over estuarine alluvium
0.9 – 1.3	4.24 – 3.84	Soft dark grey/black silty clay with occasional SR/R flint gravels and marine shell fragments. Blocky structure		Reworked estuarine alluvial deposits from dredged channel
1.3 – 4.5	3.84 – 0.41	Dark grey, black mottled silt with occasional fine laminations and marine shell fragments		Estuarine alluvial deposits

Location:	533434.560 342909.371	Borehole ID:	Test pit 3	Comments: 206951 Boston Barrier GI monitoring
Level (top):	5.31 aOD	Drg:		
Depth		Sediment description		Interpretation
Mbg	mOD			
0 – 0.25	5.31 – 5.06	Dark brown Fe mottled clayey sand, well rooted. Granular structure		Topsoil formed over estuarine alluvium
0.25 – 0.8	5.06 – 5.23	Brown clayey fine to coarse sand Fe mottled, occasional roots. Blocky structure		B horizon (subsoil) formed over alluvial deposits



Location:		533434.560 342909.371	Borehole ID:	Test pit 3	Comments: 206951 Boston Barrier GI monitoring
Level (top):		5.31 aOD	Drg:		
Depth		Sediment description			Interpretation
Mbg	mOD				
0.8 – 1.10	5.23 – 4.21	Brown Fe mottled fine to coarse slightly clayey sand			Reworked estuarine alluvial deposits from dredged channel
1.10 – 3.80	4.21 – 1.51	Dark grey, black mottled silt with occasional fine coarser laminations and marine shell fragments			Estuarine alluvial deposits

Location:		533446.574 342925.795	Borehole ID:	Test pit 4	Comments: 206951 Boston Barrier GI monitoring
Level (top):		1.38m aOD	Drg:		
Depth		Sediment description			Interpretation
Mbg	mOD				
0 – 0.4	1.38 – 0.98	Vegetated dark brown sandy silty clay			Upper part of intertidal zone only occasionally inundated
0.4 – 4.5	0.98 – -3.12	Dark grey, black mottled silt with occasional fine sandy silt laminations and marine shell fragments			Estuarine alluvial deposits

Location:		533498.856 342911.546	Borehole ID:	Test pit 5	Comments: 206951 Boston Barrier GI monitoring
Level (top):		4.76m aOD	Drg:		
Depth		Sediment description			Interpretation
Mbg	mOD				
0 – 0.35	4.76 – 4.41	Dark brown Fe mottled clayey sand, well rooted. Granular structure			Topsoil formed over estuarine alluvium
0.35 – 1.4	4.41 – 3.36	Soft grey sandy silty clay no visible primary structure. Blocky structure			Reworked estuarine alluvial deposits from dredged channel
1.4 – 2.5	3.36 – 2.26	Dark grey sandy clay silt with black mottles, occasional roots and fine sandy silt laminations			Estuarine alluvial deposits
2.5 – 3.5	2.26 – 1.26	Dark grey with black mottles clayey silt with occasional patches of sand.			
3.5 – 4.0	1.26 – 0.76	Brown clayey sand with black mottles			



Location:		533498.361 342923.350	Borehole ID:	Test pit 6	Comments: 206951 Boston Barrier GI monitoring
Level (top):		0.9m aOD	Drg:		
Depth		Sediment description			Interpretation
Mbg	mOD				
0 – 0.5	0.9 – 0.4	Vegetated dark brown sandy silty clay			Upper part of intertidal zone only occasionally inundated
0.5 – 1.2	0.4 – -0.3	Dark grey, black mottled silt with occasional fine sandy silt laminations and A/SA flint gravels			Estuarine alluvial deposits
1.2 – 4.5	-0.3 – -3.6	Dark grey, black mottled silt with occasional fine laminations and marine shell fragments			

Location:		533546.267 342928.915	Borehole ID:	Test pit 7	Comments: 206951 Boston Barrier GI monitoring
Level (top):		1.08m aOD	Drg:		
Depth		Sediment description			Interpretation
Mbg	mOD				
0 – 0.4	1.08 – 0.68	Vegetated dark brown/black sandy silty clay with modern debris			Upper part of intertidal zone only occasionally inundated
0.4 – 1.0	0.68 – 0.08	Dark brown black mottled sandy silty clay, modern debris			Estuarine alluvial deposits
1.0 – 4.2	0.08 – -3.12	Dark grey, black mottled silt with occasional fine laminations and marine shell fragments			
4.2 – 4.5	-3.12 – -3.62	Dark brown/black slightly clayey fine to coarse sand			Reworked estuarine alluvial deposits

Location:		533382.510 342905.889	Borehole ID:	RC01	Comments: 206951 Boston Barrier GI monitoring
Level (top):		4.96m aOD	Drg:		
Depth		Sediment description			Interpretation
Mbg	mOD				
0 – 0.45	4.96 – 4.51	Brown clayey to very clayey fine to coarse sand			Topsoil formed over estuarine alluvium
0.45 – 1.10	4.51 – 3.86	Light brown Fe stained fine to coarse sand, occasional clay laminations			Reworked estuarine alluvial deposits from dredged channel



Location:		533382.510 342905.889	Borehole ID:	RC01	Comments: 206951 Boston Barrier GI monitoring
Level (top):		4.96m aOD	Drg:		
Depth		Sediment description			Interpretation
Mbg	mOD				
1.1 – 1.3	3.86 – 3.66	Dark grey blue thinly laminated silt			Estuarine alluvial deposits
1.3 – 5.4	3.66 – -0.44	Soft thinly laminated black silty clay			
5.4 – 6.6	-0.44 – -1.64	Dark brown fine sand			
6.6 – 6.75	-1.64 – -1.79	Brown black sandy gravel SA/SR with silt patches			Higher energy (fluvial) deposits
6.75 – 6.9	-1.79 – -1.94	Dark brown humified peat			Stabilisation horizon due to period of marine stability
6.9 – 7.0	-1.94 – -2.04	Dark grey fine to medium sand			Estuarine alluvial deposits
7.0 – 7.4	-2.04 – -2.44	Dark brown/black clayey silt/sand			
7.4 – 8.3	-2.44 – -3.34	Soft grey clay, brown mottles, occasional SA/SR gravel			
8.3 – 8.8	-3.34 – -3.84	Brown gravelly sand, gravel is SA/SR			Higher energy (fluvial) deposits
8.8 – 9.2	-3.84 – -4.24	Grey brown gravelly clay, gravel is SA/SR chalk			Glacial till (reworked)
9.2 – 9.45	-4.24 – -4.49	Red brown/grey brown gravelly sand, gravel is SA flint and chalk			Higher energy (fluvial) deposits
9.45 – 11.0	-4.49 – -6.04	Grey brown gravelly clay, gravel is SA/SR chalk Chalk gravels increasing with depth			Glacial till
11.0 – 19.3	-6.04 – -14.34				



Location:		533464.410 342911.908	Borehole ID:	RC02	Comments: 206951 Boston Barrier GI monitoring
Level (top):		5.14m aOD	Drg:		
Depth		Sediment description			Interpretation
Mbg	mOD				
0 – 0.3	5.14 – 4.84	Brown clayey to very clayey fine to coarse sand			Topsoil formed over reworked estuarine alluvium
0.3 – 0.7	4.84 – 4.44	Fe stained brown sand, small clay patches and occasional marine shell fragments			Reworked alluvial colluvium
0.7 – 1.6	4.44 – 3.54	Fe mottled sand with occasional silty laminations at depth			Estuarine alluvium (upper part to 1.2m poss. evidence of reworked material from channel dredging).
1.6 – 3.0	3.54 – 2.14	Dark grey/black slightly gravelly silt, gravel is SA/SR flint			Estuarine alluvium
3.0 – 4.8	2.14 – 0.34	Soft dark grey/black clay			
4.8 – 5.0	0.34 – 0.14	Soft dark grey/black clayey silt, occasional SA flint gravel			
5.0 – 5.2	0.14 – -0.06	No recovery			Compression gap
5.6 – 7.8	-0.06 – -2.66	Brown – dark brown fine to medium sand			Estuarine alluvium (coarse = higher energy)
7.8 – 7.9	-2.66 – -2.76	Dark grey silty clay			Estuarine alluvium
7.9 – 8.3	-2.76 – -3.16	Grey gravelly clay, gravel SA/R chalk and flint			
8.3 – 8.8	-3.16 – -3.66	Dense brown gravelly sand, gravel is SA flint			Estuarine alluvium (coarse = higher energy)
8.8 – 10.2	-3.66 – -5.06	Dense orange brown gravel, gravel is SA flint, becoming SA/SR with cobbles at depth			Higher energy (fluvial) deposits
10.2 – 24.9	-5.06 – -19.76	Stiff grey gravelly clay, gravels are chalk with some flint and sandstone			Glacial till
24.9 – 26.33	-19.76 – -21.19	Stiff dark grey clay, with frequent shell fragments			Amphill Beds



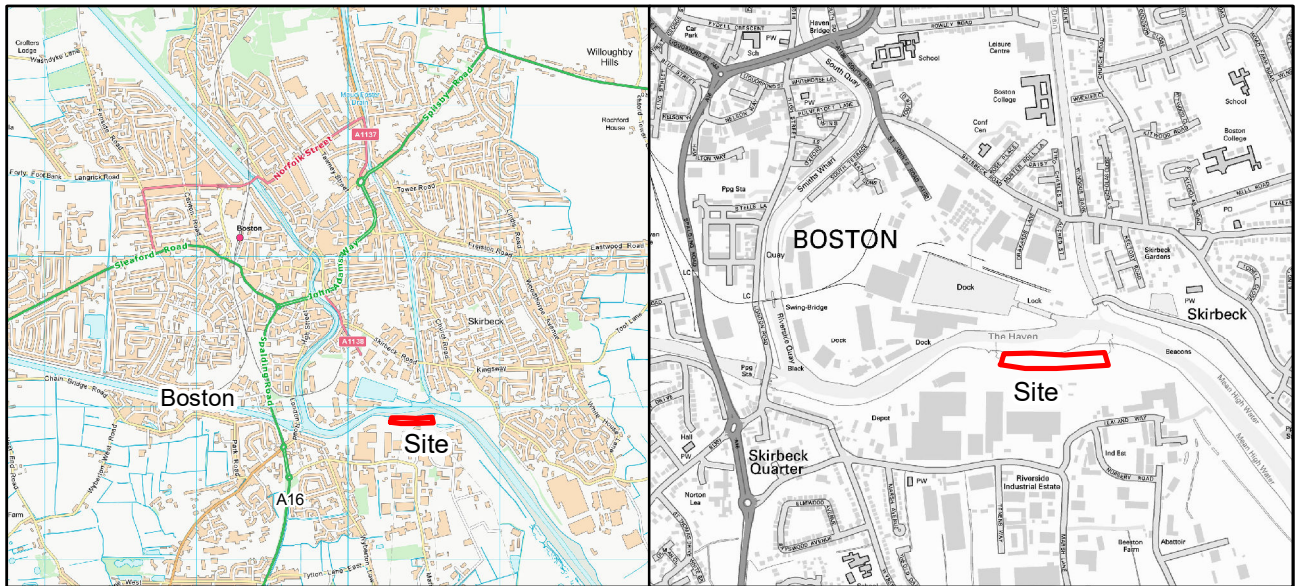
Location:		533546.503 342916.00	Borehole ID:	RC03	Comments: 206951 Boston Barrier GI monitoring
Level (top):		5.12m aOD	Drg:		
Depth		Sediment description			Interpretation
Mbg	mOD				
0 – 0.4	5.12 – 4.72	Light Fe stained clayey sand			Topsoil
0.4 – 0.5	4.72 – 4.62	Brown fine to coarse sand			Alluvium
0.5 – 1.1	4.62 – 4.02	Soft brown clayey silt, occasional fine roots, no visible structure			Reworked estuarine alluvial deposits from dredged channel
1.1 – 1.2	4.02 – 3.92	Soft black silt			Estuarine alluvium
1.2 – 1.6	3.92 – 3.52	Soft dark brown very silty clay			
1.6 – 2.0	3.52 – 3.14	Soft black clay with thin coarser laminations and occasional marine shell fragments			
2.0 – 2.6	3.14 – 2.52	Soft dark grey/black clay, with poss fragments of CBM			
2.6 – 4.0	2.52 – 1.12	Black clayey silt with occasional roots			
4.0 – 4.5	1.12 – 0.62	Very soft black clay			
4.5 – 6.8	0.62 – -1.68	Very soft black clayey silt			alluvium (coarse = higher energy)
6.8 – 8.0	-1.68 – -2.88	Dark brown sand			
8.0 – 8.4	-2.88 – -3.28	Stiff grey clay, mottled brown and containing chalk gravels			Reworked glacial till
8.4 – 8.8	-3.28 – -3.68	Brown sand containing SA/SR gravels			alluvium (coarse = higher energy)
8.8 – 9.0	-3.68 – -3.88	Stiff gravelly clay, gravel is chalk			Glacial till
9.0 – 11.0	-3.88 – -5.88	Stiff gravelly clay, gravel is chalk			



Location:	533546.503 342916.00	Borehole ID:	RC03	Comments: 206951 Boston Barrier GI monitoring
Level (top):	5.12m aOD	Drg:		
Depth		Sediment description		Interpretation
Mbg	mOD			
11.0 – 11.5	-5.88 – -6.38	Band of grey chalk, occasional Fe staining, no structure		Reworked chalk
11.5 – 19.33	-6.38 – -14.21	Very stiff dark grey gravelly clay, gravel is chalk		Glacial till



7 FIGURES



- Approximate boundary of GI monitoring area
- Test pit and borehole locations

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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	Date:	22/11/2019	Revision Number:	1
	Scale:	1:50,000; 1:20,000; 1:2500 @ A4	Illustrator:	ND/KJF
	Path:	W:\Projects\206951\GIS\FigsMXD\2019_11_04\206951_Fig01.mxd		

Location of Site and position of test pits and boreholes

Figure 1

8 PLATES

Plate 1. Borehole RC03



Plate 2. View of Test pit 2 looking east



Plate 3. Thin layer of peat in RC01 between 6.75-6.9 m in depth



Plate 4. Typical throughout the boreholes, minerogenic alluvial clays and silts recorded from 5.0-7.0 m in depth in borehole RC03

