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University of Reading

COCKREED LANE, NEW ROMNEY, KENT

Geoarchaeological Deposit Model Report

NGR: TR 06600 25640

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1. INTRODUCTION

This report summarises the findings arising out of the geoarchaeological investigations undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development of land at Cockreed Lane, New Romney, Kent (National Grid Reference centred on: TR 06600 25640; Figures 1 and 2). The site lies approximately 2km from the coast of the English Channel, on the western outskirts of the town of New Romney and covering an area of approximately 3.15ha. British Geological Survey (BGS) mapping (www.bgs.ac.uk/opengeoscience) shows the superficial geology across the area of the site as Tidal Flat Deposits (described as clay and silt) of Quaternary age, overlying the sandstone, siltstone and mudstone of the Cretaceous Hastings Beds bedrock. Storm Beach Deposits (described as gravel) are recorded as the superficial geology on the southeastern margin of the site, and beyond that Blown Sands, both of which are of Quaternary age.

A total of 18 geotechnical boreholes were put down at the site in July and August 2015 (GES, 2015; Figure 2), including four cable percussion boreholes to 20m depth and 14 window samples to between 0.45 and 4.0m depth. Although no elevation data is available for the geotechnical records, topographic survey of the site shows that it is approximately level at between *ca.* 2.5 and 3.5m OD. In the geotechnical boreholes Made Ground was recorded to depths of between 0.25 and 2.2m below ground level (bgl), with none recorded in boreholes WS8, 9 and 11. The Made Ground was underlain by silty or sandy and in places gravelly clay or silty sand to depths of 3.8 to 5.0m bgl, present in thicknesses of between 2.8 and 4.2m and interpreted as alluvial Tidal Flat Deposits. Below this a lower unit of sand, provisionally interpreted as alluvial, was recorded to 20m bgl in the four cable percussion boreholes, and towards the base of selected window samples. The bedrock Hastings Beds was not recorded in any of the boreholes. Significantly, peat (present as either layers or lenses) was recorded within the alluvial Tidal Flat Deposits in several of the boreholes, including BH2 (2.8-3.5m bgl), WS03 (2.9-3.0m bgl), WS05 (2.8m bgl), WS06 (2.3m bgl), WS07 (2.4m bgl), WS12 (2.9-3.0m bgl) and WS14 (2.70-2.75m bgl).

Significantly, the peat horizons recorded at the site have a high potential to provide a detailed reconstruction of past environments on both the wetland and dryland during the prehistoric and/or historic periods. In particular, there is the potential to increase knowledge and understanding of the

interactions between relative sea level, human activity, vegetation succession and climate in this area of Romney Marsh. Such investigations are carried out through the assessment/analysis of palaeoecological remains (e.g. pollen, plant macrofossils & insects) and radiocarbon dating. So called palaeoenvironmental reconstructions have previously been carried out on sedimentary sequences in this area of Romney Marsh and the Dungeness Foreland (e.g. Waller et al., 1999; Waller & Long, 2003; Long *et al*., 2006). A comprehensive review of the age and depth of the alluvial sediments in this area is provided by Long *et al*. (2006). They show peat horizons up to *ca*. 2m thick in the area of Romney Marsh, generally lying at between *ca*. -1 and 1m OD but relatively thin or absent towards New Romney. Thicker peat horizons are recorded towards the west in the area of Walland Marsh, where peat generally up to 3m thick is recorded at elevations between *ca*. -3 and 1m OD (Long *et al*., 2006). Thicknesses of up to 6m have been recorded in the valleys on the western side of Walland Marsh, although the peat thins eastward and was recorded at 0.5m in the area of Midley Church (Long *et al*., 2006; Long & Innes, 1993). Where peat is recorded it is generally radiocarbon dated to between *ca*. 6000 and 1700 cal. BP, the lower sand units underlying the peat accumulating from *ca*. 7800 cal. BP (Long *et al*., 2006).

The Cockreed Land site thus offers an opportunity to contribute to our understanding of landscape evolution in this area of Romney Marsh and the Dungeness Foreland. On the basis of other nearby investigations, the peat horizons recorded within the alluvial sequences may be of prehistoric date, and include evidence of both palaeoenvironmental change and human activity. A programme of geoarchaeological investigation was therefore recommended within the written scheme of investigation for the site (Young, 2015), including three new geoarchaeological boreholes and a programme of deposit modelling incorporating the existing geotechnical data.

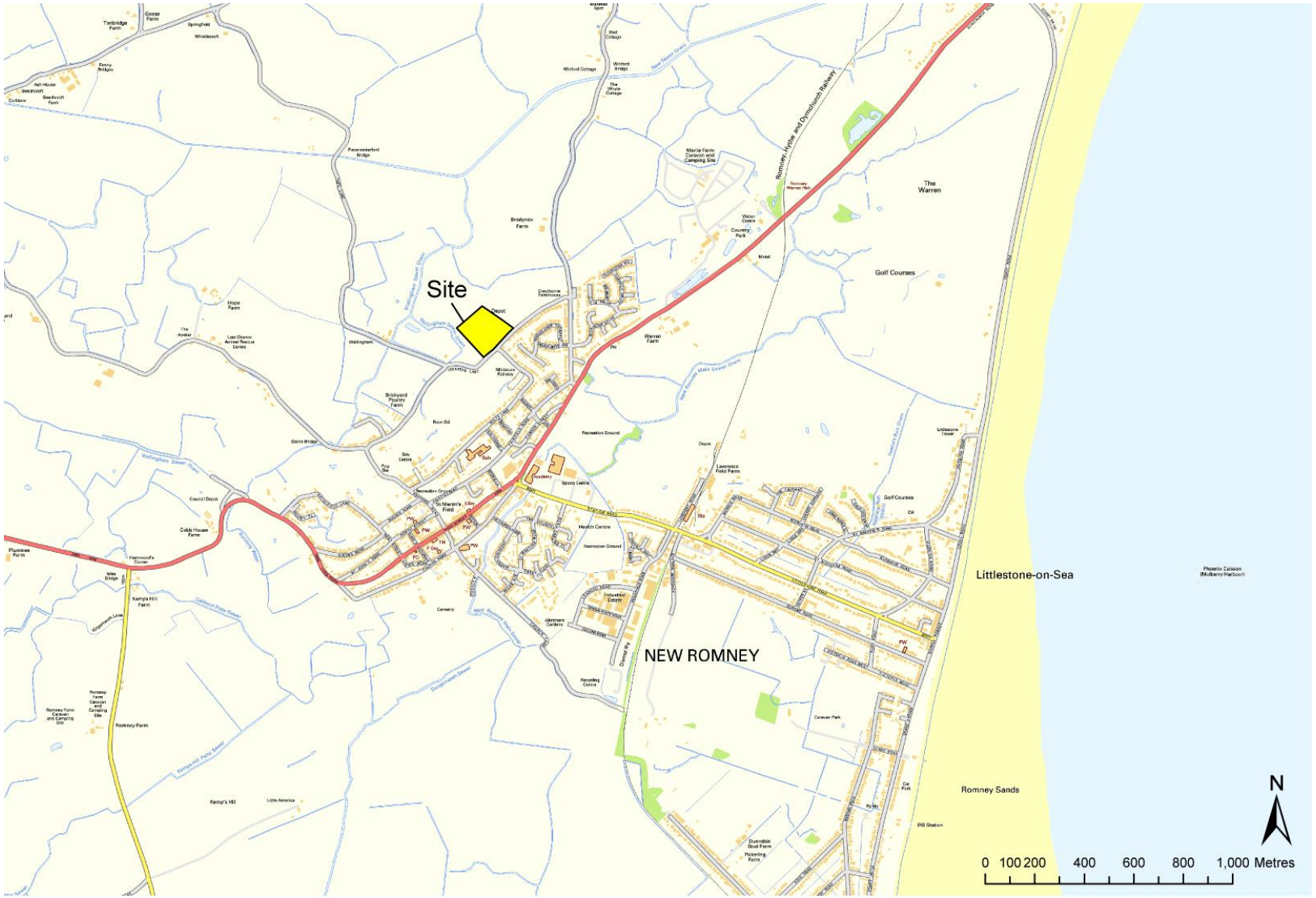

Figure 1: Location of Cockreed Lane, New Romney, Kent. ***Contains ordnance survey data © Crown copyright and database right [2015].***

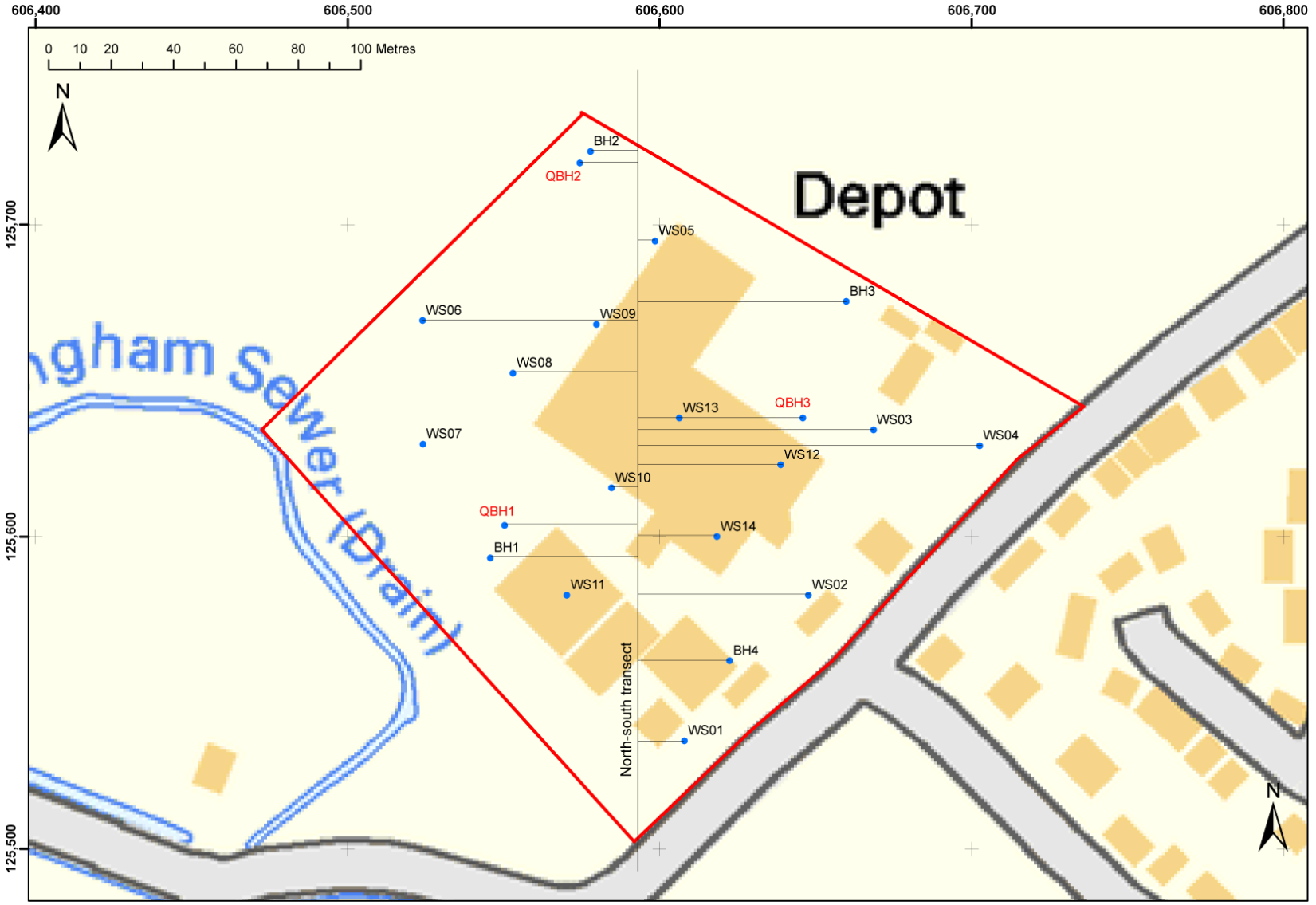

Figure 2: Location of the new geoarchaeological (QBH1 to QBH3) and existing geotechnical boreholes at Cockreed Lane, New Romney, Kent. Selected boreholes in Figure 8 also shown. *Contains Ordnance Survey data © Crown copyright and database right [2012].*

2. METHODS

Field investigations and lithostratigraphic descriptions

Three geoarchaeological boreholes (boreholes QBH1 to QBH3) were put down at the site in February 2016 by Quaternary Scientific. The borehole core samples were recovered using an Eijkelkamp window sampler and gouge set using an Atlas Copco TT 2-stroke percussion engine. This coring technique is a suitable method for the recovery of continuous, undisturbed core samples and provides sub-samples suitable for not only sedimentary and microfossil assessment and analysis, but also macrofossil analysis. The borehole locations were recorded using a Leica GS09 Differential GPS (Table 1). The lithostratigraphy of the retained core samples was described in the laboratory using standard procedures for recording unconsolidated sediment and organic sediments, noting the physical properties (colour), composition (gravel, sand, clay, silt and organic matter) and inclusions (e.g. artefacts) (Tröels-Smith, 1955). The procedure involved: (1) cleaning the sample using a scalpel; (2) recording the physical properties, most notably colour using a Munsell Soil Colour Chart; (3) recording the composition; gravel (Grana glareosa; Gg), fine sand (Grana arenosa; Ga), silt (Argilla granosa; Ag) and clay (Argilla steatoides); (4) recording the degree of peat humification and (5) recording the unit boundaries e.g. sharp or diffuse. The results of the geoarchaeological descriptions of the boreholes are displayed in Tables 2 to 4.

Deposit modelling

The deposit model was based on a review of 21 borehole records, including the three new geoarchaeological boreholes and 18 existing geotechnical records (GES, 2015). No BGS archive boreholes (www.bgs.ac.uk/opengeoscience) with sufficient spatial data for modelling were found within the vicinity of the site. Modelling was undertaken using RockWorks 16 geological utilities software and displayed using ArcMAP 10. The term 'deposit modelling' describes any method used to depict the sub-surface arrangement of geological deposits, but particularly the use of computer software to create contoured maps or three dimensional representations of contacts between stratigraphic units. The first requirement is to classify the recorded borehole sequences into uniformly identifiable stratigraphic units. At the Cockreed Lane site, the sedimentary units were classified into four groupings: (1) Sand, (2) Peat, (3) Alluvium and (4) Made Ground. Models of surface height (using a nearest neighbour routine) were generated for the Sand, Peat and Alluvium (Figures 3 to 5). Thickness of the Peat (Figure 6) and Made Ground (Figure 7) was also modelled (also using a nearest neighbour routine). A north-south two-dimensional transect of boreholes across the site is shown in Figure 8.

How effectively Rockworks portrays the relief features of stratigraphic contacts or the thickness of sediment bodies depends on the number of data points (boreholes/test pits) per unit area, and the extent to which these points are evenly distributed across the area of interest. The portrayal is also affected by the significance assigned to these data points, in terms of the extent of the area around the point to which the data are deemed to apply. This can be predetermined for each data set, and in the present case the value chosen for each data point (borehole) is equivalent to an area of 50m radius for all models. The boreholes are relatively well distributed over the area of investigation. In

general, reliability improves towards the core area of boreholes where mutually supportive data are likely to be available from several adjacent data points. Reliability is also affected by the quality of the stratigraphic records, which in turn are affected by the nature of the sediments and/or their post-depositional disturbance during previous stages of land-use on the site. Quality is also affected where boreholes have been put down at different times and recorded using different descriptive terms and subject to differing technical constraints in terms of recorded detail including the exact levels of the stratigraphic boundaries. Of the records used in the deposit model, the cores from the geoarchaeological boreholes put down by Quaternary Scientific represent the most detailed record of the sediment sequences. Finally, because of the 'smoothing' effect of the modelling procedure, the modelled levels of stratigraphic contacts may differ slightly from the levels recorded in borehole logs.

Table 1: Borehole attributes for the records used in the deposit model, Cockreed Lane, New Romney, Kent.

Borehole	Easting	Northing	Elevation (m OD)
Geoarchaeological boreholes			
QBH1	606550.3	125603.5	2.5
QBH2	606574.4	125719.7	2.8
QBH3	606645.9	125638.0	2.8
Geotechnical boreholes (GES, 2015)			
BH1	606545.7	125593.2	2.8
BH2	606577.8	125723.4	2.65
BH3	606659.8	125675.3	2.55
BH4	606622.4	125560.2	3.3
WS01	606608.0	125534.6	3.0
WS02	606647.8	125581.2	3.5
WS03	606668.5	125634.1	3.3
WS04	606702.7	125629.1	3.2
WS05	606598.5	125694.7	2.6
WS06	606523.9	125669.2	2.6
WS07	606524.1	125629.6	2.5
WS08	606553.0	125652.4	2.8
WS09	606579.7	125668.0	3.0
WS10	606584.6	125615.6	2.8
WS11	606570.3	125581.2	3.1
WS12	606638.8	125622.9	3.2
WS13	606606.3	125637.9	3.2
WS14	606618.4	125600.0	3.1

3. RESULTS AND INTERPRETATION OF THE GEOARCHAEOLOGICAL BOREHOLE INVESTIGATIONS AND DEPOSIT MODELLING

The results of the geoarchaeological investigations are shown in Tables 2 to 4, with the resultant deposit models shown in Figures 3 to 8. The basal unit recorded across the site consists of variably silty sand with occasional Mollusca, considered to represent Tidal Flat Deposits of Holocene age deposited within an intertidal environment. This unit is recorded in the three new geoarchaeological boreholes (QBH1 to QBH3) and in four of the geotechnical boreholes (BH1 to BH4). The surface of this unit is highest in the area of boreholes QBH2, QBH3 and BH2, where it lies at -0.8, -0.6 and -1.15m OD respectively; elsewhere, it lies at between -1.23 and -1.95m OD (Figure 3). The variability in the surface of this unit is most likely indicative of the small channel features and intervening sand bars that are typical of tidal flat environments. This unit is recorded to a depth of 20m bgl (-16.7 to -17.45m OD) in the four geotechnical boreholes; no evidence was found within these logs for any finer-grained or organic deposits that might have palaeoenvironmental potential, their composition being dominantly sandy throughout the sequence.

The sandy deposits are overlain by generally clayey, silty, occasionally sandy and in places organic material, most likely deposited within a low energy alluvial environment, probably at a distance from any active channels and perhaps related to salt-marsh formation (cf. Long & Innes 1993). A horizon of Peat is recorded in selected boreholes within this unit (QBH2, QBH3, BH2, WS03, WS06, WS12 and WS14), in most cases recorded at elevations between 0.0 and 0.5m OD (Figure 4) and present in thicknesses of between 0.7 (BH2) and 0.05m (WS14; Figure 5). Significantly, the Peat represents a transition to semi-terrestrial conditions supporting the growth of wetland vegetation at these locations. Given the relatively consistent elevation of the peat horizons recorded, it seems likely that this transition occurred at approximately the same time. Noticeably however, the Peat recorded in geotechnical borehole BH2 lies at a lower elevation to that recorded elsewhere (-0.15 to -0.85m OD; best illustrated in Figure 8). However, the sequence recorded in geoarchaeological borehole QBH2 (within 5m of BH2) is more consistent with the deposits recorded elsewhere.

The surface of the silty clay alluvial deposits is generally recorded at between 1.82 and 2.9m OD across the site, but in one borehole (BH3) it lies at 0.35m OD (Figure 6). Here it is truncated by Made Ground, which at this location is 2.2m thick; elsewhere it is generally between 0.25 and 1.0m thick (Figure 7).

Table 2: Lithostratigraphic description of borehole QBH1, Cockreed Lane, New Romney, Kent.

Depth (m OD)	Depth (m bgs)	Composition
2.50 to 1.82	0.00 to 0.68	Made Ground
1.82 to 0.63	0.68 to 1.87	10YR 5/3; As3 Ag1 Ga+; brown silty clay with a trace of sand. Thin layer of detrital organic matter/charred plant material at 0.81 to 0.79m OD. Diffuse contact in to:
0.63 to 0.29	1.87 to 2.21	10YR 5/2; Ag2 As1 Ga1; greyish brown sandy clayey silt. Frequent iron staining. Sharp contact in to:
0.29 to -0.14	2.21 to 2.64	2.5Y 3/1; Dh2 Ag1 As1 Sh+; very dark grey silt and clay with very frequent detrital herbaceous material and a trace of organic matter. Sharp contact in to:

-0.14 to -0.50	2.64 to 3.00	10YR 5/1; As2 Ag1 Dh1; grey silty clay with detrital herbaceous material. Frequent vertical rooting (mainly of sedges).
-0.50 to -1.23	3.00 to 3.73	2.5Y 5/1; Ag2 As1 Ga1 Dh+; grey clayey sandy silt with a trace of detrital herbaceous material. Frequent vertical rooting (mainly of sedges). Diffuse contact in to:
-1.23 to -1.50	3.73 to 4.00	2.5Y 5/1; Ga4 Ag+; grey sand with a trace of silt. Occasional Mollusca.

Table 3: Lithostratigraphic description of borehole QBH2, Cockreed Lane, New Romney, Kent.

Depth (m OD)	Depth (m bgs)	Composition
2.80 to 0.40	0.00 to 0.40	Made Ground
0.40 to 1.57	0.40 to 1.23	10YR 5/3; As3 Ag1 Ga+; brown silty clay with a trace of sand. Frequent iron staining. Sharp contact in to:
1.57 to 1.54	1.23 to 1.26	10YR 2/1; Sh3 As1; humo. 4; black very well humified silty peat. Sharp contact in to:
1.54 to 1.18	1.26 to 1.62	10YR 5/2; As2 Ag2 Ga+; greyish brown silt and clay with a trace of sand. Diffuse contact in to:
1.18 to 0.87	1.62 to 1.93	Gley 1 5/10Y; Ag2 As2; greenish grey silt and clay. Sharp contact in to:
0.87 to 0.80	1.93 to 2.00	10YR 2/1; Sh3 Th^{3}1; humo. 3; black well humified herbaceous peat.
0.80 to 0.57	2.00 to 2.23	10YR 4/1; Ag2 As1 Dh1; dark grey clayey silt with detrital herbaceous material. Diffuse contact in to:
0.57 to -0.04	2.23 to 2.84	10YR 5/1; As2 Ag2 Dh+; grey silt and clay with a trace of detrital herbaceous material. Diffuse contact in to:
-0.04 to -0.20	2.84 to 3.00	10YR 5/1; Ag2 Ga1 As1 Dh+; grey sandy clayey silt with a trace of detrital herbaceous material.
-0.20 to -0.80	3.00 to 3.60	Gley 1 4/10Y; Ag2 Ga2; dark greenish grey sand and silt. Diffuse contact in to:
-0.80 to -1.20	3.60 to 4.00	Gley 1 5/10Y; Ga4 Ag+; greenish grey sand with a trace of silt. Occasional Mollusca becoming more frequent with depth.

Table 4: Lithostratigraphic description of borehole QBH3, Cockreed Lane, New Romney, Kent.

Depth (m OD)	Depth (m bgs)	Composition
2.80 to 2.40	0.00 to 0.40	Made Ground
2.40 to 1.15	0.40 to 1.65	10YR 5/4; As2 Ag1 Ga1; yellowish brown sandy silty clay. Diffuse contact in to:
1.15 to 0.93	1.65 to 1.87	10YR 5/4; As3 Ag1 Ga+; yellowish brown silty clay with a trace of sand. Detrital organic layer at 1.04 to 1.02m OD (As2 Ag1 Sh1 Dh+). Diffuse contact in to:
0.93 to 0.50	1.87 to 2.30	10YR 5/2; Ag2 As1 Ga1; greyish brown sandy clayey silt. Sharp contact in to:
0.50 to 0.33	2.30 to 2.47	10YR 2/1; Sh3 Th^{2}1; humo. 2; black humified herbaceous peat. Diffuse contact in to:
0.33 to -0.60	2.47 to 3.40	Gley 1 5/10Y; As2 Ag2 Dh+; greenish grey silt and clay with a trace of detrital herbaceous material. Diffuse contact in to:
-0.60 to -1.20	3.40 to 4.00	Gley 1 5/10Y; Ga3 Ag1; greenish grey silty sand.

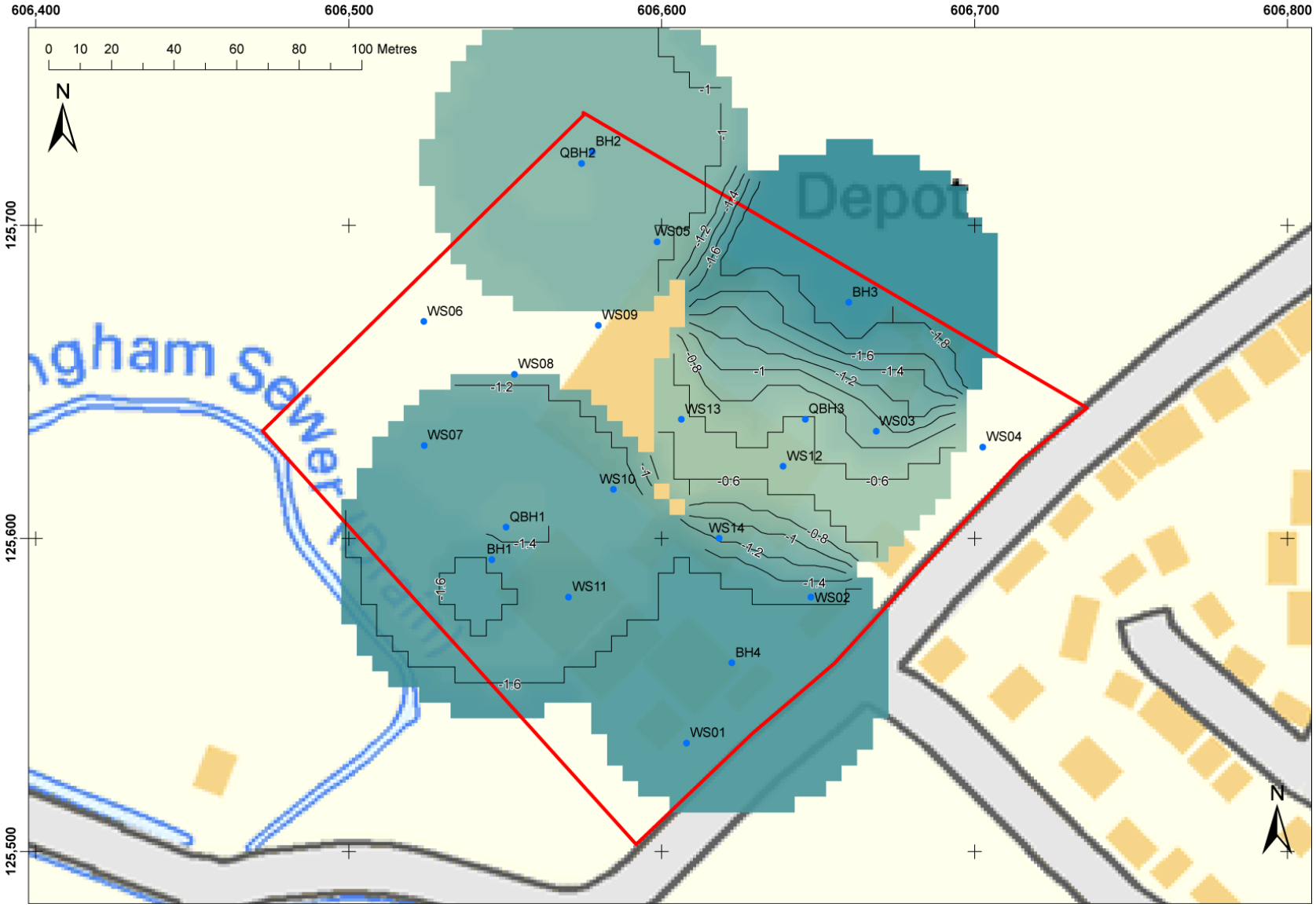

Figure 3: Modelled surface of the Sandy Tidal Flat Deposits (contour heights in metres OD).

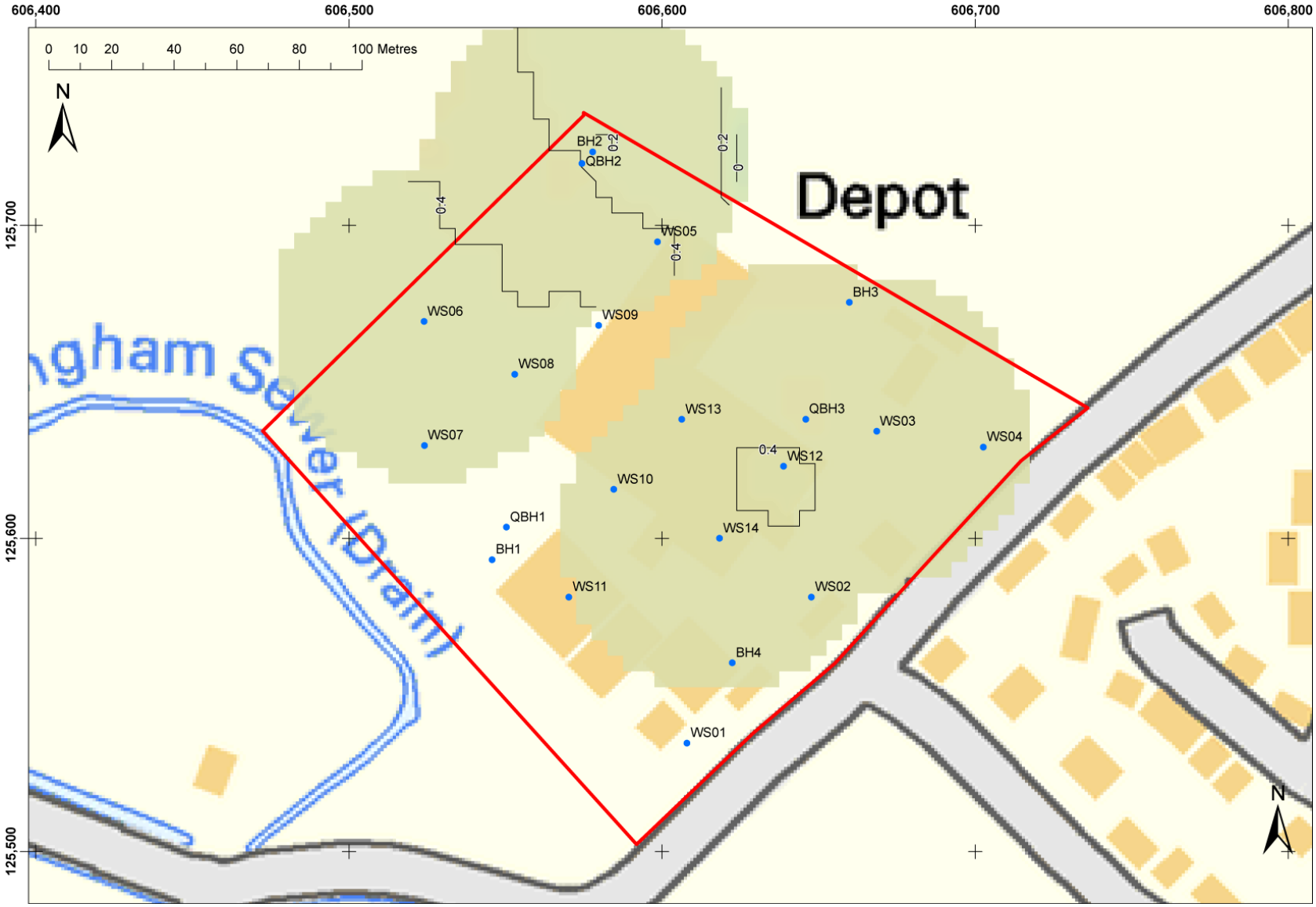

Figure 4: Modelled surface of the Peat (contour heights in metres OD).

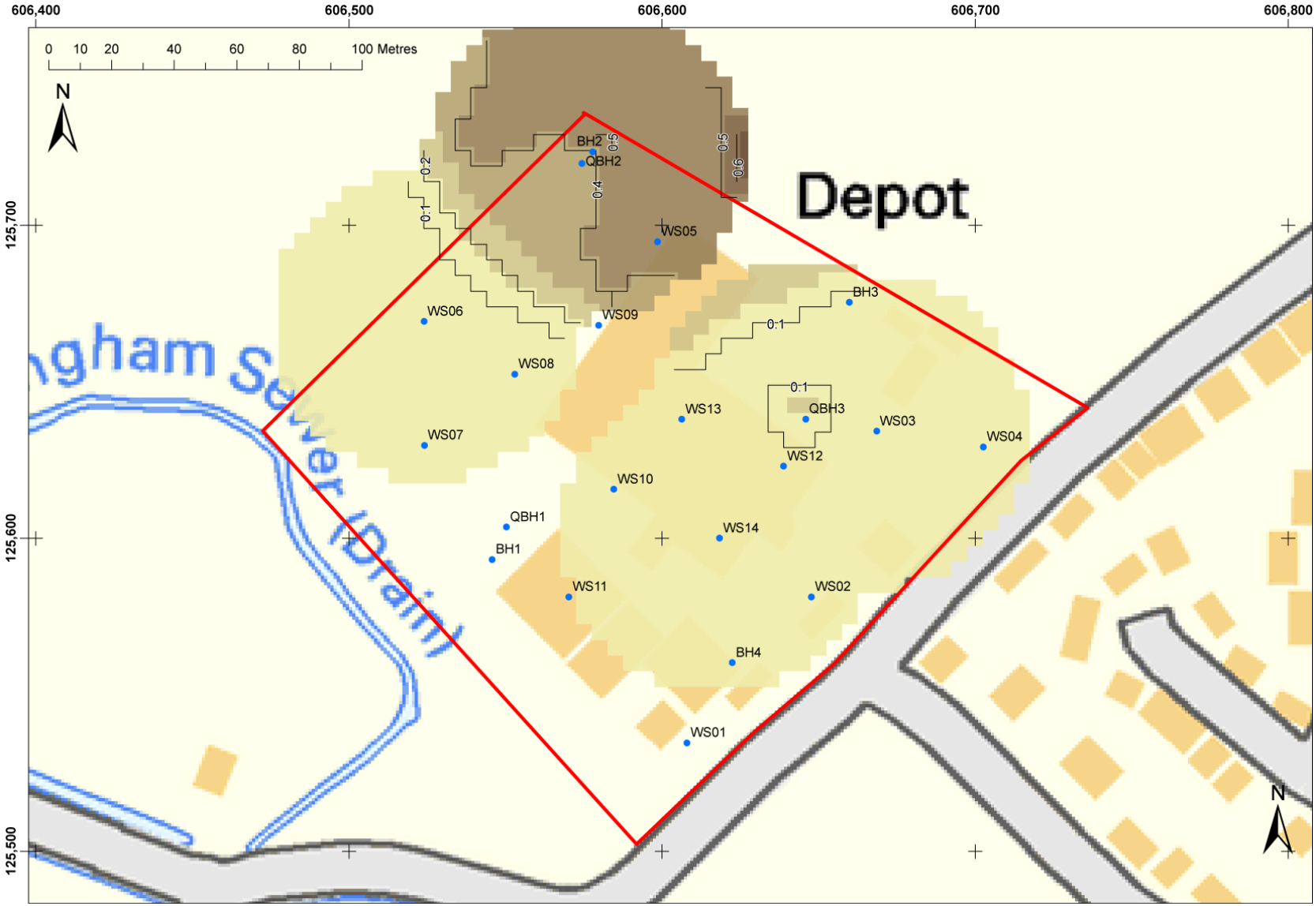

Figure 5: Modelled thickness of the Peat (contours in metres).

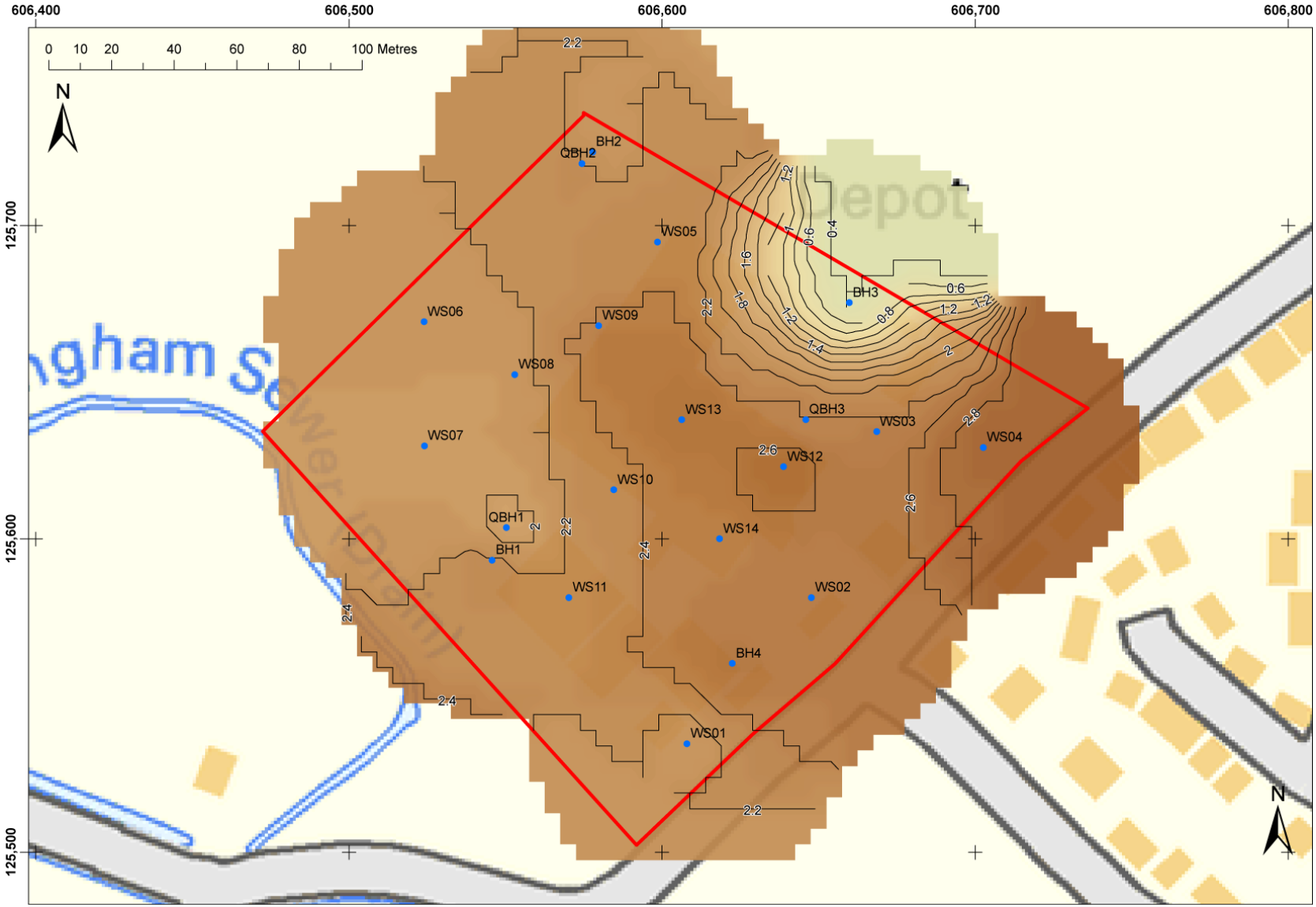

Figure 6: Modelled surface of the Alluvium (contour heights in metres OD).

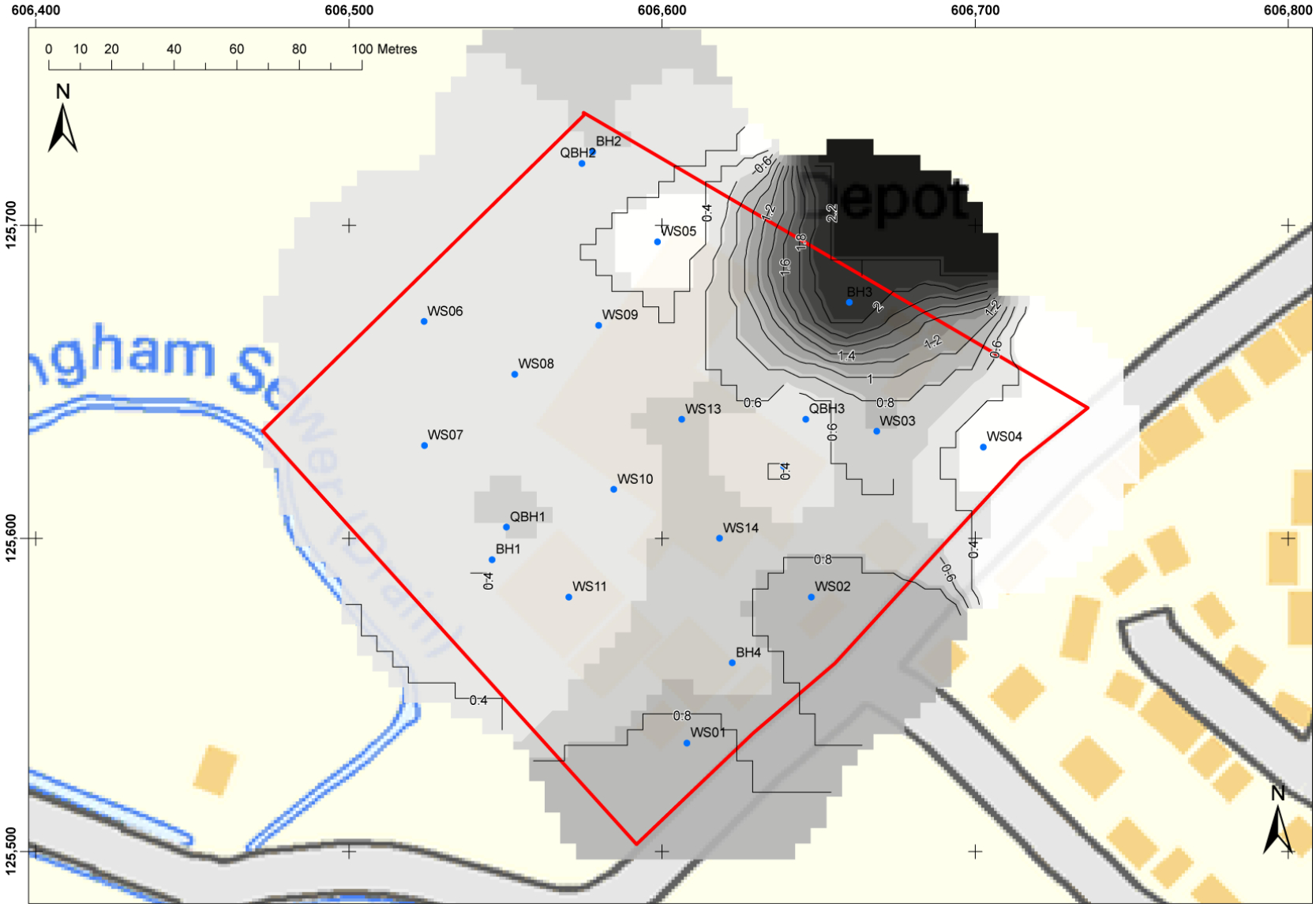

Figure 7: Modelled thickness of the Made Ground (contours in metres).

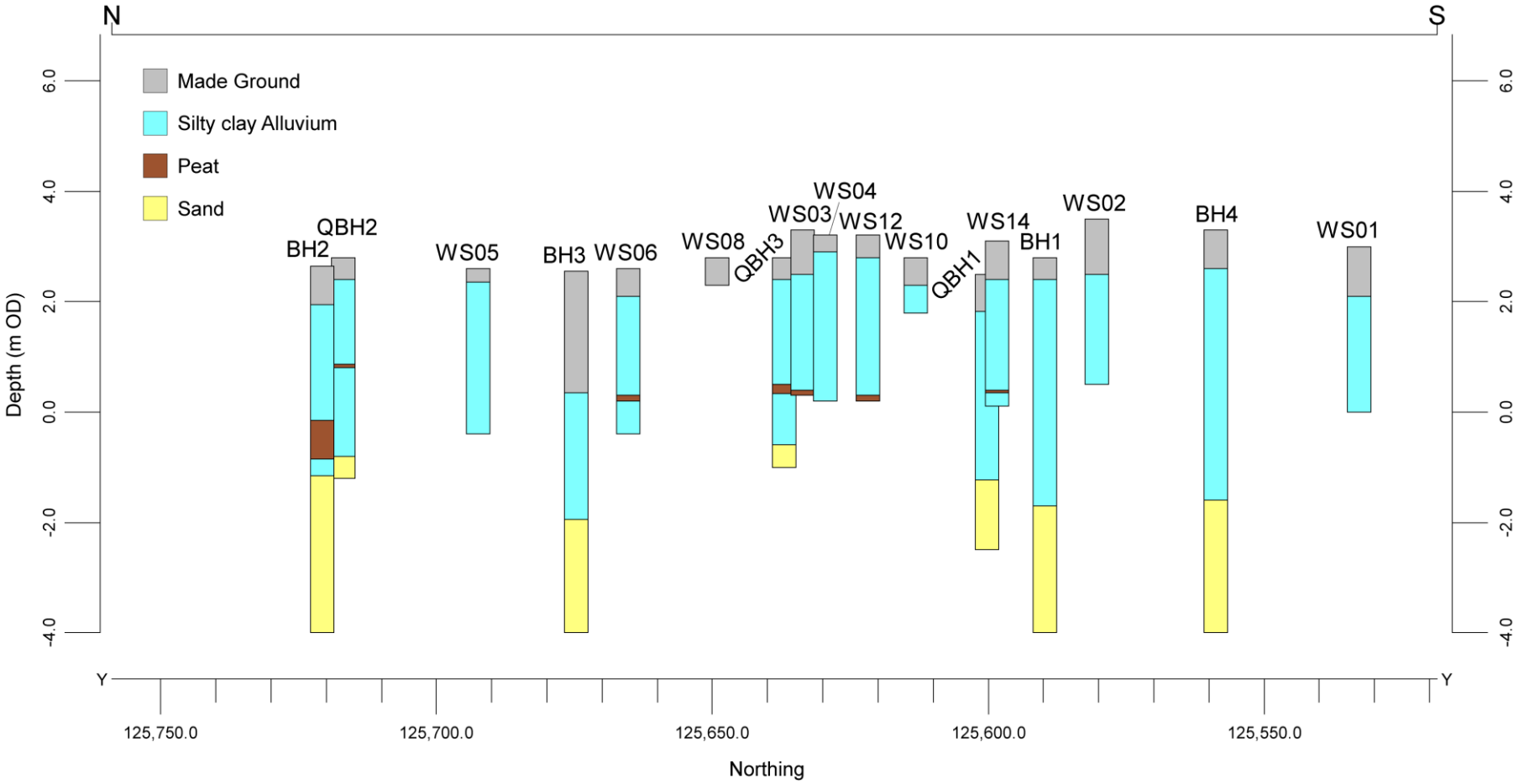

Figure 8: North-south transect of boreholes across the Cockreed Lane, New Romney site.

4. DISCUSSION, CONCLUSION & RECOMMENDATIONS

The aims of the geoarchaeological investigations at the Cockreed Lane site were (1) to clarify the nature of the sub-surface stratigraphy across the site; (2) to clarify the nature, depth, extent and date of any Alluvium and organic/Peat deposits; and (3) to investigate whether the sequences have the potential to contain any artefact or ecofact evidence for prehistoric or historic human activity. In order to achieve these aims three geoarchaeological boreholes were put down at the site, and a programme of deposit modelling undertaken incorporating the results previous geotechnical investigations.

The sequence at the site consists of predominantly sandy Tidal Flat Deposits to a level of between -1.95 and -0.6m OD, overlain by generally silty and clayey Alluvium, possibly related to salt-marsh formation (cf. Long & Innes 1993), to a level of between *ca.* 1.8 and 2.9m OD across much of the site. A thin horizon of Peat is recorded in seven of the 21 boreholes, generally at elevations between 0.0 and 0.5m OD, and present in thickness of between 0.05 and 0.2m. These results are consistent with investigations by Long *et al.* (2006), who show peat horizons up to *ca.* 2m thick in the area of Romney Marsh, generally lying at between *ca.* -1 and 1m OD but relatively thin or absent towards New Romney. As stated above, where Peat is recorded it is generally radiocarbon dated to between *ca.* 6000 and 1700 cal. BP, the lower sand units underlying the peat accumulating from *ca.* 7800 cal. BP (Long *et al.*, 2006). In one geotechnical borehole peat was recorded at a lower elevation of -0.15 to -0.85m OD; however, the reliability of this borehole is unclear given its close proximity to geoarchaeological borehole QBH2, in which the depth and thickness of the Peat is consistent with those boreholes elsewhere. Significantly, the Peat horizons recorded at the site represent a (perhaps synchronous) transition to semi-terrestrial conditions, supporting the growth of wetland vegetation and forming a land surface which might have utilised by prehistoric people.

The Peat recorded at the site is relatively thin, but has good potential to reconstruct the environmental history of the site and its environs. A limited environmental archaeological assessment of one sequence from the site is therefore recommended; this assessment should be focussed on borehole QBH3, in which the thickest Peat is recorded. This assessment should consist of: (1) radiocarbon dating of the base of the Peat, to establish a chronological framework for the environmental archaeological assessment; (2) organic matter determinations to aid identification of the sedimentary units; (3) assessment of the palaeobotanical remains (pollen, waterlogged wood and seeds) to provide a provisional reconstruction of the vegetation history; and (4) assessment of the diatoms to provide an indication of the palaeohydrology (e.g. marine, brackish or freshwater) of the site. The assessment will also highlight any indications of nearby human activity, and provide recommendations for further analysis (if necessary).

5. REFERENCES

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6. APPENDIX 1: OASIS

OASIS ID: quaterna1-245433

Project details

Project name	COCKREED LANE, NEW ROMNEY, KENT
Short description of the project	A programme of geoarchaeological investigation was carried out at the site in February 2016, including three new geoarchaeological boreholes and a programme of deposit modelling (incorporating existing geotechnical data), in order to (1) to clarify the nature of the sub-surface stratigraphy across the site; (2) to clarify the nature, depth, extent and date of any Alluvium and organic/Peat deposits; and (3) to investigate whether the sequences have the potential to contain any artefact or ecofact evidence for prehistoric or historic human activity. The sequence at the site consists of predominantly sandy Tidal Flat Deposits to a level of between -1.95 and -0.6m OD, overlain by generally silty and clayey Alluvium, possibly related to salt-marsh formation, to a level of between ca. 1.8 and 2.9m OD. A thin horizon of Peat is recorded in seven of the 21 boreholes, generally at elevations between 0.0 and 0.5m OD, and present in thickness of between 0.05 and 0.2m. These results are consistent with investigations by Long et al. (2006), who show peat horizons up to ca. 2m thick in the area of Romney Marsh, generally lying at between ca. -1 and 1m OD but relatively thin or absent towards New Romney. Significantly, the Peat horizons recorded at the site represent a (perhaps synchronous) transition to semi-terrestrial conditions, supporting the growth of wetland vegetation and forming a land surface which might have utilised by prehistoric people. The Peat recorded at the site is relatively thin, but has good potential to reconstruct the environmental history of the site and its environs; a limited environmental archaeological assessment of one sequence from the site was therefore recommended.
Project dates	Start: 01-12-2015 End: 11-03-2016
Previous/future work	No / Not known
Type of project	Environmental assessment
Survey techniques	Landscape

Project location

Country	England
Site location	KENT SHEPWAY NEW ROMNEY Cockreed Lane, New Romney, Kent

Postcode	TN28 8TW
Study area	3.15 Hectares
Site coordinates	TR 06600 25640 50.992386411575 0.944371553387 50 59 32 N 000 56 39 E Point

Project creators

Name of Organisation	Quaternary Scientific (QUEST)
Project brief originator	CgMs Consulting
Project design originator	D.S. Young
Project director/manager	C.R. Batchelor
Project supervisor	D.S. Young
Type of sponsor/funding body	Developer

Entered by	Dan Young (d.s.young@reading.ac.uk)
Entered on	11 March 2016