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Chapel Riverside, Southampton, Hampshire

Geoarchaeological Deposit Modelling



Ref: 107171.05
(SOU 1675)
March 2016



Chapel Riverside, Southampton, Hampshire

Geoarchaeological Deposit Modelling

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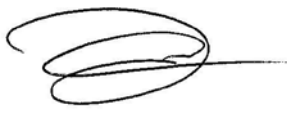
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Summary

Wessex Archaeology was commissioned by CgMs Consulting to undertake a programme of archaeological investigations at Chapel Riverside on the west bank of the River Itchen in Southampton (NGR 443030 111400). This followed an initial phase of geoarchaeological work (borehole monitoring) in November 2014, undertaken by Southampton Archaeology Unit. Subsequently, in December 2014, two trial trenches were excavated in the north-west portion of the Site, where Anglo-Saxon, medieval and early post-medieval features are known to be concentrated. This had been established on the basis of limited previous investigations within the Site, excavations in the vicinity, and documentary and cartographic evidence. Much of the remainder of the Site was, prior to the construction of two mill ponds (probably in the later medieval period), lower-lying, tidal riverside marsh.

Further to the 2014 geoarchaeological work, a second phase of investigation consisting of borehole monitoring and deposit modelling was undertaken between January and March 2016. This confirmed the extent of natural Brickearth in the north-west corner of the Site, where Anglo-Saxon and pre-modern activity was focussed, and provided further information on the mill pond deposits. Models produced of the surface of the Tidal Flat deposits (TFD) and the underlying River Terrace deposits (RTD) indicate the general area of the former shoreline prior to reclamation of the foreshore to form the present day river edge / quayside, which lies approximately 150m to the east.

Examination of the deposit records also showed the location of one or more layers of peat, noted in 2014, extending along approximately 125m of the north-east boundary of the site, adjacent to the River Itchen. This peat was recorded at depths of between -4.5m OD and -8m OD, and is thought most likely to have formed in the earlier part of the prehistoric period. A Mesolithic–Neolithic date range can be provisionally suggested, though the sequence currently remains undated.

Based on what is currently understood, the removal of the existing storm water tanks and construction of the replacement tanks in the eastern part of the Site is unlikely to expose or impact on the known peat deposits. Otherwise, the impact of piling and construction works will be confined almost entirely to made ground and alluvial deposits.



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Thanks are also due to David Hastings of WDE Consulting for the provision of deposit data gathered during the two phases of geotechnical site investigations. Ingrid Peckham, Historic Environment Record Officer at Southampton City Council, made a number of useful and pertinent comments on an earlier version of this report, which have been taken account of here, and we would like to acknowledge her assistance with the geological sequence in particular.

Richard Payne and Phil Andrews monitored the borehole work carried out by WDE Consulting in 2016. Geoarchaeological deposit modelling was undertaken by Richard Payne, and the figures were produced by Kitty Foster. Phil Andrews edited this report and the project was managed for Wessex Archaeology by Andrew Crockett.



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Geoarchaeological Deposit Modelling

1 INTRODUCTION

1.1 Project background

- 1.1.1 Wessex Archaeology (WA) was commissioned by CgMs Consulting (the Client) to undertake a geoarchaeological deposit modelling exercise on a 4.4ha block of land alongside the Itchen Riverside in Southampton, Hampshire, hereafter referred to as the 'Site'. The Site (Southampton site code: SOU 1675) is centred on National Grid Reference NGR 443030 111400 (**Figure 1**).
- 1.1.2 The Site is located within Area 8 of the Local Areas of Archaeological Potential (LAAP), which is one of sixteen areas defined in the City of Southampton Core Strategy, and which offers a general guide to the archaeological potential in Southampton.
- 1.1.3 The Site is part of the proposed Chapel Riverside development, which is to create a new city quarter for Southampton City along the Itchen Riverside. The Site is to host a mixture of commercial buildings, residential dwellings and public open space.
- 1.1.4 The Southampton City Council (SCC) Planning Archaeologist (within the Historic Environment Team, which forms part of the Planning, Transport and Sustainability Division) has been consulted. Following this, a phased programme of archaeological work on the Site was requested by SCC.
- 1.1.5 In November 2014 Southampton Archaeology Unit (SAU) undertook an initial phase of geoarchaeological work on the Site relating to the current proposals for development (see below; Russel 2014).
- 1.1.6 The phase 1 evaluation of the current programme of works, comprising two trenches and undertaken in December 2014, focused on the north-west corner of the Site. The evaluation confirmed the presence of Mid-Saxon and medieval deposits on the slightly higher (and what would have been drier) ground in this area (Wessex Archaeology 2015).
- 1.1.7 The geoarchaeological work undertaken between January and March 2016 (reported on here) was designed to complete the main phase of geotechnical investigations on the Site and provide further information to guide the programme of archaeological works.

1.2 The Site

- 1.2.1 The Site is located on the western bank of the River Itchen, just above its confluence with the River Test. It comprises a 4.4ha block of land which is bounded to the east and north-east by the River Itchen and to the south by Crosshouse Road. To the west lies Albert Road, Elm Terrace and Endle Street (**Figure 1**).
- 1.2.2 The natural topography of the Site has been fundamentally altered by successive phases of reclamation and development. Today, the land within the Site ranges in height from

3.98m OD to 2.36m OD, with a gradual downward slope south-east towards the River Itchen. The area of the Site is mapped by the BGS as Tidal Flat Deposits (TFD) over clay, silt and sand of the Wittering Formation of the Bracklesham Group (BGS website; <http://www.bgs.ac.uk>).

- 1.2.3 It is worth noting that the BGS online search tools only list the main superficial (formerly referred to as drift) unit and the upper bedrock unit upon which the superficial deposits lies. In the case of the Chapel Riverside, TFD is listed as the superficial deposit overlaying the bedrock across the Site. From the BGS lexicon of named rock units (<http://www.bgs.ac.uk/Lexicon/lexicon.cfm?pub=TFD>) TFD are given a generic description, which describes them as Holocene in date and usually comprised of soft silty clay with layers of sand, gravel and peat deposited in the intertidal zone. From the ground investigation works not only were layers of peat located within the intertidal TFD, but the TFD were also found to be overlying River Terrace Deposits (RTD), which are not mapped across the Site in the latest BGS online map of superficial deposits for that area.
- 1.2.4 The Site has been cleared of buildings and structures associated with its previous use as the Town Depot and recycling centre, and it is currently partly occupied by three large long-established stormwater tanks and several small, temporary structures. However, the vast majority of the area is covered either by concrete or tarmac, and is currently used as a cargo handling centre and for vehicle storage.

1.3 Historical and archaeological background

- 1.3.1 An earlier desk-based assessment (Cottrell 2009) and previous fieldwork have established that there is a clear archaeological interest within the Site, primarily in the north-west corner. Here, there is a known potential for the survival of remains relating to the Mid- to Late Saxon waterfront, Holy Trinity Chapel (in existence by 1217) with associated burials, and a medieval and later mill (in existence by 1220 and a tide mill by the 17th century).
- 1.3.2 Much of the remainder of the Site was, prior to the construction of two mill ponds (probably in the later medieval period), lower-lying, tidal riverside marsh. The mill ponds were gradually infilled during the second half of the 19th century, and wharves and shipbuilding facilities along with various industrial and commercial premises established in the eastern part of the Site, whilst terraced housing was built to the west.
- 1.3.3 The two large settling tanks which survive on the Site were constructed in the later 19th century as part of a drainage scheme for the eastern side of Southampton, with a large refuse destructor subsequently installed as part of this scheme.

2 GEOARCHAEOLOGICAL BACKGROUND

2.1 Introduction

- 2.1.1 The earlier desk-based assessment established that in addition to archaeologically significant remains, in particular dating to the Mid- to Late Saxon and the medieval to post-medieval periods, the location of the Site suggests that there may also be palaeo-environmental data of early prehistoric date contained at depth within the alluvial sequences of the River Itchen (Cottrell 2009).
- 2.1.2 In November 2014 Southampton Archaeology Unit undertook an initial phase of geoarchaeological work on the Site relating to the current proposals for development. This comprised the monitoring of 11 boreholes and 22 window samples, predominantly in the southern half of the Site (Russel 2014). The geotechnical logs from the 2014 phase of the

ground investigation were examined and incorporated in the report below, and included in **Table 1**, with the exception of any that only recorded made ground.

- 2.1.3 In January 2016 Wessex Archaeology Unit carried out a subsequent phase of geoarchaeological work on the Site. A further four boreholes and 27 window samples were monitored and recorded. The results of this work are reported on below, with further details provided in **Table 1**.
- 2.1.4 As part of the geoarchaeological investigations on the Site, a deposit modelling exercise was undertaken based on the records from the 2014 and 2016 monitoring works.
- 2.1.5 In broad format and content this report conforms with current best practice and to the guidance outlined in *Management of Research Projects in the Historic Environment* (MoRPHE) (English Heritage 2006) and *Geoarchaeology. Using Earth Sciences to Understand the Archaeological Record* (English Heritage 2007).

2.2 Deposit sequence

- 2.2.1 In order to put the Site in its geoarchaeological context, the sub-surface deposits as mapped by the BGS, and using data from other sources (e.g. excavation records) are summarised below.

Bracklesham Group

- 2.2.2 The bedrock underlying the superficial quaternary deposits is often recorded as a dense to very dense silty to sandy clay, often laminated, belonging to the Wittering Formation, overlying London Clay, and of Eocene date.

Quaternary

- 2.2.3 The bedrock geology is overlain by coarse-grained mineral-rich deposits of sand and gravel representing Pleistocene sands and gravels. In the north-west of the Site these sands and gravels are recorded as being overlain by silty clay Brickearth.

Holocene

- 2.2.4 The Pleistocene sands and gravels are overlain by fine-grained alluvial deposits of sand, silt and clay, often organic-rich, and representative of low-energy deposition. In boreholes located in the north-east of the Site adjacent to the River Itchen, peat has been recorded as overlying the sands and gravels, this in turn sealed by estuarine alluvial deposits.
- 2.2.5 The alluvial clays (and Brickearth in the northwest corner of the Site) are overlain by modern made ground.

3 AIMS AND METHODS

3.1 Aims

- 3.1.1 The broad aim was to use borehole and window sample data to model and map the sub-surface topography of the Site, with suitable illustrations, discussion and interpretation.
- 3.1.2 In particular, the aim was to confirm the geological sequence, define the extent of the Brickearth (where Anglo-Saxon and medieval activity was focussed), clarify the presence and extent of the intertidal silt and peat deposits, and provide more details of the depth and nature of the mill pond (later timber ponds) deposits.

- 3.1.3 The results will provide information about the nature of the deposits likely to be impacted when the existing storm water tanks are removed and the replacement tanks constructed, as well as the impact of proposed piling and construction works on such deposits.

3.2 Methods

- 3.2.1 Outlined below are the methods employed during the collection, description and interpretation of the geotechnical records.
- 3.2.2 The 15 boreholes (including DBH 1–4 in 2016) were drilled by driving a 200mm diameter hollow shell auger into the ground to approximately 20m depth and extracting the deposits by bringing them to the surface in the auger.
- 3.2.3 The 49 window samples (including WS 24–50 in 2016) were drilled by driving a 100mm diameter steel tube into the ground to depths of up to 6m (generally 4m; a small number failed) and extracting the deposits in 1m lengths in a plastic sleeve held inside the tube. The tubes were cut open on site to allow examination of the cores, after which they were disposed of.
- 3.2.4 The locations of window samples 24-50 were surveyed in using GPS equipment, the locations of the other boreholes were not surveyed in at the time of drilling and as such their positions are approximate.
- 3.2.5 All archaeological records were made using the Wessex Archaeology recording system. In particular, auger log sheets were used to record the sequences of deposits for each of the boreholes and window samples.
- 3.2.6 A few finds comprising CBM and shell were noted but not retained. Those from window samples can be confidently assigned to contexts but the shell auger-retrieved finds from the boreholes may well have become transposed to other contexts.
- 3.2.7 The archive will be stored by Southampton City Council Museums on completion of the project
- 3.2.8 The deposit records obtained from the 2014 and 2016 geotechnical works, as well as the 2014 geotechnical works watching brief records (Russel 2014), together with suitable records obtained from the BGS, were entered into industry-standard software (Rockworks™ v17.0). For consistency, the modelling was carried out using geoarchaeological interpretation of geotechnical data, rather than the results of archaeological monitoring of that data. However, the results of that archaeological monitoring have been considered within this report (for example, where they have identified possible Brickearth, which would be recorded differently by a geotechnical engineer), along with other observations made by the attending geoarchaeologist and field archaeologists on site during these works.
- 3.2.9 Information on the extent of the Brickearth was derived directly from the monitoring records for the boreholes, and this was used to produce a plan of its approximate limits (**Figure 2**). From the Rockworks programme a subsurface model was produced in the form of a Digital Elevation Model (DEM) of the upper surface of the Tidal Flat deposits (**Figure 3**) and the Pleistocene sands and gravels underlying them (**Figure 4**). There was a good coverage of deposit records across the Site and the models produced will have a good to high level of accuracy. However, as all models can only be based on the deposit information known at the point of data collection (i.e. the borehole or test pit) the information provided by the models must be used with caution and only as a guide.

4 RESULTS

Made ground

- 4.1.1 Made ground was encountered across the Site and was recorded as ranging in thickness from 0.1m in BH4 in the north of the Site to 6.6m in BH5 in the east adjacent to the River Itchen.

Brickearth

- 4.1.2 Clayey silt deposits interpreted as “Brickearth” were recorded in the north-west corner of the Site (in BH 1 and WS 24–26, as well as 2014 evaluation trench 1), in what has been designated area 1 (following Russel 2014; **Figure 2**), at a depth of approximately 1m. It was up to 0.6m thick and overlay Pleistocene sands and gravels. Probable re-worked Brickearth and alluvial silt was recorded in 2014 evaluation trench 2 approximately 30m to the east of trench 1, presumably on the edge between the higher, drier ground (in the Saxon and medieval periods) and the river. This broadly accords with the results from the earlier evaluation (SOU 652) in this area, where Brickearth 0.2m thick was recorded, with gravels further to the south but also in one trench to the north (Kavanagh 1994).

Alluvium

- 4.1.3 Alluvium in the form of Tidal Flat deposits (TFD) was recorded across most of the Site and ranged in thickness from 0.2m in WS50 in the eastern half of the Site to 4.9m in BH4 in the north.
- 4.1.4 From the digital elevation model (DEM) of the upper surface of the Tidal Flat deposits (with clayey silt “Brickearth” deposits where recorded) (**Figure 3**), these alluvial clays were mapped at a maximum height of approximately 2m OD in the north of the Site to approximately -3m OD in the east adjacent to the river.
- 4.1.5 In general, the alluvial deposits were higher to the west and sloped down to the south and east towards the river.
- 4.1.6 In area 2, the inner millpond (see Figure 2), the alluvial silts/clays occurred approximately 2.6–3m below the present surface, whereas in area 4, the outer millpond, they occurred 4–5m below the surface. However, it was not clear how much of these deposits represent silt/clay deposition within the tidal ponds and how much may represent river silts that predate them, and these figures may oversimplify the topography of the bottom of the ponds.
- 4.1.7 As with the 2014 geoarchaeological investigations, the evidence for the bank between the inner and outer millponds (area 3) was inconclusive, not surprising perhaps if this comprised material dredged from the alluvium, which would be very difficult to distinguish from borehole evidence alone. Similarly, evidence for the outer bank (area 5) to the millponds could not be discerned from any of the borehole records.

Peat

- 4.1.8 Peat deposits were recorded in four records, BH4, BH5, DBH3 and DBH4 (**Figure 4**), all located along the north-eastern edge of the Site (area 6), adjacent to the existing, later 19th century edge of the River Itchen but within the former, pre-reclamation course of the channel. The upper surface of the peats were encountered at depths that ranged from --2.5m OD in BH4 to -5.3m OD in BH4 to -7.98m OD in DBH3, the range of depths suggesting that at least two separate deposits are represented in the records. The thickness of the peat(s) ranged from 0.4m in DBH3 to 1.2m in BH5 to as much as 2.3m in DBH4, and all overlay the River Terrace deposits. They indicate a period of stabilisation

before burial by estuarine alluvium/Tidal Flat deposits resulting from marine transgression due to sea level rise.

Pleistocene sands and gravels

- 4.1.9 The Pleistocene sands and gravels in the form of River Terrace deposits were recorded across the Site. They ranged in thickness from 0.1m in WS5 in the centre of the north half of the Site to 8.6m in DBH1 in the east adjacent to the river.
- 4.1.10 The DEM of the upper surface of the River Terrace deposits (**Figure 4**) indicates that they are at their highest at approximately 0.9m OD in the west of the site adjacent to Albert Road North, sloping down to their lowest level at approximately -8m OD in the east.

5 CONCLUSIONS

- 5.1.1 The modelled surface of the Pleistocene sands and gravels, in the form of River Terrace deposits, clearly show the edge of the channel formed by the River Itchen, with the surface of the gravels gradually rising to the west away from the river. The surface contains both minor highs and depressions within it; these may be natural, but the effect of truncation due to the former development (e.g. the mill ponds and subsequent post-medieval timber ponds) that has occurred cannot be ruled out.
- 5.1.2 At the current edge of the River Itchen, adjacent to the north-east boundary of the Site, was a layer of peat that extended along an area approximately 125m in length. This layer (or layers) of peat was recorded at between -4.5m OD and -8m OD and overlay the River Terrace deposits. The different heights of the peat recorded within the boreholes indicates the possibility of the formation of perhaps two or more channel-edge peat deposits, before these was inundated by estuarine alluvium as sea levels rose. The upper surface of the estuarine alluvium overlying the peat was recorded as 2.1m OD at BH4, -3.3m OD at BH5, -3.28m OD at DBH3 and -3.4m OD at DBH4
- 5.1.3 Although the peat deposit(s) remains undated, it is thought most likely that they formed in the earlier prehistoric period. A Mesolithic–Neolithic date range can be provisionally suggested, on the basis of dated deposits recorded elsewhere in the lower reaches of the River Test and River Itchen in Southampton (e.g. Nicholls and Scaife 2008; Allen *et al.* 2009).
- 5.1.4 The digital elevation model (DEM) of the estuarine alluvial deposits followed that of the River Terrace deposits in that they were also higher to the west and sloped down to meet the river in the east.
- 5.1.5 Both of these models, together with the depth of made ground across the Site, indicate the location of the old shore line prior to land reclamation and the establishment of the present river edge/quayside in the mid-19th century, showing it to have been approximately 150m to the west of where it is today. This fairly closely corresponds with the eastern extent of the Brickearth, which defined the higher, drier ground on which Saxon and medieval activity was focussed. The 2016 geoarchaeological work has also shown the Brickearth to extend along the entire 80m western edge of the Site, along the Albert Road North frontage, and continuing further to the south beyond Elm Terrace (**Figure 2**).
- 5.1.6 Furthermore, the 2016 geoarchaeological work has confirmed the results of the 2014 work (Russel 2014) in regards to the millponds. In particular, it has shown that the bottom of the inner pond is at a depth of approximately 2.6m below current ground level, and the bottom of the outer pond lies at a depth of 4–5m. However, it is unclear if some of the deposits



encountered represent (tidal) silting within the millponds or were intertidal silts that predated them. Also, no clear evidence was identified of the bank between the two millponds, or the outer bank separating them from the river, though this may reflect the dredged material likely to have been used to create the banks, as well as the 'keyhole' nature of the borehole investigations, and the figures may mask local variations in the basal topography of the two ponds.

- 5.1.7 Based on what is currently understood, the removal of the existing storm water tanks and construction of the replacement tanks in the eastern part of the Site is unlikely to expose or impact on the known peat deposits. Otherwise, the impact of piling and construction works will be confined almost entirely to made ground and alluvial deposits, though it will impact on the outer causeway of the outer millpond in this area.



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Table 1: Details of boreholes (BH/DBH), window samples (WS) and BGS records consulted for 2016 deposit modelling (WDE = Geotechnical engineers, BGS = British Geological Society, WA = Wessex Archaeology)

Deposit record	Depth to top	Depth to base	Lithology	Comment	SCCAU Observations (SOU1672)
WDE - BH1 2.6m OD	0	1.35	Made Ground		0 – 0.3m modern 0.3 – 1.5m made ground 1.5 – 2.0m yellow brown silty clay 2.0 – 2.3m brown clay (poss Brickearth) 2.3 – 3.3m River Terrace coarse gravel 3.3 – 10m Wittering Formation
	1.35	2.25	Soft brown slightly gravelly Clay	Alluvium	
	2.25	4.55	Dense yellow brown slightly sandy Gravel	River Terrace Gravels	
	4.55	10	Stiff to very stiff slightly silty Clay	Wittering Fm	
WDE - BH2 2.69mOD	0	3.1	Made Ground		0 – 3.5m Made ground 3.5 – 4.3m River Terrace gravels 4.3 – 5.7m Wittering Formation
	3.1	3.8	Medium dense brown grey slightly sandy fine to coarse Gravel	River Terrace Gravels	
	3.8	10	Stiff to v still brown mottled grey Clay	Wittering Fm	
WDE - BH3 2.69m OD	0	2.3	Made Ground		0 – 1.7m Made ground 1.7 – 2.6m dark grey intertidal silts 2.6 – 4.6m River Terrace gravels 4.6 – 5.4m Wittering Formation
	2.3	4.1	Medium dense yellow brown sandy to coarse Gravel	River Terrace Gravels	
	4.1	10	Firm to stiff grey Clay	Wittering Fm	
WDE - BH4 2.5m OD	0	0.1	Made Ground		0 – 0.3 Modern 0.3 – 1.5m Brown soil 1.5 – 4.2m Dark grey intertidal silts 4.2 - 5.0m Coarse gravel 5.0 – 6.5m D grey brown sandy clay 6.5 – 7.7m Black peat 7.7m – 9.5m River Terrace gravels
	0.1	1.7	Soft grey sandy Silt	Alluvium	
	1.7	4.2	Grey sandy fine to coarse Gravel	Coarse alluvium	
	4.2	5	Soft grey sandy silt	Alluvium	
	5	6.3	Organic, brown fibrous	Peat	
	6.3	9.7	Mediun dense Sandy Gravel	River Terrace Gravels	
WDE - BH5 3.3m OD	0	6.6	Made Ground		0 – 6.5m Made ground
	6.6	9.3	Soft grey sandy Silt	Alluvium	



	9.3	11.9	Organic, brown fibrous	Peat	6.5 – 10.1m Grey brown sandy clay 10.1 – 11.2m Black peat 11.2 – 12.2m silty clay with black gravel 12.2 – 15.1m River Terrace gravels
	11.9	15.5	V dense slightly sandy Gravel	River Terrace Gravels	
WDE - BH6 3.22m OD	0	2.3	Made Ground		0 – 2.3m Made ground 2.3 – 4.0m Gravelly intertidal silts
	2.3	3.6	Grey sandy Silt (strong hydrocarbon smell)	Alluvium	
	3.6	4.1	Medium dense grey sandy fine to coarse gravel (Refusal at 4.10m due to metal obstruction-Drillers note)	River Terrace Gravels	
WDE - BH7 3.13m OD	0	3.2	Made Ground		0 – 3.0m Made ground 3.0 – 4.0m Dark grey intertidal silts 4.0 – 10m Wittering Formation
	3.2	3.9	Grey sandy Silt	Alluvium	
	3.9	5.8	Medium dense grey fine to coarse Gravel	River Terrace Gravels	
	5.8	14	Stiff silty sandy Clay	Wittering Fm	
WDE - BH9 3.25m OD	0	2.7	Made Ground		0 – 2.4m Made ground 2.4 – 4.4m D grey intertidal silts 4.4 – 10m Wittering Formation
	2.7	3.2	Soft grey sandy sandy Silt	Alluvium	
	3.2	4.9	Grey slightly sandy silty clayey Gravel	River Terrace Gravels	
	4.9	14.5	Stiff sandy Clay	Wittering Fm	
WDE - BH10 3.25m OD	0	2.1	Made Ground		0 – 1.4m Made ground 1.4 – 2.4m Brown clay 2.4 – 4.8m D grey intertidal silt with wood fragments 4.8 – 5.2m Wittering Formation
	2.1	3.4	Soft grey sandy sandy Silt	Alluvium	
	3.4	4.5	Slightly sandy gravelly silt	River Terrace Gravels	
	4.5	10	Sandy Clay	Wittering Fm	
WDE - DBH1 2.69m OD	0	5.5	Made Ground		Not monitored by SCCAU
	5.5	7.0	Soft grey slightly sandy gravelly silt	Alluvium	
	7.0	8.95	Soft grey clay	Alluvium	
	8.95	17.55	Sandy Gravel	River Terrace Gravels	
	17.55	21	Sand	Wittering Fm	
WDE -	0	0.85	Made Ground		Not monitored by



DBH2 2.5m OD	0.85	5.5	Sft brown Gravelly Clay	Alluvium becoming River Terrace Gravels	SCCAU
	5.5	8.5	Very clayey medium to coarse Gravel, becoming sandy gravel with depth	River Terrace Gravels	
	8.5	13.2	Firm Silty Clay	Wittering Fm	
WDE - DBH3 3.22m OD	0	6.5	Made Ground		Not monitored by SCCAU
	6.5	11.2	Silty Clay	Alluvium	
	11.2	11.6	Organic	Peat	
	11.6	14.75	Gravel	River Terrace Gravels	
	14.75	15.35	Silty Sand	Wittering Fm	
WDE - DBH4 2.5m OD	0	5.9	Made Ground		Not monitored by SCCAU
	5.9	7.8	Clayey Silt	Alluvium	
	7.8	10.1	Organic	Peat	
	10.1	15	Gravel	River Terrace Gravels	
BGS- SU41SW366 2.43m OD	0	4.14	Made Ground		Not monitored by SCCAU
	4.14	5.14	Silty Clay	Alluvium with organics	
	5.14	9	Silty Clay	Wittering Fm	
BGS - SU41SW511 3.42m OD	0	2.9	Made Ground		Not monitored by SCCAU
	2.9	3.4	Sandy Clay	Alluvium	
	3.4	5.9	Gravel	River Terrace Gravels	
	5.9	15.45	Sandy Clay	Wittering Fm	
BGS - SU41SW513 3.43m OD	0	4.5	Made Ground		Not monitored by SCCAU
	4.5	5.2	Silty Clay	Alluvium	
	5.2	7	Gravel	River Terrace Gravels	
	7	15	Sandy Clay	Wittering Fm	
BGS - SU41SW514 3.25m OD	0	4.4	Made Ground		Not monitored by SCCAU
	4.4	6	Gravel	River Terrace Gravels	
	6	15	Sandy Clay	Wittering Fm	
WDE - WS1 2.78m OD	0	4.9	Made Ground		0 – 2.0m Made ground` 2.0 – 4.9m Intertidal
	4.9	6	Firm slightly Gravelly Clay, medium to coarse	River Terrace Gravels	



			gravels sub-angular to sub-rounded		silts and clays containing 19 th /20 th Century finds 4.9 – 6.0m Grey river valley silts
WDE - WS2 2.78m OD	0	0.7	Made Ground		0 – 1.0 Made ground 1.0 – 2.1 Dark grey intertidal silts 2.1 – 3.1m Wittering Formation
	0.7	3	Silty Clay	Alluvium	
WDE - WS3 2.81m OD	0	1.3	Made Ground		0 – 2.2m Made ground 2.2 – 3.7m Grey clay and gravel poss Wittering Fm?
	1.3	2.35	Gravelly Clay	Coarse alluvium/River Terrace Gravels	
	2.35	4	Medium dense brown grey fine to coarse sub-rounded to angular Gravel	River Terrace Gravels	
WDE - WS4 2.79m OD	0	4	Made Ground		0 – 4m Made ground
WDE - WS5 2.79m OD	0	3.9	Made Ground		0 – 2m Made ground 2.0 – 4.0m Dark grey intertidal silts
	3.9	4	Medium dense grey silty fine to coarse sub-angular to sub-rounded GRAVEL	River Terrace Gravels	
WDE - WS9 2.75m OD	0	2.2	Made Ground		0 – 2.0m Made ground 2.0 – 2.5m Dark grey intertidal silts 2.5 – 1.5m Wittering Formation
	2.2	3.2	Soft grey clay with shells	Alluvium	
	3.2	4	Loose, slight sand slight cobble, Gravel	River Terrace Gravels	
WDE - WS13 2.5m OD	0	3.05	Made Ground		0 – 1.6m Made ground 1.6 – 3.0m Dark grey intertidal silts
	3.05	4	soft grey silty clay	Alluvium	
WDE - WS15 2.5m OD	0	1.95	Made Ground		0 – 1.55m Made ground 1.55 – 3.0m Dark grey intertidal silts
	1.95	3	Soft green grey Silt	Alluvium	
WDE - WS17 3m OD	0	2.85	Made Ground		0 – 2.0m Made ground 2.0 – 4.0m Dark grey intertidal silts
	2.85	4	Soft black grey silt Silt	Alluvium	



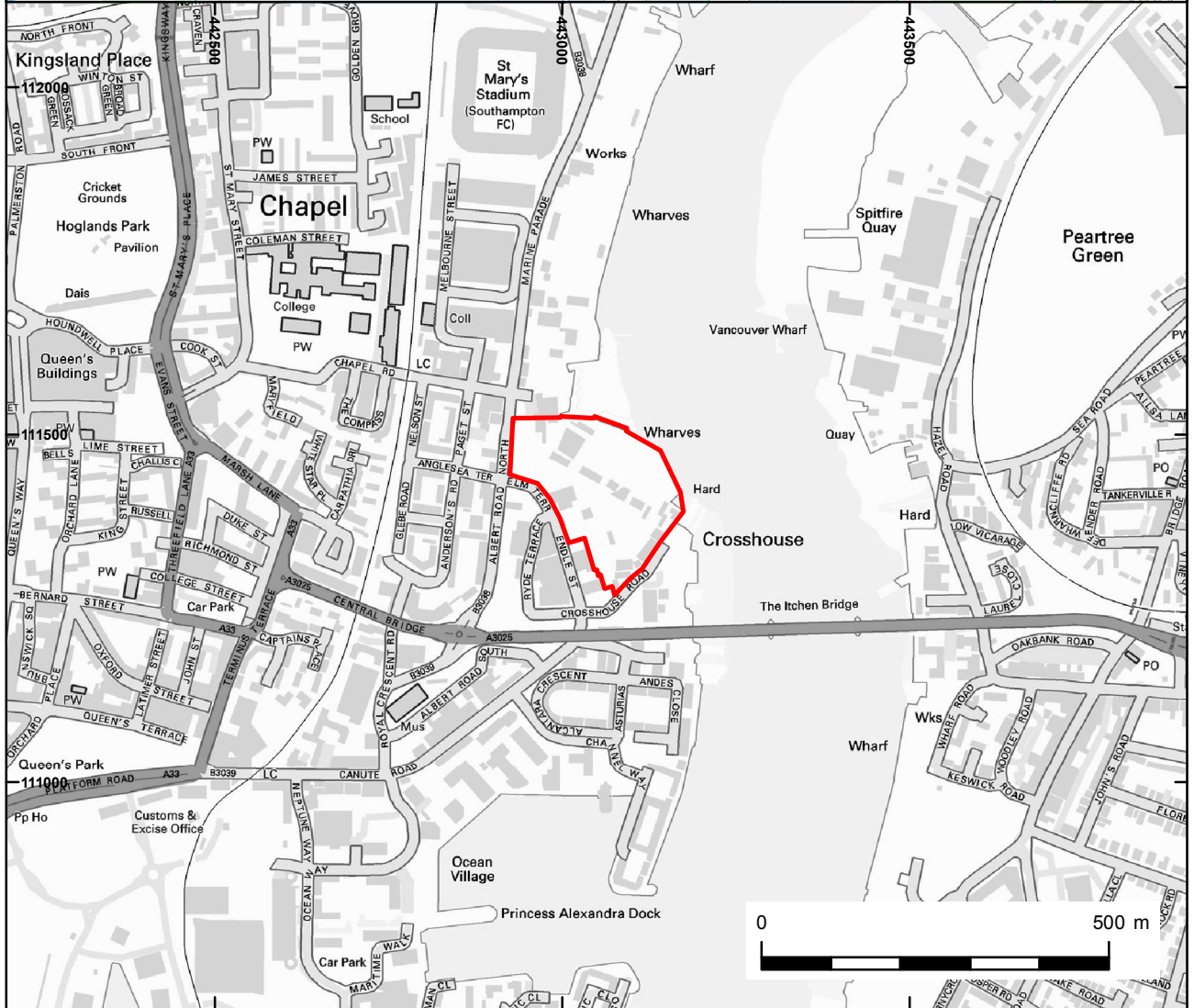
WDE - WS18 3m OD	0	2.4	Made Ground		0 – 1.6m Made ground 1.6 – 3.0m Grey intertidal silts
	2.4	3	soft black clayey Silt	Alluvium	
WDE - WS24 2.64m OD	0	1.5	Made Ground (Watching brief observations interpreted deposits at base of unit from 1.1 – 1.5m as possible plough soil over a clayey silt “Brickearth”		Not monitored by SCCAU
	1.5	3.8	Gravel	River Terrace Gravels	
	3.8	4	Silty Clay	Wittering Formation	
WDE - WS25 2.69m OD	0	1.1	Made Ground		Not monitored by SCCAU
	1.1	4	Gravel (Watching brief observations interpreted deposits at top of unit from 1.1 – 1.4m as possible plough soil over a clayey silt “Brickearth”	River Terrace Gravels	
WDE - WS26 2.37m OD	0	2.1	Made Ground (Watching brief observations interpreted deposits at base of unit from 1.1 – 1.4m as possible plough soil over a clayey silt “Brickearth” with gravel starting at 1.4m)		Not monitored by SCCAU
	2.1	3.8	Gravel	River Terrace Gravels	
	3.8	4	Silty Clay	Wittering Fm	
WDE - WS27 2.78m OD	0	1.2	Made Ground		Not monitored by SCCAU
	1.2	2	Clay	Alluvium	
	2	4	Gravel	River Terrace Gravels	
WDE - WS28 2.78m OD	0	1.2	Made Ground		Not monitored by SCCAU
	1.2	2.3	Clay	Alluvium	
	2.3	3.7	Gravel	River Terrace Gravels	
	3.7	4	Silty Clay	Wittering Fm	
WDE - WS29 2.87m OD	0	1.4	Made Ground		Not monitored by SCCAU
	1.4	2.6	Made Ground	red brick and timber fragments(Timber yard?)	
	2.6	3.8	Gravel	River Terrace Gravels	
	3.8	4	Silty Clay	Wittering Fm	





WDE - WS30 3.25m OD	0	2.9	Made Ground		Not monitored by SCCAU
	2.9	4	Gravel	River Terrace Gravels	
WDE - WS31 3.04m OD	0	2.5	Made Ground		Not monitored by SCCAU
	2.5	4	Gravelly Clay	River Terrace Gravels	
WDE - WS32 3.23m OD	0	3.5	Made Ground		Not monitored by SCCAU
	3.5	4	Gravel	River Terrace Gravels	
WDE - WS33 2.61m OD	0	2.1	Made Ground		Not monitored by SCCAU
	2.1	4	Silty Clay	Alluvium	
WDE - WS34 3.98m OD	0	3.2	Made Ground		Not monitored by SCCAU
	3.2	4	Silty Clay	Alluvium	
WDE - WS35 3.07m OD	0	2	Made Ground		Not monitored by SCCAU
	2	4	Silty Clay	Alluvium	
WDE - WS38 2.69m OD	0	2.2	Made Ground		Not monitored by SCCAU
	2.2	4	Gravel	River Terrace Gravels	
WDE - WS39 2.81m OD	0	2.6	Made Ground		Not monitored by SCCAU
	2.6	4	Gravel	River Terrace Gravels	
WDE - WS40 2.73m OD	0	1.4	Made Ground		Not monitored by SCCAU
	1.4	4	Gravelly Clay	River Terrace Gravels	
WDE - WS41 2.5m OD	0	2	Made Ground		Not monitored by SCCAU
	2	4	Gravelly Clay	River Terrace Gravels	
WDE - WS42 2.79m OD	0	2.2	Made Ground		Not monitored by SCCAU
	2.2	3.5	Made Ground		
WDE - WS43 3.42m OD	0	1.7	Made Ground		Not monitored by SCCAU
	1.7	4	Gravelly Clay	River Terrace Gravels	
WDE - WS44 3.51m OD	0	2	Made Ground		Not monitored by SCCAU
WDE -	0	2.1	Made Ground		Not monitored by



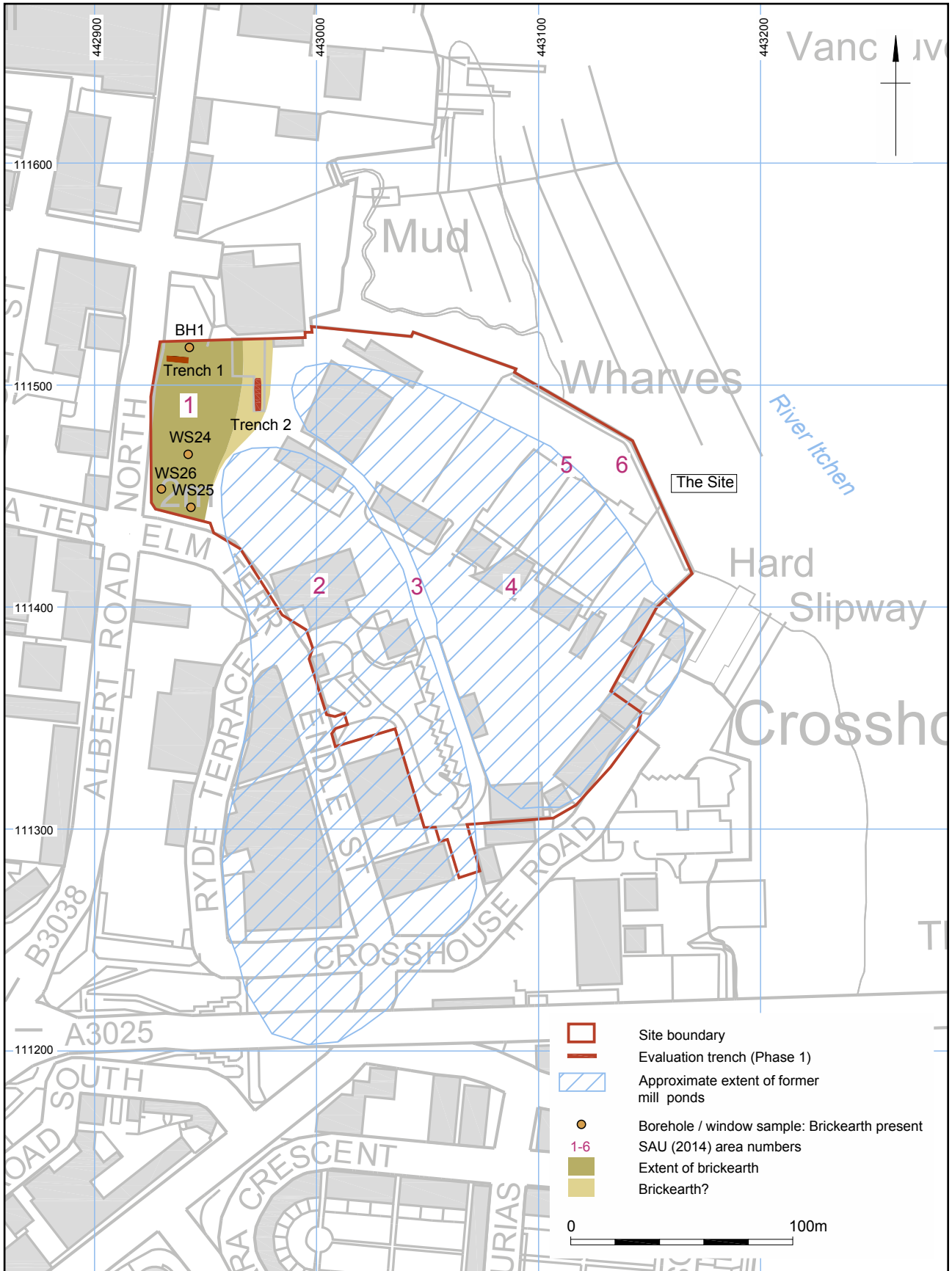
WS45 3.31m OD					SCCAU
	2.1	4	Silty Clay	Wittering Fm	
WDE - WS46 3.36m OD	0	2.2	Made Ground		Not monitored by SCCAU
	2.2	4	Gravelly Clay	River Terrace Gravels	
WDE - WS47 3.22m OD	0	2.4	Made Ground		Not monitored by SCCAU
	2.4	4	Soft grey silty Clay with shells	Alluvium	
WDE - WS48 3.27m OD	0	4	Made Ground		Not monitored by SCCAU
WDE - WS49 3.13m OD	0	2.3	Made Ground		Not monitored by SCCAU
	2.3	4	Gravelly Clay	River Terrace Gravels	
WDE - WS50 2.69m OD	0	3.8	Made Ground		Not monitored by SCCAU
	3.8	4	Soft grey silty Clay	Alluvium	



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Site location

Figure 1



- Site boundary
- Evaluation trench (Phase 1)
- Approximate extent of former mill ponds
- Borehole / window sample: Brickearth present
- 1-6 SAU (2014) area numbers
- Extent of brickearth
- Brickearth?

0 100m

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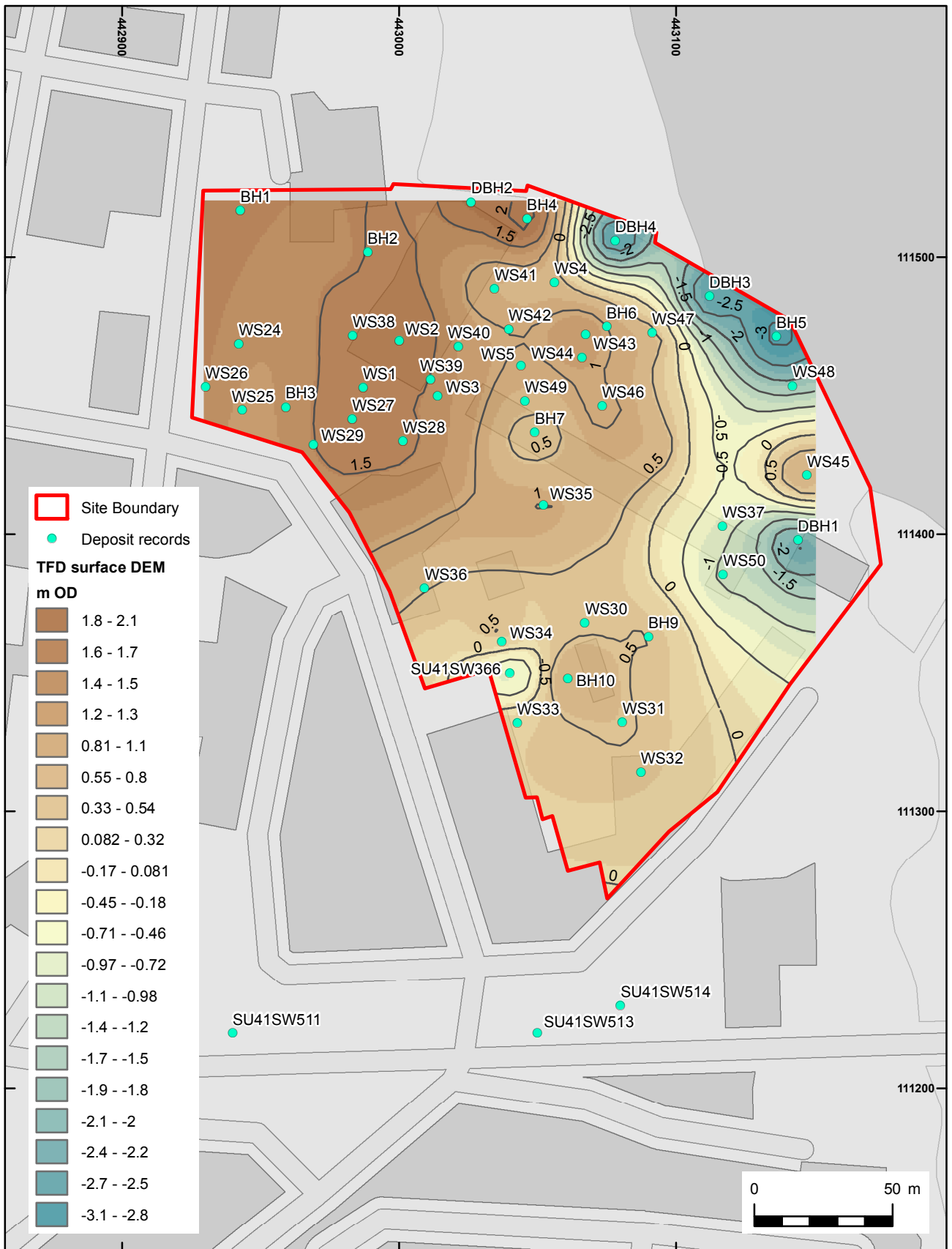
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Extent of Brickearth

Figure 2



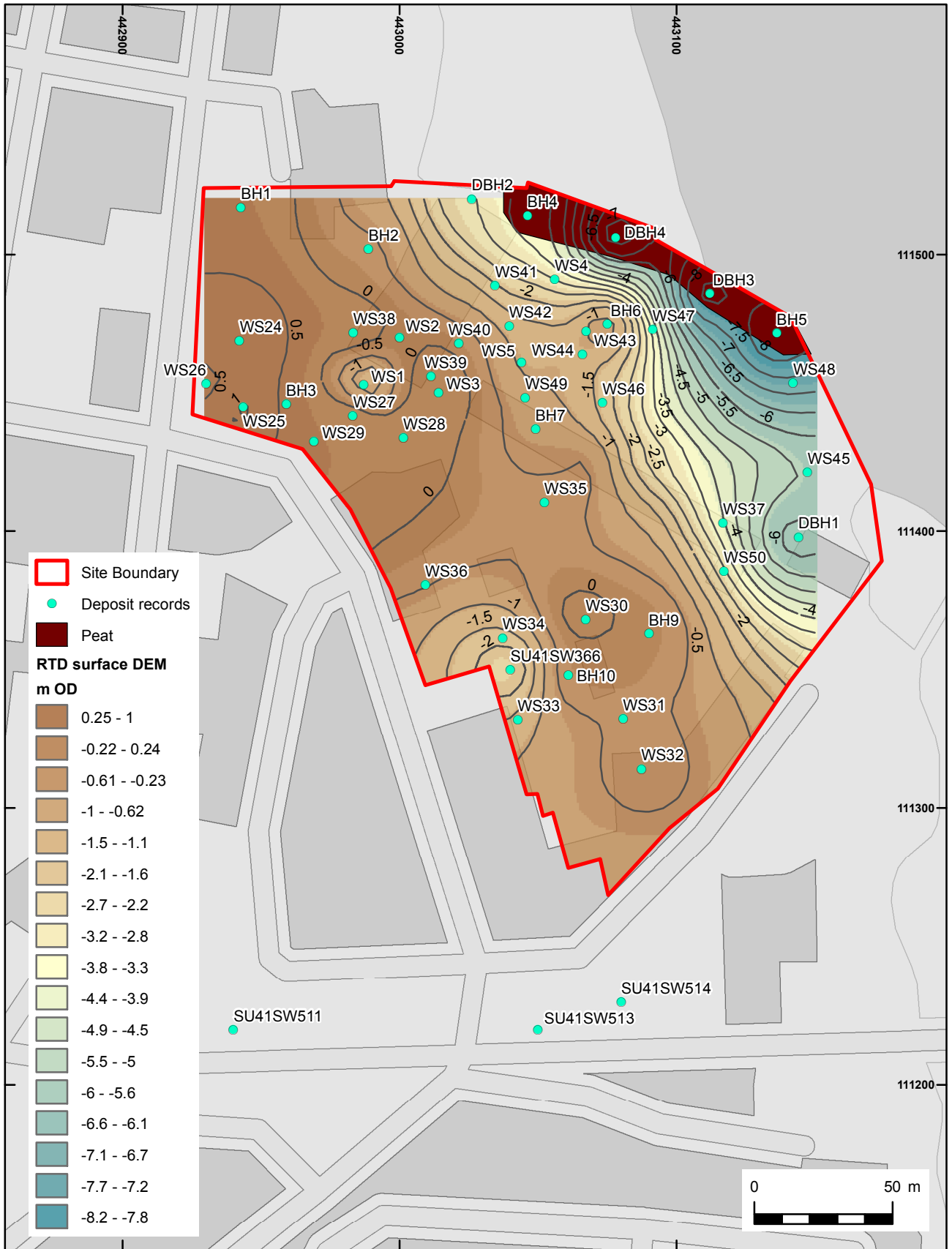
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Alluvial clay (Tidal Flat deposits) – surface, digital elevation model

Figure 3



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River Terrace deposits – surface, digital elevation model with location of peat deposits

Figure 4



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