Appendix 1
Melliss Avenue
Kew
London Borough of Richmond upon Thames

Historic Environment Assessment Supplement
Archaeological interpretation of
geotechnical ground condition data

October 2018

MOLA
MUSEUM OF LONDON
ARCHAEOLOGY

Melliss Avenue
Kew
Borough of Richmond upon Thames

NGR 519780 176920

Sign-off history

issue no.	issue date	prepared by	Review and approved by	reason for issue
1	10/07/2017	Phil Stastney (Geoarchaeology) Judit Peresztegi (Graphics)	Paul Riggott Contract Manager	First issue
2	20/08/2018	Florence Smith Nicholls (Archaeology)	-	Minor edit
3	14/09/2018	Florence Smith Nicholls (Archaeology)	-	Reissue
4	27/09/2018	Florence Smith Nicholls (Archaeology)	-	Minor edits

www.mola.org.uk

Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED
tel 0207 410 2200 fax 0207 410 2201 email:generalenquiries@mola.org.uk
Museum of London Archaeology is a company limited by guarantee
Registered in England and Wales
Company registration number 07751831 Charity registration number 1143574
Registered office Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED

Contents

Tables

Glossary

Alluvium	Sediment laid down by a river. Can range from sands and gravels deposited by fast flowing water to clays that settle out of suspension during overbank flooding. Other deposits found on a valley floor (eg peat) are usually included in the term alluvium.
Bronze Age	2,000 – 800 BC
Built heritage	Upstanding structure of historic interest.
Early medieval	AD 410 – 1066. Also referred to as the Saxon period.
Evaluation (archaeological)	A limited programme of non–intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area.
Excavation (archaeological)	A programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological remains, retrieves artefacts, ecofacts and other remains within a specified area. The records made and objects gathered are studied and the results published in detail appropriate to the project design.
Geotechnical	Ground investigation for engineering purposes, typically boreholes and/or trial/test pits, to determine the nature of the subsurface deposits. Archaeological monitoring of geotechnical works can be a cost-effective means of carrying out two required investigations at the same time.
Heritage asset	A building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions. Heritage assets are the valued components of the historic environment. They include designated heritage assets and assets identified by the local planning authority (including local listing).
Historic environment assessment	A written document whose purpose is to determine, as far as is reasonably possible from existing records and site inspection, the nature and significance of heritage assets within a specified area. Also known as a 'heritage statement' or 'statement of significance'.
Historic Environment Record (HER)	Archaeological database held and maintained by the County authority. In some counties this is named the HER (Historic Environment Record), where the built heritage data has been incorporated.
Holocene	The current geological epoch (during which a warm interglacial climate has existed) which started *c* 11,650 years ago when the glaciers of the most recent ice age began to retreat, characterised initially by the spread of forests. Also referred to as the 'Postglacial' and (in Britain) as the 'Flandrian'.
Iron Age	800 BC – AD 43
Later medieval	AD 1066 – 1500
Made Ground	Artificial deposit. An archaeologist would differentiate between modern made ground, containing identifiably modern inclusion such as concrete (but not brick or tile), and undated made ground, which may potentially contain deposits of archaeological interest.
Mesolithic	10,000 – 4,000 BC
Neolithic	4,000 – 2,000 BC
Palaeolithic	1,000,000 – 10,000 BC
Palaeoenvironment	The environment at a particular time in the past. Palaeoenvironmental remains include visible organic material such as timber, wood or seeds, and microscopic fossils such as pollen which provide information on the nature of the landscape and climate, and the context for human activity.
Peat	A build-up of organic material in waterlogged areas, producing marshes, fens, mires, blanket and raised bogs. Accumulation is due to inhibited decay in anaerobic conditions.
Pleistocene	The geological epoch before the Holocene (the current geological epoch), including a series of ice ages punctuated by warmer periods, with the advance and retreat of ice sheets.
Post-medieval	AD 1500 – present
Preservation by record	Archaeological mitigation strategy where archaeological remains are fully excavated and recorded archaeologically and the results published. For remains of lesser significance, preservation by record might comprise an archaeological watching brief.
Preservation in situ	Archaeological mitigation strategy where nationally important (whether Scheduled or not) archaeological remains are preserved *in situ* for future generations, typically through modifications to design proposals to avoid damage or destruction of such remains.
Residual	When used to describe archaeological artefacts, this means not *in situ,* ie Found outside the context in which it was originally deposited.
Roman	AD 43 – 410
Site	The area of proposed development
Study area	Defined area surrounding the proposed development in which archaeological data is collected and analysed in order to set the site into its archaeological and historical context.
Stratigraphy	A term used to define a sequence of visually distinct horizontal layers (strata), one above another, which form the material remains of past cultures.
Truncate	Partially or wholly remove. In archaeological terms remains may have been truncated by previous construction activity.
Watching brief (archaeological)	An archaeological watching brief is '*a formal programme of observation and investigation conducted during any operation carried out for non–archaeological reasons.*'

Results

***Scope**: this report is a supplement to a Historic Environment Assessment of the site at Melliss Avenue in the London Borough of Richmond upon Thames. It provides an archaeological interpretation of geotechnical borehole and trial pit data obtained for engineering purposes to establish ground conditions. Zones of archaeological potential have been mapped across the site using deposit modelling software, and the likely nature and depth of archaeological deposits characterised.*

The archaeological interpretation of geotechnical data can assist in identifying, at an early stage, potential cost and programming risks to future development that might result from a Local Planning Authority (LPA) planning condition for archaeological mitigation prior to construction (such as archaeological excavation or the monitoring of groundworks). This report can be used to inform pre-planning application discussions with the LPA and also to support a Historic Environment Desk-Based Assessment submitted as part of a planning application. It is not intended as a stand-alone risk appraisal or a substitute for an archaeological mitigation requirement.

***Results**:*

Based on the archaeological interpretation of available geotechnical data, the archaeological potential of the site is as follows:

- *The whole of the site lies within the former floodplain of the River Thames. In this area the sediment sequence consists of Late Pleistocene river gravels overlain by Holocene alluvium (fine, waterlain sediments) and sealed by between 1.5m and 3.8m of modern made ground. There may some potential for prehistoric archaeological remains to be present within the site lying on the surface of the gravels and sealed by later alluvium. Although no high-potential organic sediments were noted in the boreholes at the site, the alluvium generally has a moderate palaeoenvironmental potential.*

The results of the previous investigation within the Kew Sewage Treatment Works have shown that the archaeological potential of the site is likely to be limited to remains of no more than low significance. The site has been impacted by the construction of the various structures associated with the treatment works. It is possible, however, that an archaeological watching brief would be required during preliminary ground preparation and subsequent foundation construction, which would ensure that any previously unrecorded archaeological assets were not removed without record.

1 Introduction

1.1 Origin and scope of the report

1.1.1 This report has been prepared by MOLA (Museum of London Archaeology) for the proposed development at Melliss Avenue in the London Borough of Richmond upon Thames (National Grid Reference 519780 176920). It provides an archaeological interpretation of geotechnical borehole and trial pit data obtained for engineering purposes to establish ground conditions on the client property ('the site'). Using this data, zones of archaeological potential have been mapped and the likely nature and depth of archaeological deposits characterised across the site. Statutory provision for the safeguarding of heritage assets[1] – including archaeological remains – has been made at a national and local level. For this reason, the potential presence of such remains can constitute a risk. The archaeological interpretation of geotechnical data as part of an assessment of the archaeological potential of a site helps to identify potential cost and programming risks to future development that might result from a Local Planning Authority (LPA) planning condition for archaeological mitigation prior to construction (eg trial evaluation trenches, archaeological excavation and/or a watching brief). Identifying these issues at an early stage allows them to be anticipated and planned for, and any risks to be contained.

1.1.2 This report forms a supplement to a separate MOLA Historic Environment Assessment (HEA), and is not intended to stand alone as the scope is restricted to the analysis of geotechnical data only. The main assessment report draws on a broad range of standard historic environment data sources, including statutory designations and the Historic Environment Record.

1.1.3 This supplemental report can also be used to inform pre-planning application discussions with the LPA and also to support an HEA when submitted as part of a planning application. The report is not intended to substitute for an archaeological mitigation requirement, but instead provides a preliminary appraisal of the nature, extent, and possible archaeological significance of any deposits on the site, based on geotechnical data. Note: within the limitations imposed by dealing with historical material and maps, the information in this document is, to the best knowledge of the author and MOLA, correct at the time of writing. Further archaeological investigation, more information about the nature of the present buildings, and/or more detailed proposals for redevelopment may require changes to all or parts of the document.

1.2 Aims and objectives

1.2.1 The aim of the document is to:

- identify, using geotechnical borehole logs and trial pit descriptions, the different depositional units within the site and map their location, extent and thickness;
- map zones of likely archaeological/palaeoenvironmental potential across the site based on the depositional units;
- provide an indication of the likely nature, depth and significance of buried archaeological deposits within each zone, based on the geotechnical data;
- provide recommendations for further investigation.

[1] Heritage assets are those parts of the historic environment which are considered to be significant because of their historic, evidential, aesthetic and/or communal interest. These might comprise below and above ground archaeological remains, buildings, structures, monuments or heritage landscape within or immediately around the site.

2 The deposit model

2.1 Introduction

2.1.1 Information about past environments is often required by LPA archaeological advisors, in order to better understand the nature and distribution of past human activity. On floodplains in particular the deposit sequence can be deep and complex, with ancient landsurfaces buried within and beneath alluvium (material deposited by water) or peat.

2.1.2 The solid geology and overlying deposits such as Brickearth and Gravels are a useful indicator of the land surface in the early Holocene, the current geological epoch which started *c* 11,500 years ago when the glaciers of the most recent ice age began to retreat, referred to in archaeological terms as the early Mesolithic (*c* 10,000 BC). Alluvium may preserve 'palaeoenvironmental' remains, ie evidence of ancient landscapes and environmental conditions such as fluctuating water levels, which together with data on the depths of the underlying deposits such as gravels or clays, gives a framework for an assessment of archaeological potential. Peat represents marshland which developed, in general, during fluctuations in a trend of rising sea level within the last 10,000 years. The acidic nature of peat preserves ancient organic palaeoenvironmental remains extremely well. Palaeoenvironmental remains provide information on the nature of the environment at a particular time in the past, giving a context for human activity. They can include visible organic remains (timber, wood, seeds), and microscopic fossils such as pollen, diatoms and ostracods.

2.1.3 Modelling software (Rockworks & ArcGIS) creates two and three-dimensional deposit models of the buried topography and overlying strata on the site. The depth and distribution of the various deposits is mapped by means of schematic cross-sections showing the thickness of each deposit and the level of the top of each deposit in metres Ordnance Datum (OD), where this is possible.

2.1.4 The modelling software has been used with readily available topographical and British Geological Survey (BGS) geological information, along with the client data obtained from geotechnical investigations on the site to map and characterise sub-surface deposits and former landsurfaces within the site and to provide an assessment of whether they are of potential archaeological/palaeoenvironmental interest

2.1.5 Borehole logs and trial pit descriptions were analysed by a MOLA Geoarchaeologist and the nature, character and thickness of each deposit entered into the modelling software. This includes the depth of the top of each deposit in relation to current ground level (and OD levels where known).

2.1.6 The resulting deposit model has been used to analyse the sequence and distribution of deposits and the landscape position and geological setting of the site. From this zones of higher and lower archaeological/palaeoenvironmental potential have been identified.

2.2 Sources and scope

2.2.1 Table 1 shows the sources consulted. As stated in the introduction, this report presents an analysis of geotechnical data only and is intended to supplement a Heritage Risk assessment or Historic Environment Assessment. It does not include a site walkover inspection. It is outside the scope of the present report to provide a broader assessment of the historic environment, including data from Historic England on statutorily designated assets (scheduled monuments and listed buildings) and also the Historic Environment Record (HER). The reader is referred to the main assessment report for this information.

Table 1 Data sources consulted

Source	Data	Comment
British Geological Survey (BGS)	Drift and solid geology digital map; online historical geological and geotechnical borehole and trial pit data.	Used to understand the characteristics of the bedrock, soils and substrate of the area of the site, which can provide an indication of suitability for early settlement, and potential depth of remains.
Environment Agency	LIDAR digital terrain model (50cm resolution)	Indicates the current ground level and topography on the site, which is used alongside the geotechnical borehole data to map the likely depth of archaeological deposits.
Client	Geotechnical data Reference: Soiltechnics. May 2018. *Proposed redevelopment, Melliss Avenue, Richmond, London. Ground Investigation Report*. Walgrave, Northamptonshire.	Indicates the main deposits within the site, including their depth and thickness. Archaeological analysis can determine their likely nature and archaeological/palaeoenvironmental potential.

2.3 Methodology

2.3.1 In order to create the deposit model the geotechnical data was entered into a digital (Rockworks 15) database; boreholes with the prefix 'BH', test pits with 'TP' and window samples with 'WS', supplemented where appropriate by boreholes recorded in the BGS digital archive[2]. The numbers of each type were :

- Geotechnical boreholes (BH) entered: 7 no.
- Geotechnical test pits (TP) entered: 7 no.
- BGS historic boreholes (BGS) entered: 15 no.

2.3.2 Each type of deposit was given a unique reference number. By examining the horizontal and vertical relationships of each deposit, correlations were made across the site and the deposits mapped laterally. Where possible, significant ancient landscape features, such as palaeochannels (ancient watercourses) and 'islands' of higher gravels beneath flood alluvium have been identified.

2.3.3 The Rockworks data was transferred to ArcGIS v.10 where the Spatial Analyst Module was used to create maps showing the OD surface level and thickness of the key deposits.

[2] The National Geoscience Data Centre collection of onshore scanned boreholes, shafts and well records via the BGS Borehole record viewer: http://www.bgs.ac.uk/data/boreholescans/home.html

3 The deposits

3.1 Nature of the deposits

3.1.1 Table 2 sets out the main depositional units identified, from ground level down to the base of the sequence representing the maximum depth of possible archaeology.

3.2 Distribution and thickness of deposits

3.2.1 The distribution and thickness of the deposits on the site are shown in a plan and transects.

3.2.2 Fig 1, Appendix 1 shows the site's location in relation to the alluvium of the River Thames (superficial geology). Fig 2, Appendix 1 is a Lidar digital terrain model. Lidar is a surveying method that measures distance to a target by illuminating the target with pulsed laser light and measuring the reflected pulses with a sensor. Fig 3, Appendix 1, is a topographic plot of the early Holocene surface (i.e. showing the Ordnance Datum (OD) level of the top of the underlying solid geology), which formed the ancient land surface at around 10,000 BC. Figure 4 Appendix 1, is a west-east transect across the site. Fig 5, Appendix 1, is a north-south transect across the site, showing the levels and thickness of deposits in section.

3.3 Data limitations

3.3.1 Although data outside of the site (e.g. BGS borehole records) are very sparse, coverage of boreholes within the site is relatively good.

3.3.2 Nevertheless, there remain some ambiguities in the existing descriptions of some deposits at the site. Some deposits described in the previous ground investigation as the base of the made ground have been tentatively re-classified as Holocene alluvium based on their description and topographical position. Such ambiguous deposits were noted in BH03 (1.5 – 2.7m below ground level (bgl)), BH04 (2.5 - 4m bgl), BH06 (2.3 – 3.9m bgl) and BH07 (3 – 4.4m bgl).

3.3.3 The deposits that have been re-designated as alluvium are described as being fine-grained (i.e. predominantly silt or clay), generally low-strength, typically grey or brown in colour, and importantly where no artificial inclusions (such as brick, concrete, pottery, etc) have been noted.

3.3.4 It is important to be aware that ground investigation reports are typically focused on the physical and engineering properties of sediments and not their archaeological or palaeoenvironmental significance, thus leading to potentially differing interpretations of the same data. Additionally, the sampling method (cable percussion drilling) is likely to have led to the recovery of disturbed sediment samples from these boreholes, hampering their description.

3.3.5 It is likely that further geoarchaeological examination of these sediments would be required to clarify the nature of these sediments. This in turn will allow a more accurate assessment of the archaeological and palaeoenvironmental potential of the site.

3.3.6 The surface elevations of the previous boreholes at the site were not surveyed, which may limit the accuracy of the present deposit model. Approximate elevations for each borehole were derived from the Environment Agency LIDAR digital terrain model.

Table 2 Summary of the deposits at the site

Facies	Deposit	Lithology/description	Interpretation	Summary of surface level OD / metres below ground level (mbgl)	Thickness
--	Ground level	Generally flat at approximately 4m OD, with a small raised embankment surrounding the margins of the site and along the riverside (eastern margins) lying at around 5m OD. Note that these levels are derived from the LIDAR digital terrain model (Fig 2).	The modern ground level .	3.80-5.19m OD	n/a
4	Modern made ground	Comprises surface layers of reinforced concrete, and a range of poorly-sorted clay, sand and gravel deposits with inclusions of brick, concrete, clinker, ash, glass, plastic and pottery. Locally described as having a hydrocarbon odour, indicating some contamination.	The result of modern development and ground raising at the site. Due to its modern date it is of no archaeological interest.	Highest: 5.19m OD (at surface) Lowest: 3.80m OD (at surface)	Minimum: 1.5m Maximum: 3.8m Average: 2.4m
3	Holocene alluvium	Fine-grained and well-sorted sediments, generally silty or sandy clay, colour ranges from grey to brown, occasionally mottled. Locally has an 'organic odour', possibly indicating the presence of some organic inclusions or bands of organic sediment not noted in the logs.	These sediments were deposited by overbank flooding of the Thames. The history of sedimentation in the Thames is closely related to changes in relative sea level during the course of the Holocene, with the level of the floodplain rising in response to rising sea level, and the gradual upstream migration of the tidal head. During the historic period many tidal creeks, natural channels and man-made drainage ditches cut through the earlier alluvial deposits and are usually found to be infilled with clays/silts. The land may have been reclaimed in the medieval or post-medieval periods, but continued to be seasonally flooded. Medieval and post-medieval remains may exist within the upper part of the alluvium or within the lower part of the made ground deposits, although these may have been truncated by modern disturbance.	Highest: 2.72m OD (2.3m bgl) Lowest: 2.10m OD (2.5m bgl)	Minimum: 0.8m Maximum: 1.6m Average: 1.3m
--	Early Holocene Surface (Mesolithic)	Within the site this equates to the un-truncated surface of the Pleistocene gravels. This surface is illustrated in Fig 3, and shows an undulating surface dipping towards the south east (i.e. towards the river channel and downstream).	The buried ancient topography: can include Gravel highs and lows and sand deposits. Areas of higher Gravel are likely to have remained dry land during the prehistoric period when the surrounding land was becoming waterlogged as sea level began to rise. Areas of low Gravel were probably the main channels, which became increasingly redundant as the pattern of water flow changed in the Late Pleistocene and Early Holocene.	Highest: 1.33m OD (3.93m bgl) Lowest: 0.6m OD (4m bgl)	n/a

Facies	Deposit	Lithology/description	Interpretation	Summary of surface level OD / metres below ground level (mbgl)	Thickness
			The early Holocene surface was encountered in all but one of the boreholes on site – the exception being BH05, where modern made ground was found to truncate the surface of the gravels.		
2	Pleistocene Gravels (Palaeolithic)	Dense sandy gravels and gravelly sands. Gravel is angular to subangular flint. Occasionally slightly clayey. Brown to grey in colour.	River gravels formed during the Late Pleistocene (120,000 – 10,000 years ago) in a high-energy river braid plain. The present course of the River Thames was established about 450,000 years ago. Subsequent cold and warm climate periods caused alternating erosion (downcutting) and deposition. This, together with a background gradual tectonic uplift, led to a sequence of progressively younger deposits down the valley sides. These (mainly gravel) deposits form a series of terraces, which represent former floodplains of the river that subsequently became incised and left dry as the river down-cut to lower levels.	Highest: 1.39m OD (3.8mbgl) Lowest: 0.6m OD (4.0mbgl)	Minimum: 2.1m Maximum: 2.6m Average: 1.3m
1	Bedrock – London Clay Formation (Eocene)	Firm to very stiff, high strength dark grey clay (upper parts are occasionally brownish in colour).	The London Clay formed in a shallow marine setting under tropical-subtropical climatic conditions during the Ypresian Age (56-48 million years ago) of the Eocene epoch. Its formation therefore predates the evolution of humans by several tens of millions of years, and so this deposit is of not archaeological interest.	Highest: -0.77m OD (4.7m bgl) Lowest: -1.5m OD (5.3mbgl)	Not bottomed within in the boreholes within the site. At least 25.75m

4 Archaeological and palaeoenvironmental potential

4.1.1 The archaeological and palaeoenvironmental potentials of the facies (types of deposits) idenitified at the site are set out in Table 3.

4.1.2 The whole of the site lies within the former floodplain of the River Thames. In this area the sediment sequence consists of Late Pleistocene river gravels overlain by Holocene alluvium (fine, waterlain sediments) and sealed by between 1.5m and 3.8m of modern made ground.

4.1.3 There is a low potential for the Pleistocene gravels themselves to contain Palaeolithic artefacts, although if present these are likely to not be in-situ and would therefore be only of limited archaeological interest.

4.1.4 There may some potential for prehistoric archaeological remains to be present within the site lying on the surface of the gravels and sealed by later alluvium.

4.1.5 Potential for the recovery of artefacts or archaeological features within the alluvium is generally low.

4.1.6 The alluvium generally has a moderate palaeoenvironmental potential, although no high-potential organic sediments were noted in the boreholes at the site.

Table 3 Summary of potential

Facies	Archaeological potential	Palaeoenvironmental potential
Facies 4 – Modern made ground	NONE Given the modern date of these deposits, they are of no archaeological interest.	
Facies 3 – Holocene alluvium	LOW These sediments were deposited in an actively accreting river floodplain subject to seasonal flooding. Due to the regular waterlogging of these environments, the floodplains themselves are not likely to have been settled by people in the past and so potential for the recovery of artefacts or evidence for occupation is low.	MODERATE – HIGH Fine-grained alluvial sediments such as these may contain a range of evidence for past environmental conditions such as pollen (which can inform about past vegetation cover) and diatoms and ostracods (which can give information on the water quality/salinity at the site during the past). Additonally organic muds and peats may be locally present within the alluvium which may preserve larger plant and insect remains which can provide more detailed information on local environmental conditions, and may provide information suitable for radiocarbon dating. Analysis of these types of evidence can provide important information relating to the evolution of the Thames floodplain, relative sea level rise, and indirect evidence for nearby human activity (farming, settlement). Without further assessment of the sediments at the site, however, this potential remains hypothetical, and the exact level of preservation of these remains and their likely date (and therefore significance) is not possible ascertain.
Facies 2 – Pleistocene gravels	LOW – MODERATE Palaeolithic flint tools are occasionally found within the floodplain gravels, however these artefacts have usually been moved and reworked by the river, and so are of only limited archaeological interest. The upper surface of the gravels, however, might have beensettled by prehistoric communities from the Mesoltihic (10,000 – 4,000 BC) onwards until the eventual flooding of the area at some time later on in the Holcoene. As such, there is some potential for the recovery of archaeological remains at the surface of the gravels, sealed by later Holocene alluvium.	LOW Palaeoenvironmental indicators, such as the remains of plants or animals are generally not well preserved within river gravels as they were deposited in a high-energy environment. Fine-grained sediments (fine sands, silts and clays) do sometimes occur within the gravels, and these sometimes do contain palaeoenvironmental remains which can provide information on Late Pleistocene environmental conditions, but they are rare.
Facies 1 – London Clay	NONE Since the London Clay formed several tens of millions of years before the evolution of humans, they are of no archaeological interest.	

5 What next?

5.1.1 The geoarchaeological deposit model has indicated that there is some potential for archaeological remains sealed beneath the Holocene alluvium at the site and that the alluvium itself is likely to be of some palaeoenvironmental potential.

5.1.2 The results of the previous investigation within the Kew Sewage Treatment Works have shown that the archaeological potential of the site is likely to be limited to remains of no more than low significance. The site has been impacted by the construction of the various structures associated with the treatment works. It is possible, however, that an archaeological watching brief would be required during preliminary ground preparation and subsequent foundation construction, which would ensure that any previously unrecorded archaeological assets were not removed without record.

5.1.3 Any archaeological work would need to be undertaken in accordance with an approved Written Scheme of Investigation (WSI) and could be carried out under the terms of a standard archaeological planning condition set out under the granting of planning consent.

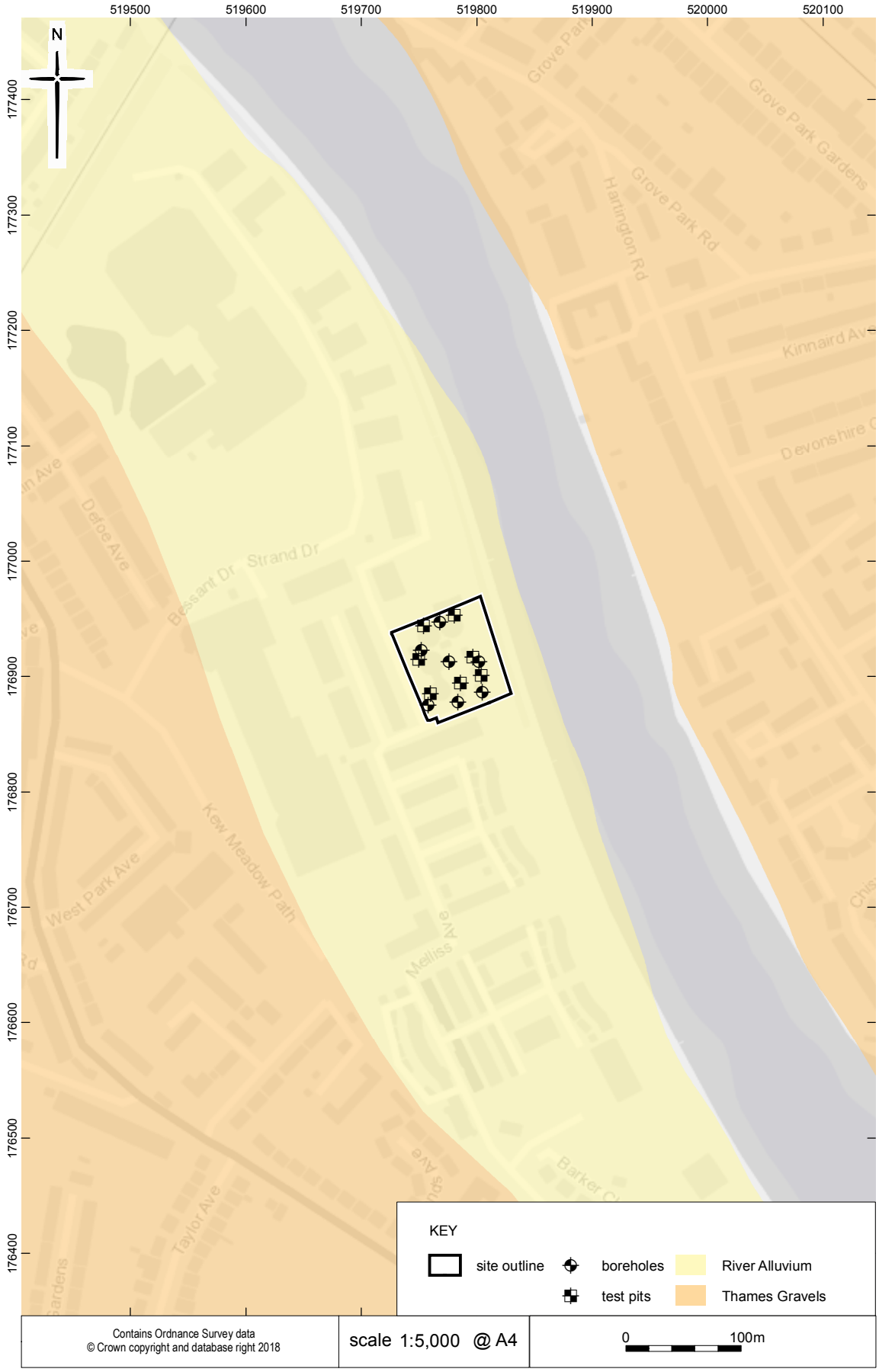

Fig 1 Superficial geology

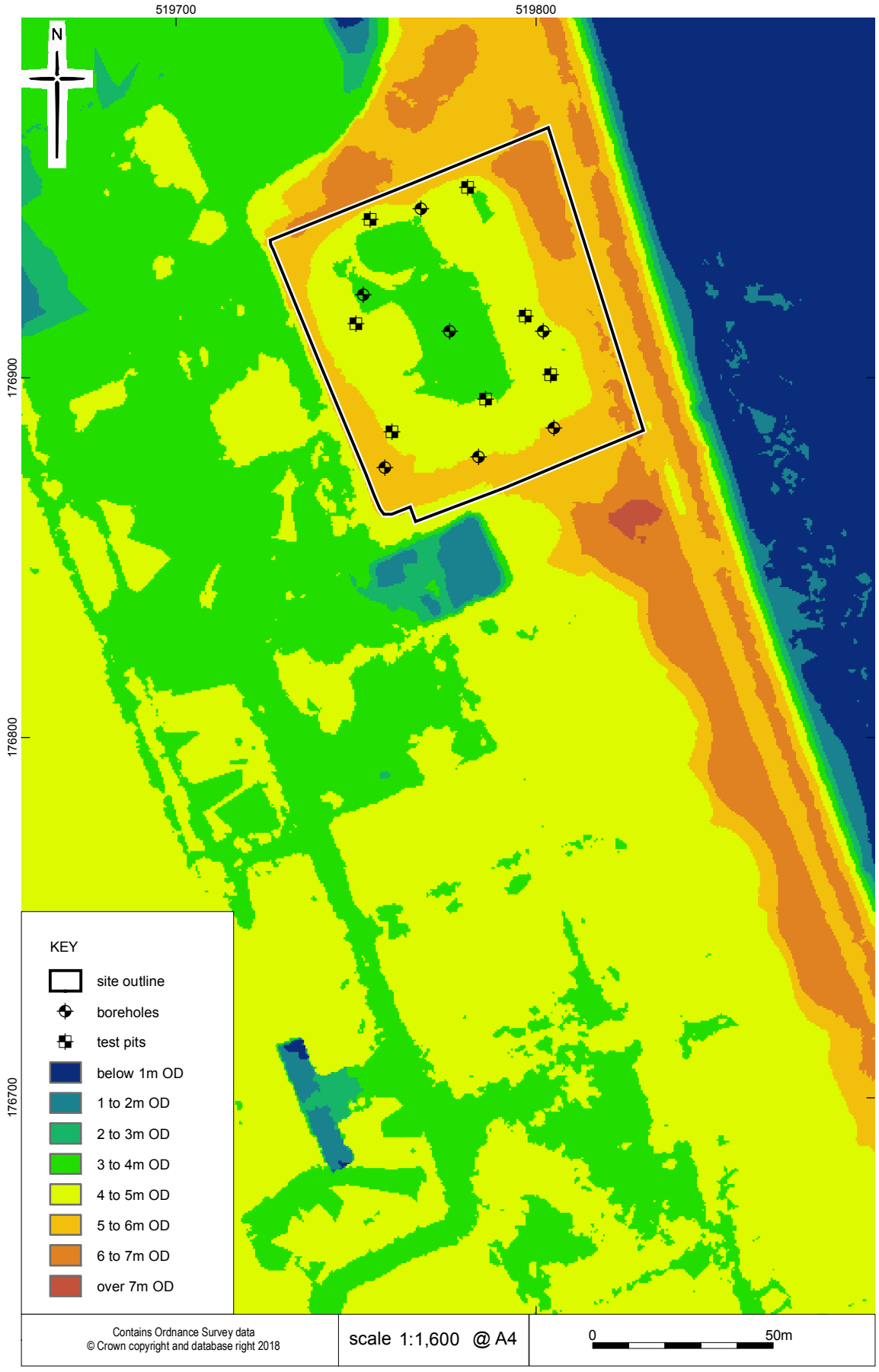

Fig 2 LIDAR digital terrain model (50 cm resolution)

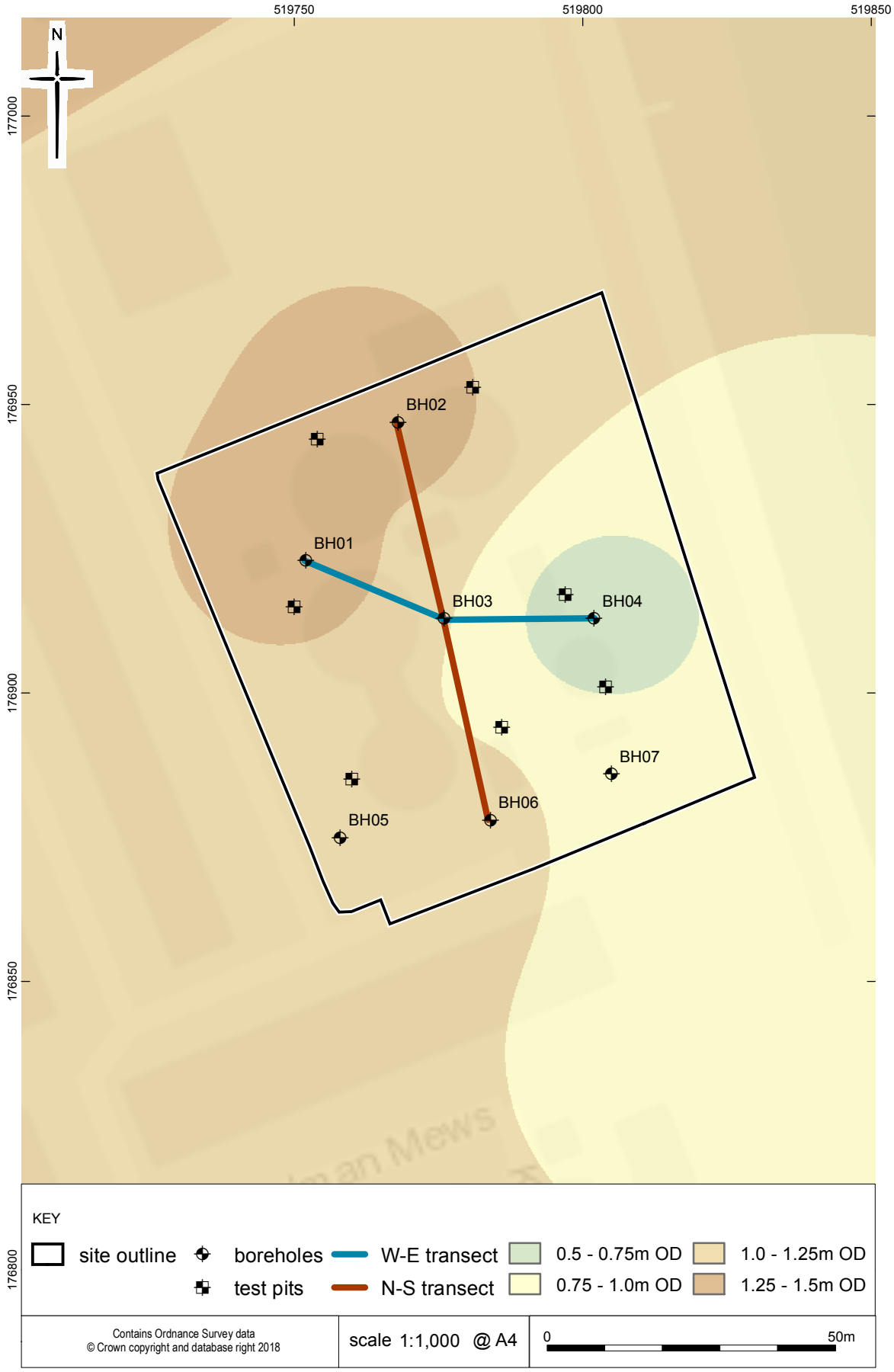

Fig 3 Modelled elevation of the early Holocene surface

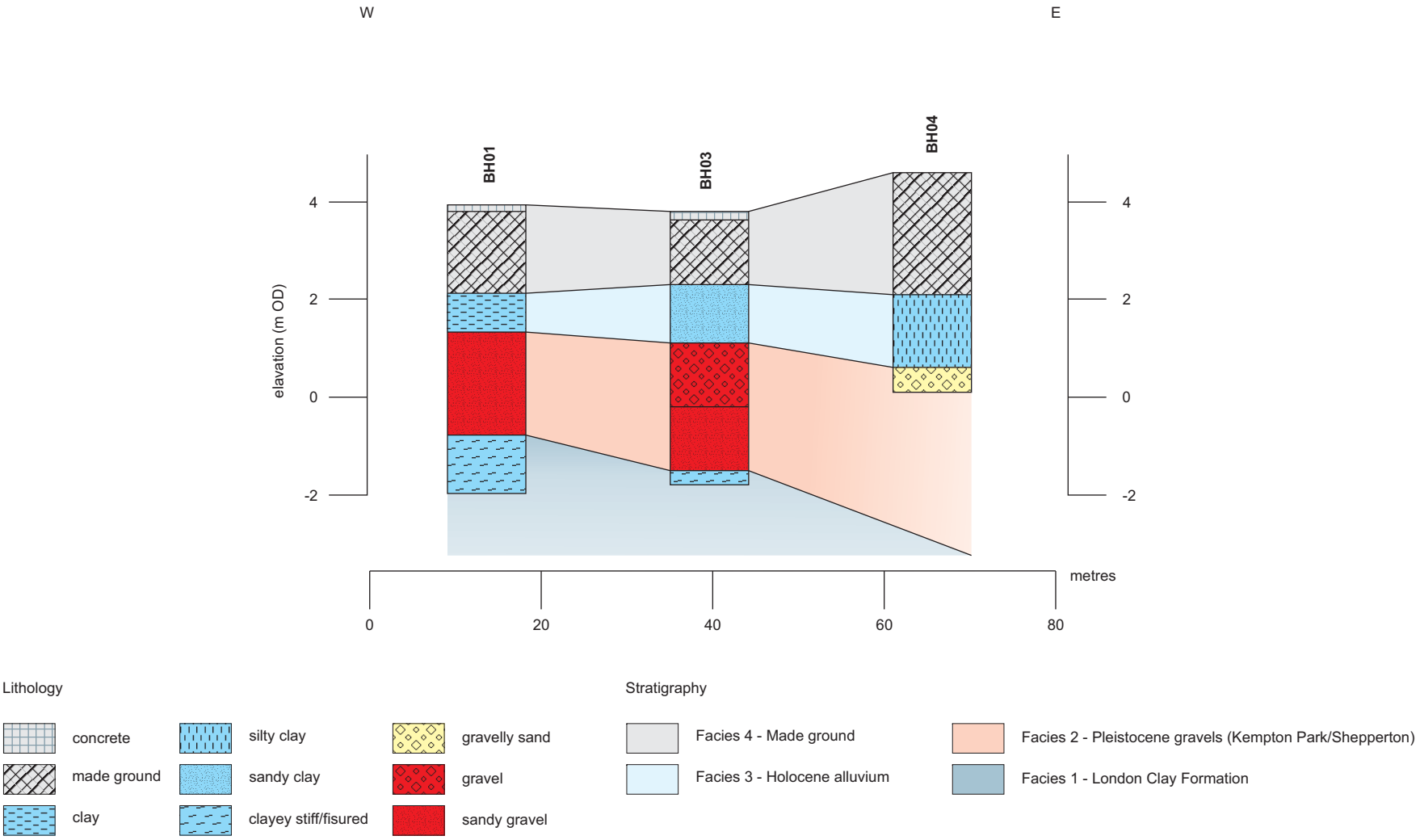

Fig 4 West to east transect across the site

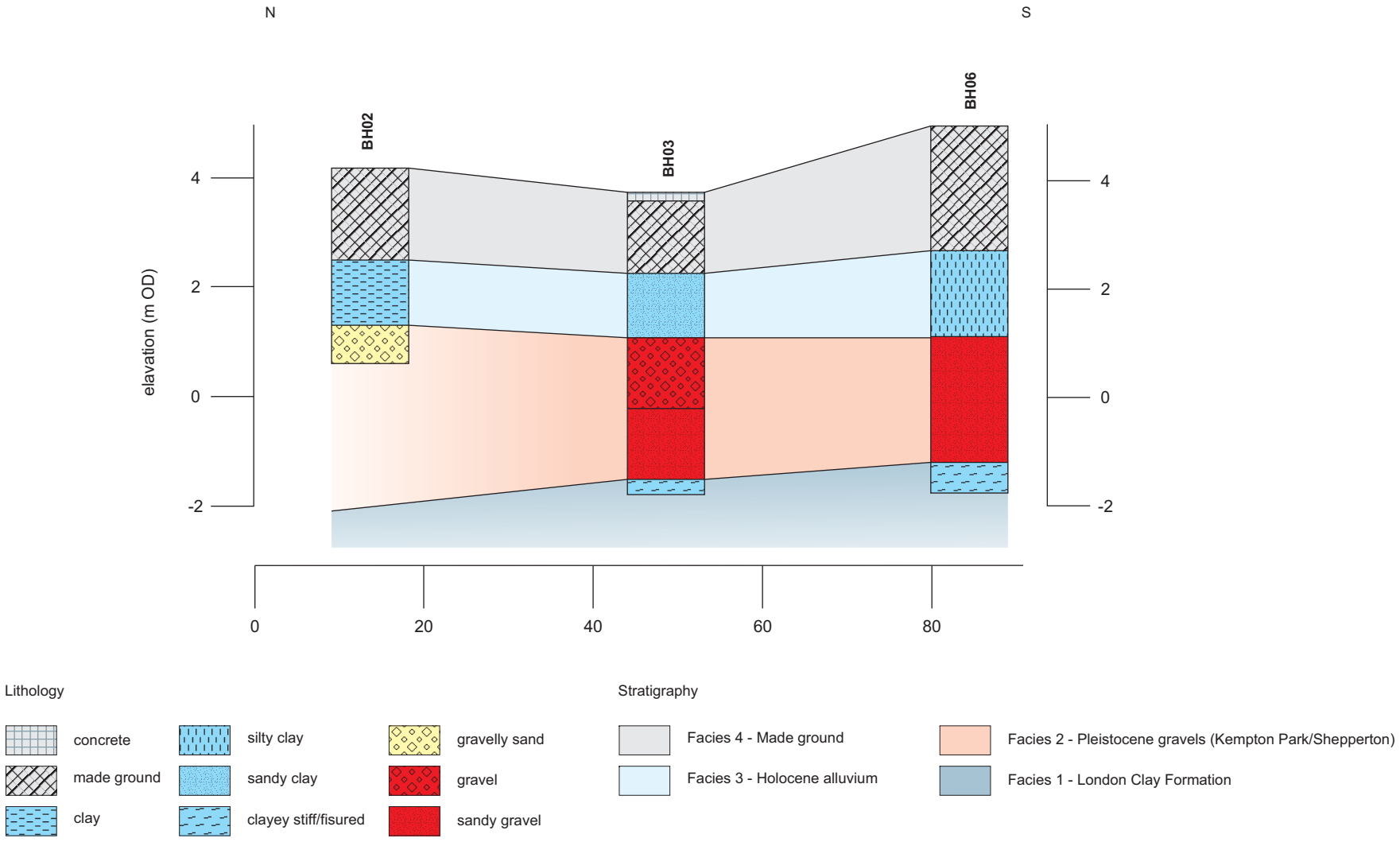

Fig 5 North to south transect across the site

invest change