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|---|---|---|---|
| Project No | 21/3600 | Hole ID | TT401A & C |
| Project Name | L4 Colt DCS Data Centre | Photograph No | 027 & 028 |
| Client | HDCI Hayes London Limited | Date | September 2021 |


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Photograph No 027 - TT401A


Photograph No 028 - TT401C

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|---|---|---|---|
| Project No | 21/3600 | Hole ID | TT401B |
| Project Name | L4 Colt DCS Data Centre | Photograph No | 029 & 030 |
| Client | HDCI Hayes London Limited | Date | September 2021 |

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Photograph No 029


Photograph No 030

| | | | |
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| Project No | 21/3600 | Hole ID | IT501 |
| Project Name | L4 Colt DCS Data Centre | Photograph No | 031 & 032 |
| Client | HDCI Hayes London Limited | Date | September 2021 |

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Photograph No 031

Photograph No 032

| | | | |
|---|---|---|---|
| Project No | 21/3600 | Hole ID | IT501 |
| Project Name | L4 Colt DCS Data Centre | Photograph No | 033 & 034 |
| Client | HDCI Hayes London Limited | Date | September 2021 |

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Photograph No 033

Photograph No 034

**APPENDIX A: ARCHAEOLOGICAL WATCHING BRIEF**

# LONDON 4 OPTIMUM DATA CENTRE
## Tudor Works and Veetec Motor Group Facility
## North of Beaconsfield Road
## Hayes
## London UB4 0SL

London Borough of Hillingdon

Geoarchaeological watching brief

October 2021

MOLA

REGISTERED ORGANISATION CIfA



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# London 4 Optimum Data Centre, Tudor Works and Veetec Motor Group Facility, North of Beaconsfield Road , Hayes, London, UB4 0SL

London Borough of Hillingdon

National Grid Reference: 511508, 180201
Reference number: MOLA/HILL/2016 v1
Site code: BCI21

Geoarchaeological watching brief report

Project Manager: Marit Leenstra

Author: David Humphreys

**Sign-off History:**

| Issue No. | Date: | Prepared by: | Checked/ Approved by: | Reason for Issue: |
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# Summary

*This watching brief report assesses the results of a geoarchaeological watching brief by Museum of London Archaeology (MOLA) on geotechnical works on the site of London 4 Optimum Data Centre, Tudor Works and Veetec Motor Group Facility, North of Beaconsfield Road , Hayes, London, UB4 0SL (NGR: 511508, 180201). The report has been commissioned from MOLA by Concept Engineering Consultants Ltd on behalf of the client Colt Data Centre Services (Colt DCS).*

*The site comprises c. 2.12ha ha, and is bounded by the Yeading Brook to the east, Beaconsfield road to the south, an are further industrial and commercial properties to the west and Brook Industrial Estate to the north. The site is currently occupied by industrial units. Modern pavement level near to the site lies at c 30m OD.*

*The geoarchaeological watching brief summarises the archaeological potential of the sediments revealed in 8 boreholes and 5 trial pits selected from across the site. These were logged by a MOLA Geoarchaeologist during the site investigation works.*

*Archaeologically significant deposits of river terrace gravels (the Lynch Hill Gravel Member), brickearth (Langley Silts) and alluvium were encountered across the site to varying degrees. In nearly all interventions, where the made ground was penetrated, river terrace gravels were found to survive. Overlying these deposits, Pleistocene brickearth was encountered only in one location. Finally, alluvium, dating to the Holocene, was only seen to survive at possibly two locations. No artefactual remains were logged.*

*The whole site is sealed by made ground varying in thickness from 0.6m to 2.5m and in a number of locations was too thick or dense to be penetrated. It is highly likely the made ground has resulted in the removal of much of the Holocene alluvium and truncation of the underlying Pleistocene deposits to some degree.*

*Given the thickness of the made ground and the patchy survival of the alluvium in particular, overall the archaeological (artefactual) and palaeoenvironmental potential of the site is considered low. Consequently, there are no recommendations for further work. The decision on any requirement for further work rests with the Local Authority however.*

# Contents



**Illustrations**

# 1 Introduction

## 1.1 Site background

1.1.1 This watching brief report assesses the results of geoarchaeological watching brief by Museum of London Archaeology (MOLA) undertaken during August and September 2021 during geotechnical works on the site of London 4 Optimum Data Centre, Tudor Works and Veetec Motor Group Facility, North of Beaconsfield Road, Hayes, London, UB4 0SL.

1.1.2 The site is centred on National Grid reference 511508, 180201 in the London Borough of Hillingdon.

1.1.3 The site comprises c. 2.21ha, and is bounded by the Yeading Brook to the east, Beaconsfield road to the south, an are further industrial and commercial properties to the west and Brook Industrial Estate to the north. The site is currently occupied by industrial units. Modern pavement level near to the site lies at c 30m OD.

1.1.4 The site is not subject to any heritage designations with the nearest Conservation Area, the Bulls Bridge Conservation Area, being some 900m south of the site and separated by open land, mature vegetation, a football stadium, and railway line. The nearest listed building to the site is within this Conservation Area and therefore is evidently distant.

1.1.5 Redevelopment of the site to deliver data centre campus including: two data centre buildings; associated energy and electricity infrastructure, buildings, and plant; security gatehouse, systems and enclosures; works to the highway, car parking and cycle parking; hard and soft landscaping; as well as associated infrastructure, ancillary office use, and associated external works.

1.1.6 A Written Scheme of Investigation (WSI) was previously prepared by MOLA (2021) for this watching brief exercise. This document should be referred to for information on the natural geology, archaeology, historical and planning background of the site.

## 1.2 Planning and legislative framework

1.2.1 The Planning and legislative background to the site has been adequately summarised in the WSI (MOLA 2021).

## 1.3 Origin and scope of the report

1.3.1 The report has been commissioned from MOLA by Concept Engineering Consultants Ltd. on behalf of the client Colt Data Centre Services (Colt DCS).

1.3.2 This report describes the results of a geoarchaeological watching brief carried out on geotechnical ground investigation works (boreholes and trial pits) which informed a preliminary stage of a desk–based assessment (MOLA 2021 forthcoming).

1.3.3 This geoarchaeological report has been prepared within the terms of the relevant standards specified by the Chartered Institute of Archaeologists (CIFA 2014a, 2014b).

## 1.4 Aims and objectives

1.4.1 All research is undertaken within the priorities established in the Museum of London's (2002) A research framework for London Archaeology.

1.4.2 The overall objective of the geoarchaeological monitoring of the geotechnical works at the site was to record the buried sequence of deposits within the site and assess

their palaeoenvironmental and archaeological potential.

1.4.3 The limited nature of the geotechnical works and the watching brief upon them makes it unreasonable to establish many specific archaeological or geoarchaeological research objectives. Nevertheless a few research questions can be outlined WSI (MOLA 2021):

- What is the nature and level of natural topography?
- What are the earliest deposits identified?
- What are the latest deposits identified?
- What is the extent of modern disturbance?
- Are there alluvial deposits of the Yeading Brook extant and what is the palaeoenvironmental potential of these?
- What is the potential for prehistoric archaeology on the site?
- Is there archaeology from other periods on the site?
- Is there potential for the survival of prehistoric remains on the site?

# 2 Geoarchaeological background

2.1.1 The L4 Colt DCS Data Centre site, is located in the valley of the Yeading Brook. Geological mapping (BGS 1:50,000, Sheet 256, North London) indicates the Yeading cuts through superficial deposits of Langley Silt which overlies the sands and gravels of the Lynch Hill river terrace in places, overlying London Clay bedrock geology. A preliminary appraisal of the site and surroundings show that the site was within open fields until the 1960s when it was first developed with industrial buildings (MOLA 2021).

2.1.2 Over the past 150 years several investigations locally (Brown 1886, 1887, 1889; Collins,1978; and Bazely et al 1991) have identified Palaeolithic (Levallois industry) material from the Pleistocene deposits MIS 8 - 9 (Middle Pleistocene, 300,000 to 340,000 years ago), ascribed to the Lynch Hill Gravel.

2.1.3 The closest investigation to the site, 200m north-east, at 1–3 Uxbridge Road was a geoarchaeological investigation that identified Lynch Hill Gravel deposits or Holocene deposits associated with the Yeading Brook overlying London Clay with a single worked flake. No datable alluvial deposits were observed (Young et al 2015). The borehole data suggested that the London Clay has an upper surface varying between 23.3m OD and 26.3m OD. Above the London Clay, most of the boreholes and window samples noted the presence of sandy gravels.

# 3 The geoarchaeological watching brief

3.1.1 The geoarchaeological watching brief was carried out according to the WSI (MOLA 2021).

3.1.2 A total of 8 boreholes (BHs) and 5 trial pits (TPs) were logged by a MOLA Geoarchaeologist during the site investigation works. The original scope of the works included 5 TPs and 6 BHs, although this was subsequently increased by two additional boreholes (BH102a and BH103a), due to concrete obstructions at the original locations (Fig 2).

3.1.3 Borehole and trial pit positions across the site are shown indicatively in Fig 2, and sedimentary logs and geoarchaeological interpretations of each unit are provided in the tables in the Appendix. An illustration of the comparitave levels and nature of the deposits found during the watching brief can be seen in Fig 3.

3.1.4 Of the 8 boreholes, 5 reached Pleistocene deposits (BH101, BH103a, BH104, BH105, BH106) and only 2 encountered undisturbed alluvium (BH101, BH105) although in the case of BH105 this may be a brickearth deposit. The rest all terminated within the made ground.

3.1.5 Of the 5 trial pits, only 1 encountered Pleistocene deposits (TP303). The rest all terminated within the made ground.

3.1.6 The earliest deposit encountered onsite was the London Clay found at 26.98m OD recorded in the south east in BH105.

3.1.7 The Lynch Hill Gravel Member (river terrace deposits) was encountered in 4 of the boreholes (BH101, BH103a, BH104, BH106) and in TP303 (Fig 2 & Fig 3). Their elevations range from 27.81m OD to 28.95m OD.

3.1.8 An additional Pleistocene deposit of reddish yellow brickearth was also encountered at 28.94m OD in BH103a overlying the river terrace gravel. This has been provisionally interpreted as the Langley Silt Member (Gibbard 1994) which is mapped to overlie the Lynch Hill Gravel in the north west of the site (BGS 1:50,000, Sheet 270, South London).

3.1.9 Possible remnants of undisturbed alluvium was encountered in the far north west and south east of the site in BH101 and BH105, and was comprised of silty clay and sandy clay. Their elevations range from 27.28m OD to 29.04m OD, with thicknesses ranging from 0.3m to 1m.

3.1.10 Made ground (including, occasionally, possible disturbed alluvium) was present all the BHs and TPs, with more than half failing to penetrate into the underlying alluvium (TP310, TP308, BH102a, BH102, TP307, TP305, BH103).

3.1.11 The made ground was variable in depth ranging from 0.6m to 2.5m bgl, comprising concrete, crushed brick and limestone, tarmac, sand, silt, clay, and gravel. These deposits are of no palaeoenvironmental or archaeological significance and are likely the reason for the limited presence of alluvium onsite, due to truncation.

# 4 Archaeological potential

4.1.1 This section provides a preliminary assessment of the extent to which the original research questions have been addressed by the geoarchaeological investigation.

- *What is the nature and level of natural topography?*

4.1.2 The earliest natural topography identified on site was the London Clay in BH105 in the south east of the site at an elevation of 26.98m OD. The earliest deposit of archaeological interest was the Lynch Hill Gravel Member which dates to the late Pleistocene and underlies the whole site. Encountered in BH101, BH103a, BH104, BH106 and TP303 in the north and particularly in the south west of the site (Fig 2) its elevations ranges from 27.81m OD to 28.95m OD. This is overlain by a 0.45m thick layer of Langley Silty brickearth in BH103a and a 1m thick layer of silty clay alluvium in BH101. Sandy clay alluvium/brickearth was also recorded in BH105 overlying the London Clay with an elevation of 27.28m OD.

- *What are the earliest deposits identified?*

4.1.3 See above.

- *What are the latest deposits identified?*

4.1.4 The latest deposits identified were made ground consisting of concrete, crushed brick and limestone, tarmac, sand, silt, clay, and gravel. Most of the area of investigation was sealed with concrete and/or tarmac.

- *What is the extent of modern disturbance?*

4.1.5 The made ground was variable in depth ranging from 0.6m to 2.5m bgl, forcing multiple BHs and TPs to terminate before successfully penetrating the natural topography. It is highly likely that the extent of the made ground has resulted in the truncation of much of the Holocene alluvium and Pleistocene gravel.

- *Are there alluvial deposits of the Yeading Brook extant and what is the palaeoenvironmental potential of these?*

4.1.6 Alluvial deposits associated with the Yeading Brook were only found in BH101 and possibly BH105. This poor survival is consistent with a previous investigation in the area (Young et al 2015). As a consequence, the palaeoenvironmental potential is considered low for the site due to the limited survival of these deposits, and their poor condition due to modern disturbance.

- *What is the potential for prehistoric archaeology on the site?*

4.1.7 No direct evidence of prehistoric archaeology was seen during the watching brief and due to the limited presence of alluvium and the high degree of modern disruption, it is considered there is low potential for indirect (palaeoenvironmental) evidence of prehistoric archaeology.

- *Is there archaeology from other periods on the site?*

4.1.8 As with evidence for prehistoric archaeology, no direct evidence of archaeology from other periods was seen during the watching brief and due to the limited presence of alluvium and the high degree of modern disruption, it is considered there is low potential for indirect (palaeoenvironmental) evidence.

- *Is there potential for the survival of prehistoric remains on the site?*

4.1.9 See above

# 5 Overall potential

5.1.1 In general, the thickness and extent of the made ground appears to have removed or disturbed the sediments of greatest archaeological and geoarchaeological potential across most of the site.

5.1.2 No artefactual remains were encountered within any deposits recorded.

5.1.3 The only areas of interest are in the areas of the site where alluvial deposits were encountered largely due to their potential for palaeoenvironmental sampling although alluvial survival was very limited across the site.

5.1.4 Overall, the truncation of the natural deposits through the thickness and disturbance of modern made ground suggests a low palaeoenvironmental and archaeological potential for the site as a whole.

5.1.5 Consequently, there are no recommendations for further work. The decision on any requirement for further work rests with the Local Authority however.

# 6 Acknowledgements

6.1.1 The author would like to thank Concept Engineering Consultants Ltd. for commissioning the work on behalf of Colt Data Centre Services (Colt DCS) and the geotechnical team for their help and assistance onsite.

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# 8 Appendix – Provisional borehole and trial pit logs

| BCI21_BH101 | | | | | | |
|---|---|---|---|---|---|---|
| 511474 | 180275 | OD height | 29.64 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.15 | **29.64** | **29.49** | 0.15 | Concrete | Made ground |
| 0.15 | 0.45 | **29.49** | **29.19** | 0.3 | Compact coarse yellow and red brick and concrete fragments | |
| 0.45 | 0.6 | **29.19** | **29.04** | 0.15 | Soft grey silty clay with occasional fine fragments of brick | Made ground / disturbed alluvium |
| 0.6 | 1.6 | **29.04** | **28.04** | 1 | Soft grey silty clay | Alluvium |
| 1.6 | 2 | **28.04** | 27.64 | 0.4 | Dense yellowish brown sandy gravels | Lynch Hill Gravel |

| BCI21_BH102 | | | | | | |
|---|---|---|---|---|---|---|
| 511590 | 180215 | OD height | 28.88 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.1 | **28.88** | **28.78** | 0.1 | Tarmac | Made ground |
| 0.1 | 0.2 | **28.78** | **28.68** | 0.1 | Moderately firm grey sandy clay with frequent fine to coarse brick fragments | |
| 0.2 | 0.8 | **28.68** | **28.08** | 0.6 | Compact light grey clayey sand with frequent fine to coarse brick and concrete fragments | |
| 0.8 | 1.5 | **28.08** | 27.38 | 0.7 | Concrete (BH Terminated) | |

| BCI21_BH102a | | | | | | |
|---|---|---|---|---|---|---|
| 511597 | 180208 | OD height | 29.13 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 2.5 | **29.13** | **26.63** | 2.5 | Concrete (BH Terminated) | Made ground |

| **BCI21_BH103** | | | | | | |
|---|---|---|---|---|---|---|
| 511504 | 180228 | m OD height | 29.74 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.1 | **29.74** | **29.64** | 0.1 | Concrete | Made ground |
| 0.1 | 0.4 | **29.64** | **29.34** | 0.3 | Compact reddish brown silty sandy clay with frequent brick and tarmac | |
| 0.4 | 0.8 | **29.34** | **28.94** | 0.4 | Firm dark brown grey silty clay with occasional charcoal flecks and brick fragments | |
| 0.8 | 1.25 | **28.94** | **28.49** | 0.45 | Firm reddish yellow sandy clayey silt with a ceramic drainpipe at top of horizon | |
| 1.25 | 1.5 | **28.49** | 28.24 | 0.25 | Concrete obstruction | |

| **BCI21_BH103a** | | | | | | |
|---|---|---|---|---|---|---|
| 511504 | 180228 | OD height | 29.74 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.1 | **29.74** | **29.64** | 0.1 | Concrete | Made ground |
| 0.1 | 0.4 | **29.64** | **29.34** | 0.3 | Compact reddish brown silty sandy clay with frequent brick and tarmac | |
| 0.4 | 0.8 | **29.34** | **28.94** | 0.4 | Firm dark brown grey silty clay with occasional charcoal flecks and brick fragments | Made ground / disturbed alluvium |
| 0.8 | 1.25 | **28.94** | **28.49** | 0.45 | Firm reddish yellow sandy clayey silt | Pleistocene brickearth/Langley Silt |
| 1.25 | 2 | **28.49** | 27.74 | 0.75 | Dense yellowish brown sandy gravels | Lynch Hill Gravel |

| **BCI21_BH104** | | | | | | |
|---|---|---|---|---|---|---|
| 511498 | 180170 | OD height | 29.11 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.05 | **29.11** | **29.06** | 0.05 | Tarmac | Made ground |
| 0.05 | 0.3 | **29.06** | **28.81** | 0.25 | Concrete | |
| 0.3 | 0.7 | **28.81** | **28.41** | 0.4 | Compact orange clayey sand with frequent gravel and occasional fine to medium brick fragments throughout | |
| 0.7 | 1.3 | **28.41** | **27.81** | 0.6 | Firm yellowish grey sandy clay and gravel with occasional coarse brick fragments throughout | |
| 1.3 | 3 | **27.81** | **26.11** | 1.7 | Dense yellowish brown sandy gravels | Lynch Hill Gravel |

| **BCI21_BH105** | | | | | | |
|---|---|---|---|---|---|---|
| 511569 | 180135 | OD height | 28.48 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.05 | **28.48** | **28.43** | 0.05 | Tarmac | Made ground |
| 0.05 | 0.3 | **28.43** | **28.18** | 0.25 | Concrete | |
| 0.3 | 1.15 | **28.18** | **27.33** | 0.85 | Compact orange sand and gravel with frequent bricks and concrete fragments throughout | |
| 1.15 | 1.2 | **27.33** | **27.28** | 0.05 | Concrete | |
| 1.2 | 1.5 | **27.28** | **26.98** | 0.3 | Moderately firm greyish brown slightly sandy fine stony clay | Alluvium / Brickearth ? |
| 1.5 | 2 | **26.98** | 26.48 | 0.5 | Stiff brown clay | London Clay |

| **BCI21_BH106** | | | | | | |
|---|---|---|---|---|---|---|
| 511447 | 180157 | OD height | 29.75 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.1 | **29.75** | **29.65** | 0.1 | Tarmac | Made ground |
| 0.1 | 0.2 | **29.65** | **29.55** | 0.1 | Concrete | |
| 0.2 | 0.8 | **29.55** | **28.95** | 0.6 | Compact light brown sandy clay with frequent fine to medium brick and concrete fragments throughout | |
| 0.8 | 1.5 | **28.95** | **28.25** | 0.7 | Dense yellowish brown sandy gravels | Lynch Hill Gravel |

| BCI21_TP303 | | | | | | |
|---|---|---|---|---|---|---|
| 511490 | 180150 | OD height | 29.4 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.1 | **29.4** | **29.3** | 0.1 | Tarmac | Made ground |
| 0.1 | 0.3 | **29.3** | **29.1** | 0.2 | Concrete slab | |
| 0.3 | 0.9 | **29.1** | **28.5** | 0.6 | Compact orange sand and gravel with frequent bricks and concrete fragments throughout | |
| 0.9 | 1.1 | **28.5** | **28.3** | 0.2 | Soft dark grey silty clay with fine fragments of brick | Made ground / disturbed alluvium |
| 1.1 | 3 | **28.3** | **26.4** | 1.9 | Compact orange sand and gravel | Lynch Hill Gravel |

| BCI21_TP305 | | | | | | |
|---|---|---|---|---|---|---|
| 511553 | 180223 | OD height | 28.95 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.05 | **28.95** | **28.9** | 0.05 | Concrete paving | Made ground |
| 0.05 | 1.1 | **28.9** | **27.85** | 1.05 | Firm brown sand with frequent fine to coarse fragments of brick | |
| 1.1 | 1.2 | **27.85** | **27.75** | 0.1 | Firm brown silty sandy very gravelly clay | |

| BCI21_TP307 | | | | | | |
|---|---|---|---|---|---|---|
| 511517 | 180211 | OD height | 28.96 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.5 | **28.96** | **28.46** | 0.5 | Concrete | Made ground |
| 0.5 | 0.25 | **28.46** | **28.71** | -0.25 | Olive grey concrete crush/powder and concrete fragments | |
| 0.25 | 0.7 | **28.71** | **28.26** | 0.45 | Medium brown compact sandy clay with moderately frequent brick and concrete fragments and frequent fine to medium gravel | |

| BCI21_TP308 | | | | | | |
|---|---|---|---|---|---|---|
| 511452 | 180190 | OD height | 29.71 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.05 | **29.71** | **29.66** | 0.05 | Tarmac | Made ground |
| 0.05 | 0.2 | **29.66** | **29.51** | 0.15 | Concrete | |
| 0.2 | 0.4 | **29.51** | **29.31** | 0.2 | Compact grey sand with frequent gravel and occasional fine to medium brick fragments throughout | |
| 0.4 | 0.65 | **29.31** | **29.06** | 0.25 | Firm reddish brown slightly gravelly clay | |
| 0.65 | 0.9 | **29.06** | **28.81** | 0.25 | Firm brown gravelly sandy clay | |

| BCI21_TP310 | | | | | | |
|---|---|---|---|---|---|---|
| 511595 | 180191 | OD height | 28.42 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.05 | **28.42** | **28.37** | 0.05 | Limestone gravel | Made ground |
| 0.05 | 1 | **28.37** | **27.42** | 0.95 | Compact orange coarse sand and gravel with occasional brick fragments and pipe at base | |

| BCI21_TP308 | | | | | | |
|---|---|---|---|---|---|---|
| 511452 | 180190 | OD height | 29.71 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.05 | **29.71** | **29.66** | 0.05 | Tarmac | Modern ground level |
| 0.05 | 0.2 | **29.66** | **29.51** | 0.15 | Concrete | Made ground |
| 0.2 | 0.4 | **29.51** | **29.31** | 0.2 | Compact grey sand with frequent gravel and occasional fine to medium brick fragments throughout | |
| 0.4 | 0.65 | **29.31** | **29.06** | 0.25 | Firm reddish brown slightly gravelly clay | |
| 0.65 | 0.9 | **29.06** | **28.81** | 0.25 | Firm brown gravelly sandy clay | |

| BCI21_TP310 | | | | | | |
|---|---|---|---|---|---|---|
| 511595 | 180191 | OD height | 28.42 | | | |
| **Depth to top of unit (m bgl)** | **Depth to base of unit (m bgl)** | **OD height of top of unit (m)** | **OD height at base of unit (m)** | **Thickness** | **Description** | **Interpretation** |
| 0 | 0.05 | **28.42** | **28.37** | 0.05 | Limestone gravel | Modern ground level |
| 0.05 | 1 | **28.37** | **27.42** | 0.95 | Compact orange coarse sand and gravel with occasional brick fragments and pipe at base | Made ground |

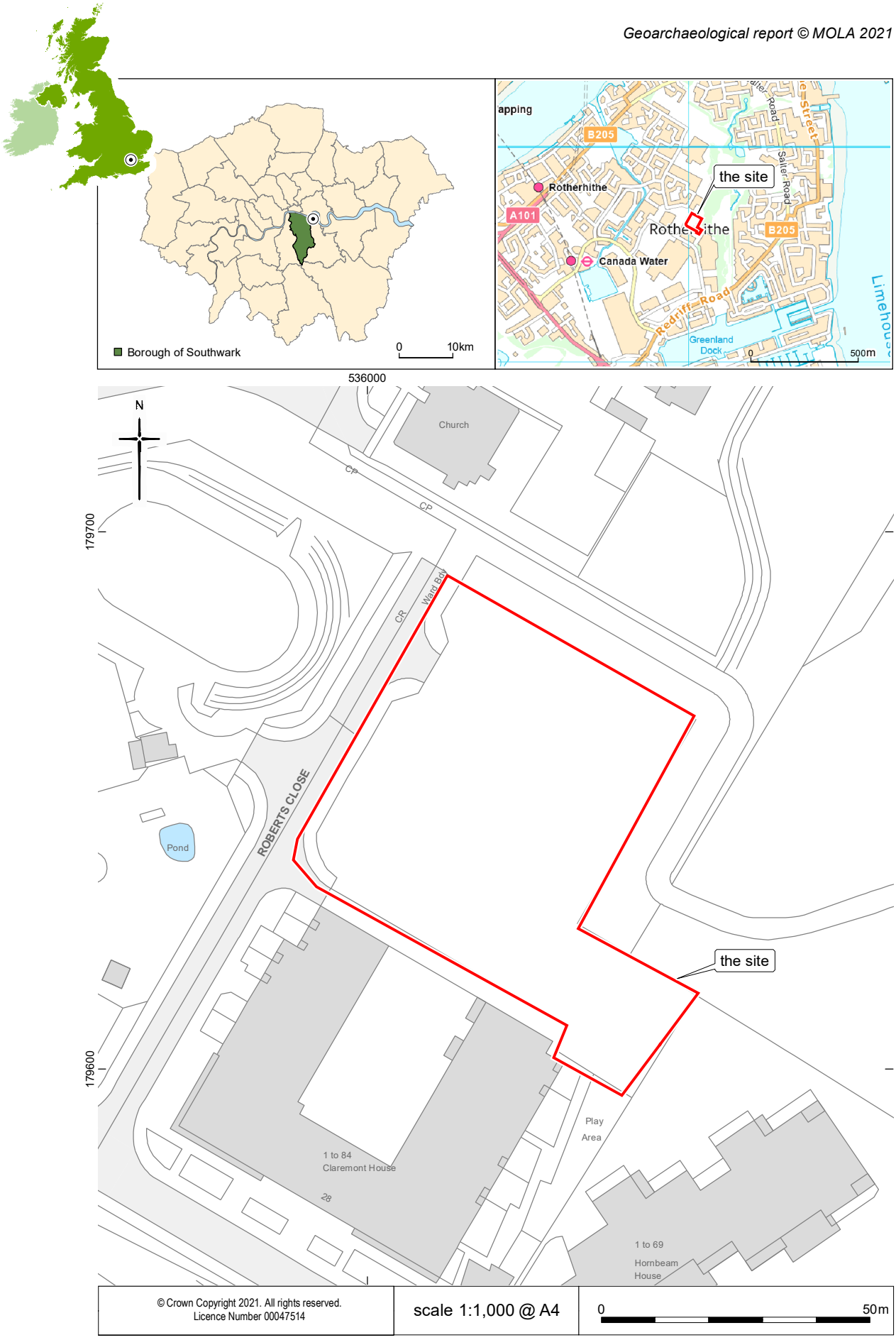


Fig 1 Site location


Fig 2 Borehole and trial pit locations (MOLA watching brief interventions highlighted in green)

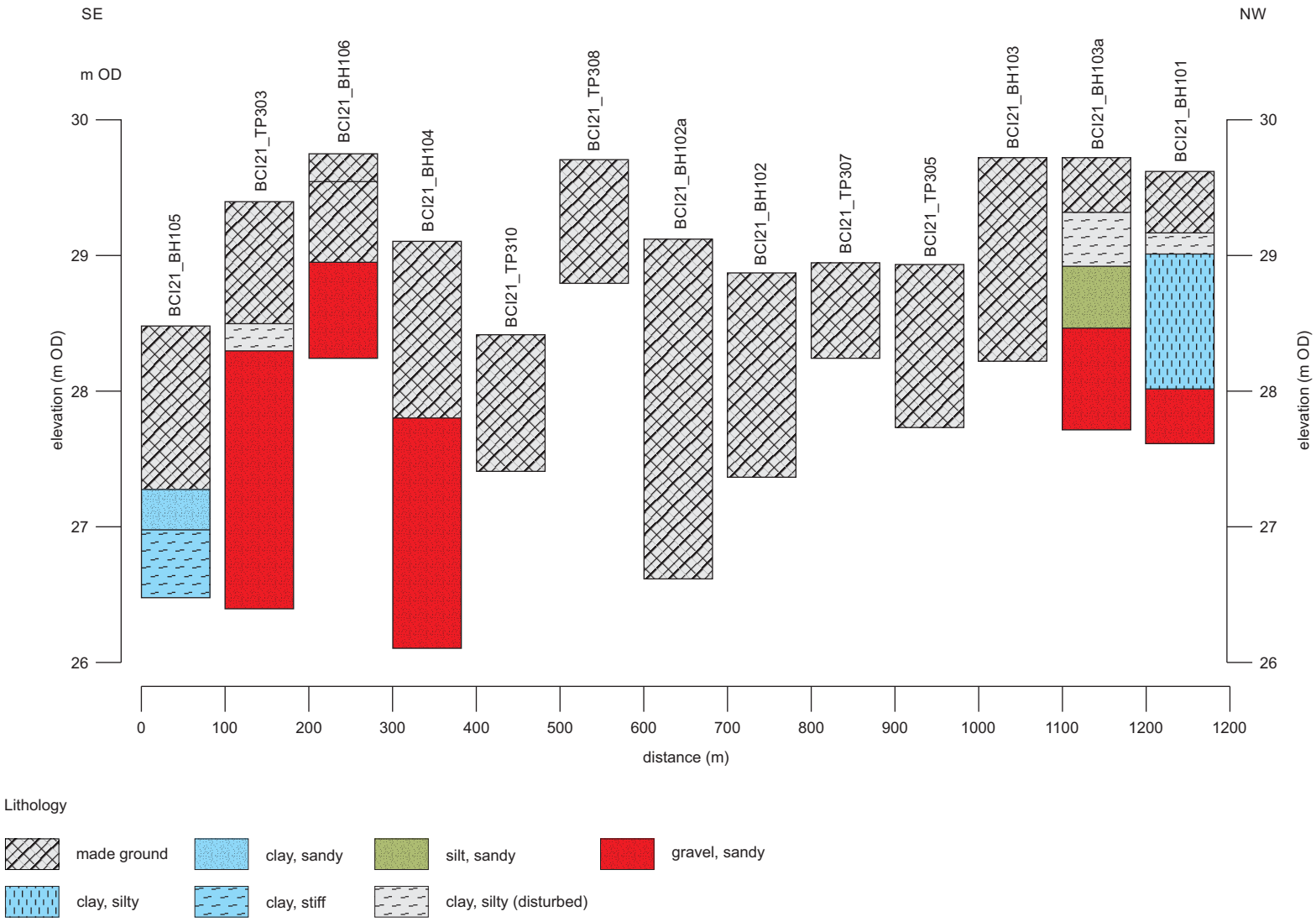


Fig 3 Site wide transect

# Appendix B

Assessment methodology

# B1 Risk assessment methodology

The potential risks to human health and environmental receptors have been considered in accordance with the current UK approach to contaminated land assessment taking into consideration the available information on the construction and operational phases of the development.

The method for risk evaluation takes into consideration the magnitude of the potential severity of the risk as well as the probability of the risk occurring. The risk characterisations have been assessed based on the qualitative method of interpretation set out in CIRIA guidance C552 [23][22]. The method for risk evaluation involves the classification of the:

- magnitude of the potential consequence (severity) of the risk occurring (refer to Table A1-1); and
- magnitude of the probability (likelihood) of the risk occurring (refer to Table A1-2).

Table A1-1 Classification of consequence

| Classification | Definition |
|---|---|
| Severe | Short-term (acute) risk to human health likely to result in 'significant harm' as defined by the Environmental Protection Act 1990, Part IIA.<br>Short-term risk of pollution of a sensitive water resource.<br>Catastrophic damage to buildings or property.<br>A short-term risk to an ecosystem, or organism forming part of such ecosystem. |
| Medium | Chronic damage to human health.<br>Pollution of a sensitive water resource.<br>A significant change to an ecosystem, or organism forming part of such ecosystem. |
| Mild | Pollution of a non-sensitive water resource, such as non-classified groundwater.<br>Damage to buildings, structures and services. |
| Minor | Harm, which may result in a financial loss, or expenditure to resolve.<br>Non-permanent effects to human health, which could easily be prevented by means such as personal protective clothing.<br>Easily repairable effects of damage to buildings, structures and services. |

Table A1-3 presents the risk assessment matrix and Table A1-4 defines the risk classifications.

Table A1-2 Classification of probability

| Classification | Definition |
|---|---|
| High likelihood | There is a contaminant linkage and an event that either appears very likely in the short term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution. |
| Likely | There is a contaminant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur.<br>Circumstances are such that an event is not inevitable, but possible over the short term and likely over the long term. |
| Low likelihood | There is a contaminant linkage and circumstances are possible under which an event could occur. However, it is not certain that such an event would occur. |
| Unlikely | There is a contaminant linkage, but circumstances are such that it is improbable that an event would occur even in the very long term. |

Table A1-3 Comparison of consequence against probability

| | | Consequence | | | |
|---|---|---|---|---|---|
| | | **Severe** | **Medium** | **Mild** | **Minor** |
| **Probability** | **High likelihood** | Very high risk | High risk | Moderate risk | Moderate / low risk |
| | **Likely** | High risk | Moderate risk | Moderate / low risk | Low risk |
| | **Low likelihood** | Moderate risk | Moderate / low risk | Low risk | Very low risk |
| | **Unlikely** | Moderate / low risk | Low risk | Very low risk | Very low risk |

Table A1-4 Risk classifications

| Risk classification | Description of risk |
|---|---|
| Very high | There is a high probability that severe harm could arise to a designated receptor from an identified pollutant linkage at the site without appropriate remediation action OR there is evidence that severe harm to a designated receptor is currently happening. The risk, if realised, is likely to result in substantial liability. |
| High | Harm is likely to arise to a designated receptor from an identified pollutant linkage at the site without appropriate remediation action.<br>Realisation of the risk is likely to present a substantial liability. |
| Moderate | It is possible that without appropriate remediation action harm could arise to a designated receptor from an identified pollutant linkage. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that such harm would be relatively mild. |
| Low | It is possible that harm could arise to a designated receptor from an identified pollutant linkage. It is likely that if any harm was realised, at worst any effects would be mild. |
| Very low | The presence of an identified pollutant linkage does not give rise to the potential to cause harm to a designated receptor. |

# B2 Human health

The UK statutory guidance suggests that generic soil quality guideline values may be used for an initial screening of soil contamination results in relation to human health risk assessment. Generic assessment criteria (GAC) provide an indication of concentrations in soil below which the long-term human health risks for various generic land-use scenarios are considered to be minimal. Concentrations above GAC do not necessarily indicate that significant contamination is present, but rather that further assessment or risk management measures may be warranted.

GAC have been derived by Arup using the CLEA 1.071 software model [35]. Input data for the toxicological effects, physical characteristics and contaminant fate and transport parameters for the determinands have been taken from sources published by the Environment Agency and other industry sources (including LQM and CL:AIRE). These Arup derived GAC have been used in the assessment where available. In addition, LQM Suitable 4 use levels (S4UL) (Copyright Land Quality Management Limited reproduced with permission (Publication Number S4UL3227)) [36] and Category 4 screening levels (C4SLs) [37], released by Defra for some determinands, have been considered in the assessment where appropriate. The S4ULs use C4SL exposure parameters but maintain the traditional minimal risk toxicological benchmarks.

## B2.1 Asbestos in soil

Work with asbestos in the UK is controlled by the Health and Safety Executive (HSE) and the Control of Asbestos Regulations (CAR) 2012 [38]. Certain activities, such as working with asbestos insulation, coatings, and insulting board