



**CENTRAL SECTION PROJECT**  
**Fieldwork Report**  
**Archaeological Evaluations and Borehole**  
**Watching Brief**  
**Moorgate Shaft (XSP10)**

**Document Number: C257-MLA-X-RGN-CRG02-50069**

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## Non technical summary

*This report presents the results of an archaeological field evaluation and borehole monitoring carried out by the Museum of London Archaeology (MOLA) on the site of 91 to 109 Moorgate, London EC2, in the City of London. This report was commissioned from MOLA by Crossrail Ltd. This work is being undertaken as part of a wider programme of assessment to quantify the archaeological implications of railway development proposals along the Crossrail route.*

*The worksite at the Moorgate Shaft site (part of Crossrail contract C257 Archaeology Central) consists of the area within the basement of the now demolished 91 to 109 Moorgate buildings. Four evaluation trenches were opened and excavated down to natural deposits. Three boreholes within the basement area were also monitored and recorded.*

*In the four evaluation trenches and the three boreholes at the future shaft location, natural geology (brickearth) was overlain by a mixed wetland clay deposit containing undiagnostic Roman material such as pottery sherds and mortar fragments. A single cut feature of an unknown date was seen in evaluation Trench 6 cutting this layer. Above this deposits belonging to the late Roman or medieval Moorfield Marsh were observed in three of the evaluation trenches. All archaeological remains above this marsh deposit have been truncated by the modern concrete basement slab.*

*The results from the trial trenches and boreholes are assessed as being of low to moderate significance, and will be used by the Crossrail design archaeologist to revise and finalise the mitigation strategy for the site.*

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## 1 Introduction

Crossrail is a new cross London rail link project which will provide transport routes in the south east and across London. The line will provide a range of both new and improved rail journeys across London and its immediate surroundings. The proposed development will include the construction of seven stations within central London which will have interchange with other public transport modes including the London Underground, National Rail and the London Bus service; the development will also include the renewal and/or upgrade of existing stations outside central London. The route itself will link Maidenhead and Heathrow in the west with Shenfield in the north-east and Abbey Wood in the south-east. As part of these works a new station is required running from Moorgate to Liverpool Street, of which the western end consists of a shaft at Moorgate/Moorfields from ground level to the tunnels.

The Crossrail mitigation response to archaeology is described in the Crossrail Generic WSI (Crossrail 2009) and the detailed desk based assessment (DDBA; Crossrail 2008), and can be summarised as follows:

- In the event that intact and important archaeological remains are identified at Crossrail worksites through this process, it may be preferable, where practicable, to preserve these where they are found (ie preservation in situ).
- However, because of the nature of major works projects such as Crossrail, experience of other similar projects suggests that preservation by record is usually the most appropriate method of dealing with archaeological finds.
- Following an extensive Environmental Impact Assessment (EIA) supporting the Crossrail Bill, and the production of site-specific DDBAs, appropriate mitigation measures were scoped and specified in detail in individual project designs (site-specific WSIs – Written Schemes of Investigation) which were prepared in accordance with the principles set out in the Generic WSI, and developed in consultation with the relevant statutory authorities.
- Archaeological information that is gained from fieldwork will be followed by analysis and publication of the results and will be transferred to an approved public receiving body.

This fieldwork report describes the results of four archaeological evaluation trenches and a general watching brief on three boreholes through the basement of 91 to 109 Moorgate by Museum of London Archaeology (MOLA) under Crossrail contract C257 Archaeology Central.

The Moorgate shaft worksite is located within the basements of 91 to 109 Moorgate, in the City of London, EC2. The centre of the site is at Ordnance Survey National Grid Reference 532713 181639.

The site is bounded by Moorgate to the east, Moor Place to the north, Moorfields to the west and 87 Moorgate to the south (Fig 1). All fieldwork was conducted both pre and post demolition of the pre-existing buildings of 91 to 109 Moorgate and occurred between 25/11/10 and 09/09/11. It was supervised by Robert Hartle, Matthew Ginnever and Sam Pfizenmaier (MOLA Supervisors) and Graham Spurr (geo-archaeologist) and included the following activities:

| Task   | Supervisor       | Dates                                     |
|--|------------------|---|
| <ul style="list-style-type: none"> <li><b>Trial trench evaluation</b> (Trench 6 only)</li> </ul>             | Robert Hartle    | 25/11/10 to 01/12/10<br>(Pre-demolition)  |
| <ul style="list-style-type: none"> <li><b>Trial trench evaluation</b> (Trenches 4 and 5)</li> </ul>          | Matthew Ginnever | 06/09/11 to 09/09/11<br>(Post-demolition) |
| <ul style="list-style-type: none"> <li><b>General Watching Brief</b> (Boreholes in AMRO basement)</li> </ul> | Sam Pfizenmaier  | 23/08/11 to 06/09/11<br>(Post-demolition) |

The event code (sitecode) is **XSP10**.

**All levels in this document are quoted in metres Above Tunnel Datum (m ATD). To convert Tunnel Datum to Ordnance Datum subtract 100m, ie 1m OD = 101m ATD.**

## 2 Planning background

The legislative and planning framework in which all archaeological work took place was summarised in the Site Specific Written Scheme of Investigation (SS-WSI): *Liverpool Street Station Design Package 138*, Doc. No C138-MMD-T1-RST-C101-00001, Version 2, April 2010; a brief summary is included here:

The overall framework within which archaeological work will be undertaken is set out in the Environmental Minimum Requirements (EMR) for Crossrail (<http://www.crossrail.co.uk/therailway/getting-approval/parliamentary-bill/environmental-minimum-requirements-includingcrossrail-construction-code>). The requirements being progressed follow the principles of Planning Policy Guidance Note 16 on archaeology and planning (1990). Accordingly the nominated undertaker or any contractors will be required to implement certain control measures in relation to archaeology before construction work begins.

Schedules 9, 10 and 15 of the Crossrail Bill (2005) concern matters relating to archaeology and the built heritage and allows the dis-application by Crossrail of various planning and legislative provisions including those related to listed building status, conservation areas and scheduled ancient monuments (Schedule 9). Schedule 10 allows certain rights of entry to English Heritage given that Schedule 9 effectively dis-applied their existing rights to the Cross Rail project, and Schedule 15 allows Cross Rail to bypass any ecclesiastical or other existing legislation relating to burial grounds.

Notwithstanding these disapplications, it is intended that agreements setting out the detail of the works and requiring relevant consultations and approvals of detail and of mitigation arrangements will be entered into by the nominated undertaker with the relevant local planning authorities and English Heritage in relation to listed buildings and with the Department of Culture, Media and Sport (DCMS) and English Heritage in relation to Scheduled Ancient Monuments (SAMs).

## 3 Origin and scope of the report

This report has been commissioned from Museum of London Archaeology (MOLA) by Crossrail Ltd. The report has been prepared within the terms of the relevant standard specified by the

Institute for Archaeologists (IFA, 2001). It considers the significance of the fieldwork results (in local, regional or national terms) and makes appropriate recommendations for any further action, commensurate with the results.

This report will be made available from The London Archaeological Archive and Research Centre (LAARC) in due course.

## 4 Previous work relevant to the archaeology of the site

The primary previous Crossrail studies are as follows:

- A Crossrail **Site-specific Written Scheme of Investigation** (SS-WSI): *Liverpool Street Station Design Package 138*, Doc. No C138-MMD-T1-RST-C101-00001, Version 2, April 2010
- An **Addendum to the WSI**: Package C138 – *Liverpool Street Station, Addendum to Written Scheme of Investigation: Moorgate Shaft*, Doc. No: C138-MMD-T1-TCP-C101- 0001, Revision 2.0, July 2010.
- An **Archaeological Method Statement**: MOLA, *C257 Archaeology Central Method Statement Archaeological Evaluation and Watching Briefs (C138) Moorgate Shaft*, Doc. No: C257-MLA-T1-GMS-CR088-00003, Version 5, 30/08/11.
- An **Interim Statement**: MOLA, *C257 Archaeology Central Interim Statement Archaeological Evaluation 91 to 109 Moorgate – XSP10* Doc No: C257-MLA-X-RGN-CRG02-50028, Version 2, 13/07/11.
- An **Interim Statement**: MOLA, *C257 Archaeology Central Interim Statement Archaeological Evaluation & Boreholes 91 to 109 Moorgate – XSP10* Version 1, 27/09/11
- A **Survey Report**: MOLA, *C257 Archaeology Central Survey Report Archaeological Evaluation (C136 Moorgate Shaft) 91 to 109 Moorgate - XSP10* Version 1, 14/09/11

## 5 Geology and topography of site

The geological and topographical setting was covered in detail in the SS-WSI – *Liverpool Street Station Design Package 138*, Crossrail, April 2010, Document No C138-MMD-T1-RST-C101-00001, Revision 2.0 summarised below.

The drift geology consists of Pleistocene terrace gravels of the third (Taplow) Thames terrace, which have been located in boreholes at c 108.5m ATD. While establishing its new path during the course of the last Ice Age, the Thames river eroded its valley, periods of greater and lesser flow creating a series of sand and gravel terraces of which this is one.

The single evaluation trench on the site to date revealed brickearth at 108.65m ATD (Langley Silt Complex, a silty loam overlying the terrace gravels, formed from re-worked, fine-grained sediments laid down by wind or surface water) (Crossrail July 2011). Similar deposits were seen in boreholes monitored by MOLA in 101 Moorgate, but not on the opposite side of Moorgate at Electra House (Crossrail September 2011)

Above this at between 110.1 and 108.3m ATD were sandy clays, peats and organic sediments representing former marsh deposits which developed due to the waterlogged nature of the ground that led to only partial decomposition of organic material. At 101 Moorgate, Marsh deposits lay up to 109.71m ATD where they were truncated by the basement slab (Crossrail September 2011).

The terrace gravels, forming the base of the archaeological sequence, were predicted to lie between 2.0m (C138 deposit model) and 1.1m (single location in recent investigation by Mott MacDonald in 91–109 Moorgate) below the surface of the basement slab.

### 5.1 Archaeological and Historical Background

The archaeological potential of the Moorgate Shaft site is summarised below, and covered in detail in the *detailed desk based assessment for Liverpool Street Station*: Crossrail 2008, and the WSI SS-WSI – *Liverpool Street Station Design Package 138*, Crossrail, April 2010, Document No C138-MMD-T1-RST-C101-00001, Revision 2.0.

There is limited potential for prehistoric remains in this area, as such horizons have been removed in the majority of cases by Roman and later activity. Prehistoric evidence, if present, is likely to be limited to residual finds found in later deposits, such as the small quantities of Iron Age pottery from Moorgate Hall (MOH88) immediately north of the current site, and Riverplate House (RIV87) on Finsbury Circus, and possibly the Neolithic and Bronze Age flints at Moor House (MRL98) (LAARC summaries).

The line of the Roman and medieval City Wall runs to the south of the Moorgate Shaft site, approximately along the line of the modern London Wall street. Roman extra-mural activity, especially burials, in the area have been shown from several previous excavations. Fieldwork c 80m to the north of site in 1989 at Moorgate Hall revealed a single Roman inhumation burial. This, however, did *not* appear to the excavators to be part of the extra-mural cemetery which existed to the north of the Roman city (LAARC summary for MOH88). At least 28 cremations and 181 inhumations burials have been recorded in the surrounding area, ranging in date from the 1st to the 4th centuries AD, most recently at 18–31 Eldon Street (ENS03).

The construction of the city wall between c AD 180 and 225 appears to have impeded the drainage of the area and encouraged the development of the Moorfields Marsh deposits. It is likely that this area had been wet throughout the Roman period and efforts to reclaim the land have been noted at site such as 8–10 Moorgate (MoLAS 2006) to the south of the site.

Fitzstephen in the late 12th century described this area as a 'great fen or moor'. The recent Crossrail evaluation at Finsbury Circus has located Moorfields Marsh deposits overlying earlier Roman pits (Crossrail, June 2011). In 1415, the Mayor of London Thomas Falconer built a postern gate (lower end of Moorgate at the junction with London Wall – outside the current works) (demolished in 1762) and he ordered the digging of ditches to try and drain the area. In 1512 and 1527 further drainage schemes were carried out in the Moorfields area, which allowed this area of wasteland to be utilised for the first time in its history. The Agas map of c 1570, shows a road (Little Moorfields) leading north from the postern gate flanked on its western side by drying cloth being stretched on tenter frames. John Stow writing in c 1600 noted the presence of gardens and tenter-yards here. Rocque's map of London (1746) shows that the road leading north from the postern gate was now known as Finsbury and it was flanked to the west by suburban development, behind which was another parallel street (Little Moor Fields), now known as Moorfields. Moorgate was widened in 1840. The construction of this stretch of the Metropolitan Line during 1865, by means of a huge linear trench dug from ground level (cut and cover) means that no archaeological deposits will survive under the northern part of the development (103–109 Moorgate).

## 6 Research objectives and aims

### 6.1 Objectives of the fieldwork

The objectives of the archaeological investigations, as stated in the addendum to the WSI (Crossrail 2010), are set out below.

The overall objectives of the Trial Trench Evaluations and Borehole Watching Brief was to establish the nature, extent and state of preservation of any surviving archaeological remains that will be impacted upon by the development. Specifically, the archaeological investigations have the potential to recover:

- Artefacts of prehistoric date redeposited in later deposits.
- Remains of Roman extra-mural activity, potentially including burials.
- Water-lain deposits from the Roman to medieval Moorfields Marsh, with the potential for organic preservation and palaeoenvironmental evidence.
- Late medieval and post-medieval drainage ditches, rubbish dumps and remains associated with the reclamation of Moorfields Marsh.
- In areas not truncated by later activity: remains of mid 17th-century or earlier buildings on the western side of Moorfields, and late 17th/early 18th-century or later buildings across the whole site.

### 6.2 Research Aims

The original aims and objectives were listed in the Liverpool Street WSI (Crossrail 2009). Evidence relating to the Walbrook, its tributaries and Moorfields Marsh deposits may provide data relevant to the following themes:

- Understanding London's hydrology, river systems and tributaries and the relationship between rivers and floodplains;
- Understanding how water supply and drainage provision were installed and managed;
- Understanding the relationships between urban settlements and royal villas or religious estates;

- Examining the proposal that there was an ideological polarity between town and anti-town systems: Roman towns did not so much fail as were discarded;
- The end of the Roman occupation: developing explanatory models to explain socio-political change and considering the influence of surviving Roman structures on Saxon development; and
- Examining the use in any one period of materials from an earlier period (eg Saxon use of surviving Roman fabric) and the influence on craftsmanship, manufacture and building techniques.

## 7 Methodology of site-based and off-site work

All archaeological excavation and recording during the evaluation was carried out in accordance with:

- A Crossrail **Site-specific Written Scheme of Investigation (SS-WSI): Liverpool Street Station Design Package 138**, Doc. No C138-MMD-T1-RST-C101-00001, Version 2, April 2010
- An **Addendum to the WSI: Package C138 – Liverpool Street Station, Addendum to Written Scheme of Investigation: Moorgate Shaft**, Doc. No: C138-MMD-T1-TCP-C101- 0001, Revision 2.0, July 2010.
- **An Archaeological Method Statement: MOLA, C257 Archaeology Central Method Statement Archaeological Evaluation and Watching Briefs (C138) Moorgate Shaft**, Doc. No: C257-MLA-T1-GMS-CR088-00003, Version 5, 30/08/11.
- Museum of London *Archaeological Site Manual* (MoL 1994)
- Corporation of London Department of Planning and Transportation, 2004 Planning Advice Note 3: Archaeology in the City of London, Archaeology Guidance

The site finds and records can be found under the site code XSP10 in the MOLA archive. They will be stored there pending a future decision over the longer-term archive deposition and public access process for the wider Crossrail scheme.

### 7.1 Borehole Watching Brief Methodology

The archaeological Borehole Watching Brief covered three exploratory boreholes within the footprint of the basement of the pre-existing buildings of 91 to 109 Moorgate (See Fig 1).

The Borehole Watching Briefs consisted of a basic monitoring presence, by a MOLA Senior Archaeologist, to observe works carried out by the Principal Contractor. A record of all archaeological deposits encountered was made in accordance with the principles set out in the Museum of London site recording manual (MoL 1994).

The borehole locations were recorded by the Principal Contractor.

### 7.2 Evaluation Methodology

Four evaluation trenches were excavated within the southern and central areas of the site (see Fig 1). Initially six trenches had been planned however two of these were abandoned due to the extent of modern truncation in their proposed locations and a third (Trench 1) was excavated, but had been completely truncated by modern concrete. The trenches were excavated by

machine down to the first significant archaeological horizon. Once hand cleaned, investigated, and recorded this was carefully removed by machine under close archaeological supervision. Changes in stratigraphy uncovered by subsequent machining were similarly recorded by MOLA staff until natural deposits were encountered and all archaeological features had been removed and recorded.

A written and drawn record of all archaeological deposits encountered was made in accordance with the principles set out in the Museum of London site recording manual (MoL 1994) (see Figs 1–5).

The trench locations were recorded by MOLA Geomatics by optical survey. The survey utilised Crossrail London Survey Grid control stations, which were then tied into the Ordnance Survey National Grid. A Survey Report was produced by MOLA Geomatics (MOLA, September 2011).

### **7.3 Environmental and Geoarchaeological Sampling Strategy (Archaeological Science)**

The sampling strategy for the Moorgate sub-site was conducted following the Method Statement (MOLA 2011, sections 6 and 11). The methods actually required by the deposits present being sampling of the Moorfields Marsh deposits, by means of bulk soil samples of 20 litres of the potential marsh deposits were taken by the archaeologist on site for processing and subsequent analysis by archaeo-botanical and archaeo-zoological specialists. The environmental results from these samples can be found in Appendices 18.2 and 18.3.

A profile/section through the marsh deposits was investigated by a Geoarchaeologist, paying particular attention to the interface at the base of the Marsh sequence, how it first formed, and when (see Appendix 18.4). Monolith samples, and supporting 8 litre bulk samples, were taken from each trench, and have been retained for future sediment analysis and possibly pollen and diatom sub samples.

Other sampling methods (eg for human remains) were not required by the deposits present in the evaluation.

## 8 Results and observations

The locations of the evaluation trenches and boreholes are shown on figure 1.

### 8.1 Evaluation Trenches:

#### 8.1.1 Trench 1

| <b>Trench 1</b>   |   |
|---|---|
| Location  | 91 to 109 Moorgate (in the north of the basement) |
| Dimensions  | Not fully excavated                               |
| Centre of test trench<br>London Survey grid co-ordinates  | 83060 36331                                       |
| OS grid co-ordinates  | 532710 181639                                     |
| Modern Ground Level/top of the slab   | 110.00m ATD                                       |
| Modern subsurface deposits  | Concrete basement slab.                           |
| Level of base of archaeological deposits observed and/or base of trench   | No archaeological deposits                        |
| Natural observed  | Natural not seen                                  |
| Extent of modern truncation   | Across entire trench                              |
| <b>Archaeological remains</b>   | <b>Dating Evidence, Finds, and Samples</b>        |
| <b>Interpretation and summary</b>   |   |
| Due to extensive modern truncation across the entire of the area selected for Trench 1, the trench was abandoned and no archaeological remains were observed. |   |

### 8.1.2 Trench 4



Photo 1 Trench 4 looking North. Section showing gravelly brickearth natural overlain by clay and marsh deposits.

| <b>Trench 4 (Fig 5)</b>   |  |
|---|--|
| Location  | 91 to 109 Moorgate (in the west of the basement)   |
| Dimensions  | 3.50m north-west to south-east and 2.40m north-east to south-west x 1.20 to 1.60m deep   |
| Centre of test trench:<br>London Survey grid co-ordinates:              | 83057 36320  |
| OS grid co-ordinates:   | 532707 181626  |
| Modern Ground Level/top of the slab                                     | 110.00m ATD  |
| Modern subsurface deposits  | Concrete basement slab.  |
| Level of base of archaeological deposits observed and/or base of trench | Base of archaeological deposits: 108.83m ATD (1.17m bGL)<br>Base of trench: 108.60m ATD (1.40m bGL)  |
| Natural observed  | Gravelly brickearth [15] at 108.83m ATD (1.17m bGL), overlaying natural brickearth layer [16] at 108.60m ATD (1.40m bGL)<br>Natural gravel not seen. |

|  |  |
|--|--|
| Extent of modern truncation  | 110.00m to 109.25m ATD over whole trench   |
| <b>Archaeological remains</b>  | <b>Dating Evidence, Finds, and Samples</b>   |
| Organic wetland clay layer [14] with very occasional anthropogenic material, including occasional animal bone fragments, ceramic building material fragments and mortar flecks which were too small to recover.<br><br>Highest surviving point at 109.05m ATD (0.95m bGL).<br><br>Overlies natural brickearth and overlain by [13].  | Undated, probably Roman from observation in other evaluation trenches (Trench 5 and 6).<br><br>Monolith and bulk samples (20 litres) (Bulk sample No. {9} and Monolith {7}) from context [14] in the south-east section. |
| Dark brown organic silty clay layer [13]. Highest surviving point at 109.27m ATD (0.73m bGL).  | Undated, probable late Roman or early medieval<br><br>Monolith and bulk samples (20 litres) (Bulk sample No. {6} and Monolith {7}) from context [13] in the south-east section.  |
| Cut of small pit [18] truncating layers [13] and [14] and natural layer [15]. Highest surviving point 109.25m ATD (0.75m bGL).   |  |
| Clay fill [17] of small pit [18]. Sealed by modern overburden.   | Undated, probably medieval or post-medieval.   |
| <b>Interpretation and summary</b>  |  |
| <p>The gravely brickearth layer [15] could potentially be re-deposited given its position immediately below layer the Roman dump [14]. The absence of any man-made material does not support or disprove this. The cleaner brickearth layer [16] can confidently be identified as natural.</p> <p>Wet land clay layer [14] is likely to be Roman in date, and is comparable with the clay layer [10] from Trench 5 and layer [3] from Trench 6, both of which produced Roman pottery. This layer can be interpreted as either a dumping or levelling layer, or as a proto-marsh deposit, as suggested by the geoarchaeological and environmental samples (see 18.2, 18.3 and 18.4) within which Roman finds accumulated. The geo-archaeological analysis at the publication stage should help to refine this interpretation.</p> <p>Layer [13] is almost certainly representative of the formation of the Moorfields Marsh in this area and is, therefore, likely to be late Roman or medieval in date.</p> <p>The small pit [18] in the south-western corner is currently undated. It could be modern as it is immediately below the concrete in the sequence and cuts layers [13] and [14]. However no modern remains were found in the fill and as such it may also be of medieval or post-medieval date.</p> |  |

### 8.1.3 Trench 5



Photo 2 Trench 5 looking west. Section showing natural gravelly brickearth overlain by clay and marsh deposits

| <b>Trench 5 (Fig 4)</b>   |   |
|---|---|
| Location  | 91 to 109 Moorgate (in the west of the basement)  |
| Dimensions  | 2.80m north-west to south-east and 3.10m north-east to south-west x 1.20 to 1.60m deep  |
| Centre of test pit:<br>London Survey grid co-ordinates                  | 83064 36317   |
| OS grid co-ordinates:   | 532698 181627   |
| Modern Ground Level/top of the slab                                     | 110.00m ATD   |
| Modern subsurface deposits  | Concrete basement slab.   |
| Level of base of archaeological deposits observed and/or base of trench | Base of archaeology: 108.83m ATD (1.17m bGL)<br>Base of trench: 108.45m ATD   |
| Natural observed  | Gravelly brickearth [11] at 108.81m ATD (1.19m bGL), natural brickearth layer [12] at 108.45m ATD (1.55m bGL)<br>Natural gravel not seen. |
| Extent of modern truncation   | 110.00m to 109.25m ATD  |

| Archaeological remains  | Dating Evidence, Finds, and Samples   |
|---|---|
| <p>Organic wetland clay layer [10] with very occasional anthropogenic material, including animal bone fragments and mortar fragments.</p> <p>Highest surviving point at 108.99m ATD (1.01m bGL).</p> <p>Overlying natural [11] and overlain by [9].</p>   | <p>3 sherds of pot – dated to AD 120–160</p> <p>Monolith and bulk samples (20 litres) (Bulk sample No. {10} and Monolith {8}) from context [10] in the eastern section.</p>         |
| <p>Dark brown organic silty clay layer [9]. Highest surviving point at 109.35m ATD (0.65m bGL). Overlying [10] and sealed by modern overburden.</p>   | <p>Undated – probably late Roman or early medieval</p> <p>Monolith and bulk samples (20 litres) (Bulk sample No. {5} and Monolith {8}) from context [9] in the eastern section.</p> |
| Interpretation and summary  |   |
| <p>The gravelly brickearth [11] could potentially be re-deposited given its position immediately below [10]. However the absence of any man-made material does not support or disprove this. The cleaner brickearth [12] can confidently be identified as natural.</p> <p>[10] is likely to be Roman in date as it contained Roman pottery dated to between AD 120 and AD 160, and other evidence of Roman activity such as fragments of ceramic building material. This layer can be interpreted as either a dumping or levelling layer, or as a proto-marsh deposit within which Roman finds accumulated. The geo-archaeological samples may be able to refine this interpretation at the publication stage.</p> <p>Zoological and botanical evidence (see 18.2, 18.3 and 18.4) indicates that [9] is almost certainly representative of the formation of the Moorfields Marsh in this area and is likely to be late Roman or medieval in date.</p> |   |

### 8.1.4 Trench 6



Photo 3 Evaluation Trench 6 looking south, showing archaeological layers [1], [2] and [3] in section and probably natural brickearth [6] at the base of the test pit and in small test hole.

| <b>Trench 6 (Fig 2 and Fig 3)</b>                                       |  |
|---|--|
| Location  | 91 to 109 Moorgate (in south of basement)  |
| Dimensions  | 1.90m north-east to south-west and 1.85m north-west to south-east x 1.40 to 1.84m deep   |
| Centre of test pit:<br>London Survey grid co-ordinates                  | 83058 36310  |
| OS grid co-ordinates:   | 532769 181618  |
| Modern Ground Level/top of the slab                                     | 110.05m ATD  |
| Modern subsurface deposits  | Small area of mixed silt and clay with modern rubble (0.6m–0.8m deep) - modern levelling/demolition deposits   |
| Level of base of archaeological deposits observed and/or base of trench | Base of trench: 108.65m ATD (1.4m bGL)   |
| Natural observed  | Brickearth [6] at 108.65m ATD (1.4m bGL), overlaying natural Brickearth layer [7] at 108.43m ATD (1.62m bGL) and natural Brickearth layer [8] at 108.21m ATD (1.84m bGL)<br><br>Brickearth truncated by modern concrete features.<br><br>Natural gravel not seen |

|  |  |
|--|--|
| Extent of modern truncation  | 110.05m to 108.65m ATD   |
| <b>Archaeological remains</b>  | <b>Dating Evidence, Finds, and Samples</b>   |
| Mixed clay and brickearth levelling dump [3]. 108.80m ATD (1.25m bGL).   | Pottery: Roman sherds, AD 150–200  |
| Feature: An unidentified shallow rectangular cut [5] truncating layer [3] and overlain by layer [2]. Top at 108.75m ATD (1.30m bGL). Base at 108.51m ATD (1.54m bGL).  | Potentially AD 100–200, given it's position relative to dated layers [2] and [3]. No finds.  |
| Mixed clay and brickearth levelling dump [2]. Surface at between 108.85 and 108.79m ATD (1.20m and 1.26m bGL).   | <p>Pottery: Roman sherds, including black-burnished wares and samian, AD 150–200, with one sherd of re-deposited late Iron Age flint-tempered ware.</p> <p>Ceramic building material: undated Roman (AD 40–400)</p> <p>Monolith from context [2] in south-east section (Sample No. {1}).</p> |
| Dark brown organic silt layer [1], overlaying [2]. Highest surviving point at 109.25m ATD (0.8m bGL), truncated to a maximum depth of 108.75m ATD (1.3m bGL).  | <p>Undated – probably late Roman or early medieval</p> <p>Monolith and slab samples (8 litres) (Sample Nos. {2},{3} and {4}) from context [1] in south-east section.</p>   |
| <b>Interpretation and summary</b>  |  |
| <p>Brickearth [6] (see Photo 4), although likely to be natural, could potentially be re-deposited, given it's position immediately below [3]. However, there is no evidence to support or disprove this. However, [7] and [8] can be confidently interpreted as natural.</p> <p>[2] and [3] are certainly Roman in date and are dump or levelling layers, although [3] had been truncated by an unidentified cut [5]. Cut [5] is un-diagnostic as it can not be dated and a function cannot be determined. These layers are probably preparation for Roman extra-mural activity. The single sherd of iron age pot recovered from [2] provides limited evidence for prehistoric activity in the surrounding area.</p> <p>[1], while undated, is presumably late Roman or early medieval, given its position in the sequence, and, while not a water lain deposit, appears to have been perhaps partially waterlogged. This layer may represent the early formation of the Moorfields Marsh.</p> |  |



Photo 4 Natural brickearth in the base of Trench 6, looking west

## 8.2 Borehole Results:

(For Borehole locations see Fig 1)

### 8.2.1 Borehole 1



Photo 5 Borehole 1. Looking east. During drilling

| <b>Borehole 01</b>                                |              |                                   |              |   |                        |
|---|--------------|-----------------------------------|--------------|---|------------------------|
| Location  |              | Basement of 91 to 109 Moorgate    |              |   |                        |
| Dimensions  |              | Excavation monitored to 2.95m bGL |              |   |                        |
| LSG grid coordinates                              |              | 83065 36314                       |              |   |                        |
| OS National grid coordinates                      |              | 532716 181622                     |              |   |                        |
| Modern Ground Level/top of the slab               |              | 110.00m ATD                       |              |   |                        |
| Modern subsurface deposits                        |              | Concrete basement slab.           |              |   |                        |
| Level of base of archaeological deposits observed |              | 108.50m ATD                       |              |   |                        |
| Natural observed                                  |              | Sandy gravel 108.05m ATD          |              |   |                        |
| Truncated/not truncated?                          |              | Truncated down to 109.40m ATD     |              |   |                        |
| Extent of modern truncation                       |              | Concrete slab 600mm thick         |              |   |                        |
| Top (m bGL)                                       | Base (m bGL) | Top (m ATD)                       | Base (m ATD) | Description   | Interpretation         |
| 0.00  | 0.60         | 110.00                            | 109.40       | Reinforced concrete slab  | Basement slab          |
| 0.60  | 1.05         | 109.40                            | 108.95       | Soft mid purplish grey silty clay   | Marsh deposit clay     |
| 1.05  | 1.50         | 108.95                            | 108.50       | Dirty clay silt, occasional small CBM & charcoal fragments.                               | Redeposited brickearth |
| 1.50  | 1.95         | 108.50                            | 108.05       | Mixed clayey gravel, small-mid sub-rounded pebbles. No anthropogenic signs or inclusions. | Natural brickearth     |
| 1.95  | 2.45         | 108.05                            | 107.55       | Sandy gravel  | Natural terrace gravel |
| 2.45  | 2.95         | 107.55                            | 107.05       | Coarse sandy gravel   | Natural terrace gravel |

## 8.2.2 Borehole 2

| <b>Borehole 02</b>                                |          |   |              |   |                                      |
|---|----------|---|--------------|---|--------------------------------------|
| Location  |          | 91 to 109 Moorgate                        |              |   |                                      |
| Dimensions  |          | Borehole excavation monitored to 2.4m bGL |              |   |                                      |
| LSG grid coordinates                              |          | 83053 36315                               |              |   |                                      |
| OS National grid coordinates                      |          | 532704 181622                             |              |   |                                      |
| Modern Ground Level/top of the slab               |          | 110.00m ATD                               |              |   |                                      |
| Modern subsurface deposits                        |          | Truncated to 2.4m bGL                     |              |   |                                      |
| Level of base of archaeological deposits observed |          | No archaeological remains observed        |              |   |                                      |
| Natural observed                                  |          | Sandy gravel at 107.60m ATD               |              |   |                                      |
| Truncated/not truncated?                          |          | Truncated by void and modern made ground  |              |   |                                      |
| Extent of modern truncation                       |          | 2.4m bGL into natural terrace gravels     |              |   |                                      |
| Top (m)   | Base (m) | Top (m ATD)                               | Base (m ATD) | Description                                       | Interpretation                       |
| 0.00  | 2.40     | 110.00                                    | 107.60       | Void approx 0.8m deep and 1.6m of rubble backfill | Void and made ground for lift shaft. |
| 2.40  | 2.60     | 107.60                                    | 107.40       | Sandy gravel                                      | Natural terrace gravels              |

### 8.2.3 Borehole 3

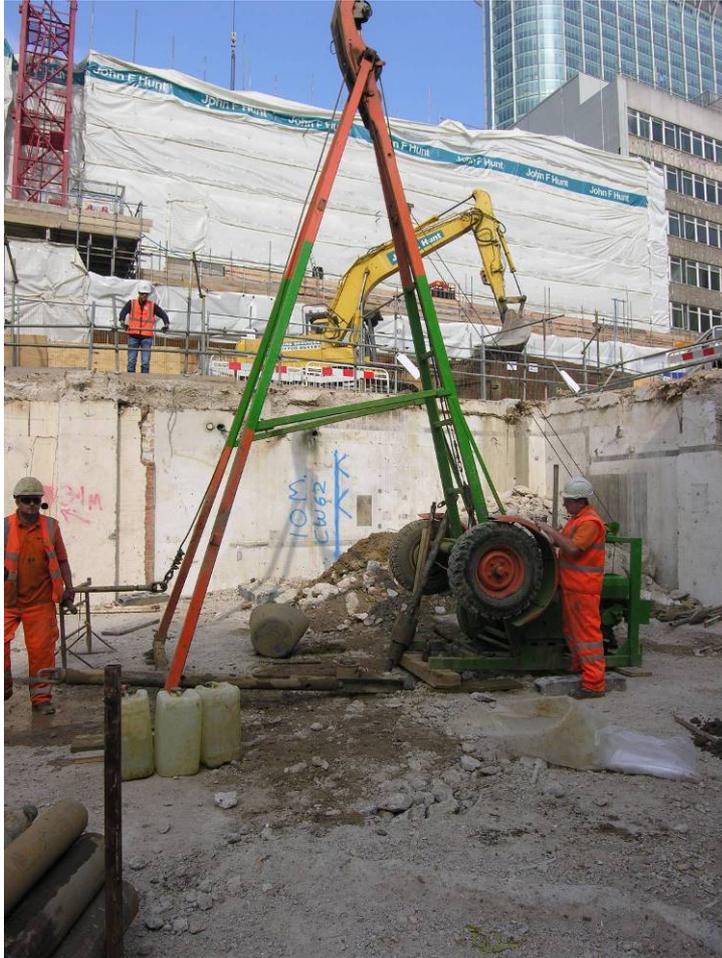


Photo 6 Borehole 3 looking north-west during drilling

| <b>Borehole 03</b>                                |   |
|---|---|
| Location  | 91 to 109 Moorgate  |
| Dimensions  | Borehole excavation monitored to 2.4m bGL                         |
| LSG grid coordinates                              | 83060 36331   |
| OS National grid coordinates                      | 532710 181639   |
| Modern Ground Level/top of the slab               | 110.30m ATD   |
| Modern subsurface deposits                        | Concrete slab over modern made ground                             |
| Level of base of archaeological deposits observed | 108.50m ATD   |
| Natural observed                                  | Natural brickearth at 108.30m ATD and Sandy gravel at 107.90m ATD |
| Truncated/not truncated?                          | Not truncated at 2m bGL (108.30m ATD)                             |
| Extent of modern truncation                       | Concrete slab 600mm thick   |

| Top (m) | Base (m)              | Top (m ATD) | Base (m ATD) | Description  | Interpretation          |
|---------|-----------------------|-------------|--------------|--|-------------------------|
| 0.00    | 1.40                  | 110.30      | 108.90       | Reinforced concrete slab.  | Basement slab           |
| 1.4     | 2.00                  | 108.90      | 108.30       | Firm light brown very slightly sandy clay. Rare lenses of slightly greyer clay. Occasional small bi-valve, sub rounded pebbles, charcoal and CBM flecks. | Re-deposited brickearth |
| 2.00    | 2.4                   | 108.30      | 107.90       | Slightly laminated firm greyish brown sandy clay. Sterile with moderate-frequent sub angular pebbles.  | Natural brickearth      |
| 2.4     | No further excavation | 107.90      | 107.90       | Sandy gravel. Occasional sub rounded pebbles.  | Natural terrace gravel  |

## 9 Assessment of results against original expectations and review of evaluation strategy

GLAAS guidelines (English Heritage, 1998) require an assessment of the success of the evaluation 'in order to illustrate what level of confidence can be placed on the information which will provide the basis of the mitigation strategy'. The recommendations suggest that there should be:

Assessment of results against original expectations (using criteria for assessing national importance of period, relative completeness, condition, rarity and group value) (Guidance Paper V, 4 7).

Department of the Environment guidelines for assessing the importance of individual monuments for possible Scheduling include the following criteria: *Period; Rarity; Documentation; Survival/Condition; Fragility/Vulnerability; Diversity; and Potential* (PPG16 Annex 4, slightly updated in DCMS 2010 Annex 1). The guidelines stress that 'these criteria should not be regarded as definitive; rather they are indicators which contribute to a wider judgement based on the individual circumstances of a case'.

Corporation of London guidelines (CoL 2004) also require an 'Assessment of results against original expectations (using criteria for assessing national importance of; period, relative completeness, condition, rarity, and group value) and review of evaluation strategy.'

### 9.1 Reliability of results

The results of the excavated trenches and boreholes are generally consistent and show almost identical archaeological profiles. The basement area of 91 to 109 Moorgate covered an area of approximately 800m<sup>2</sup>. The four evaluation trenches that were opened covered a combined area of approximately 31m<sup>2</sup>, or 3.9% of the total area of the basement, however, Trench 1 and Boreholes 2 and 3 demonstrate deep truncation by existing foundations. The internal consistency of these results, and their consistency with the results of borehole studies carried out previously in the area by Mott MacDonald on behalf of Crossrail (Crossrail September 2011), indicate that confidence can be placed in these results as a representative sample of the basement area of 91 to 109 Moorgate.

### 9.2 Research objectives

The original research objectives were met as follows; information was recovered on:

- *Artefacts of prehistoric date redeposited in later deposits.*

One sherd of prehistoric pottery (Iron Age) was found re-deposited in a later layer in Trench 6. No other redeposited finds were recovered.

- *Remains of Roman extra-mural activity, potentially including burials.*

Very little evidence of Roman extra-mural activity other than possible dumping or deposition layers was observed. Assemblages of Roman pot were recovered from Trenches 5 and 6.

- *Water-lain deposits from the Roman to medieval Moorfields Marsh, with the potential for organic preservation and palaeoenvironmental evidence.*

All of the evaluation trenches and boreholes encountered evidence for the Roman to medieval Moorfields Marsh in the form of the peat like layers [1], [9] and [13].

- *Late medieval and post-medieval drainage ditches, rubbish dumps and remains associated with the reclamation of Moorfields Marsh.*

No evidence for medieval and post-medieval reclamation attempts were uncovered. The truncation of the site associated with the construction of the modern basement has removed potential dumping layers associated with the reclamation of the marsh.

- *In areas not truncated by later activity: remains of mid 17th-century or earlier buildings on the western side of Moorfields, and late 17th/early 18th-century or later buildings across the whole site.*

All evaluation trenches and borehole locations were truncated by the modern basement and no post-medieval archaeology remained.

### 9.3 Assessment criteria

#### ***Criterion 1: period***

The remains fall into the following groups,

- No prehistoric features. One fragment of Prehistoric pot
- Roman remains, including finds and dump layers.
- Late Roman to Medieval Moorfields Marsh deposits
- No Post-medieval remains

#### ***Criterion 2: rarity***

This evaluation has allowed an insight in to the archaeology of this specific location north of the Roman city wall.

However evidence of Roman dumping in this area of London is not uncommon and neither is the evidence for the presence of the medieval Moorfields Marsh.

#### ***Criterion 3: documentation***

The earliest documentation for the Moorfields marsh come from Fitzstephen in the late 12th century who described this area as a 'great fen or moor' and most references to the area from then on refer to the need to drain the area (see 5.1). Historic maps also indicate the presence of the marsh in this area. This evaluation has helped to prove the existence of this wetland area at this specific location.

#### ***Criterion 4: group value***

The Moorgate Shaft site at 91-109 Moorgate adds to the group value of a collection of sites from the surrounding area that display similar archaeological remains.

Extra-mural Roman activity is known in this area from a great number of sites including 16 Tokenhouse Yard (MGX06) and Moorgate Hall (MOH88). These sites similarly show Roman dumping overlain by marsh deposits.

The Moorfields Marsh deposits have recently been revealed at similar levels at the Finsbury Circus works site for Cross Rail (site code XRF10). The possible northern edge of the marsh was also picked up at 2-16 Phipp Street (PPI07).

**Criterion 5: survival/condition**

Extensive modern truncation exists at the Moorgate Shaft site. As well as the level of the basement slab truncating the site down to the medieval Moorfields Marsh, much of the northern sector of the site where the cut and cover Metropolitan line tunnel runs appeared to be entirely truncated down to the natural geology.

However in the areas where archaeological deposits were encountered the condition of these remains was fairly good.

**Criterion 6: fragility**

Most of the archaeological deposits seen in the evaluation are of similar vulnerability to the majority of archaeological remains seen in central London.

**Criterion 7: diversity**

The Moorgate Shaft evaluation uncovered remains from both the Roman and Medieval periods. Only one sherd of redeposited prehistoric pot was uncovered. Post Medieval archaeology appears to have been truncated across the whole site.

**Criterion 8: potential**

Since only one redeposited sherd of prehistoric pot was recovered the potential for further prehistoric activity is assessed as being low.

The evaluation has shown that Roman layers survive across much of the site so the potential for further Roman remains must be assessed as moderate.

The Moorfields Marsh deposits also appear to survive beneath the modern truncations and so the potential for further medieval remains is also moderate.

There is a low potential for any post medieval remains as all of the evaluation trenches revealed that these levels had been truncated by the modern basement slab.

## 10 Statement of potential archaeology

The evaluation, supported by the results of the watching briefs at Finsbury Circus, has **demonstrated** that the site has the following potential for further remains:

- Moderate potential for Roman activity in the form of finds from possible dumping deposits showing that Roman horizons survive in this area.
- High potential for medieval remains, in the form of Moorfields marsh deposits, although no evidence was uncovered for late medieval attempts to manage the wetland environment in the evaluation trenches.
- Low or no potential for post-medieval remains, due to the level at which the modern basement has truncated this part of the site.
- Future analysis of the plant, mollusc, and beetle remains from the bulk samples, and of the soil monoliths from the column samples, will contribute to characterising the marsh and its formation processes locally, also contributing to wider discussion as to its origins and formation processes.

## 10.1 Importance of Resources

The archaeological remains identified in the fieldwork are provisionally assessed as being of low to moderate importance for the following reasons:

### *Prehistoric:*

The prehistoric remains from this site are assessed as being of low importance as only a single redeposited pot fragment was recovered.

### *Roman*

The Roman activity at this site are assessed as being of low importance, although the lack of any concentrated extra-mural activity does inform our knowledge of the spread of Roman activity in this area before the development of the Moorfields Marsh.

### *Medieval:*

The presence of the Moorfields Marsh deposits are assessed of being of moderate importance as there is significant potential to further the understanding of the medieval marsh locally, contributing to wider-ranging studies of its formation and development.

## 11 Conclusions

### 11.1 Geology

The terrace gravels which had previously been observed in boreholes at c 108.5m ATD (see section 5) were identified from Boreholes 1 to 3 only, ranging from c 107.60m ATD to 108.05m ATD. The gravels were not observed in any of the evaluation trenches as they were sealed by brickearth.

*In-situ* brickearth was confidently identified at levels between 108.30m ATD and 108.60m ATD in the evaluation trenches and the boreholes from this site. A slightly mixed, possibly redeposited or weathered brickearth was observed overlying the *in-situ* brickearth at levels ranging between 108.65m ATD and 108.95m ATD.

### 11.2 Prehistoric

A fragment of redeposited Iron Age pottery was recovered from a Roman deposit in Trench 6. Whilst this adds to the small corpus of Iron Age material from the Moorgate/Finsbury area, it might well have transported with material from a distance. It therefore adds to the suggestion of Iron Age activity in the surrounding area, rather than specifically on the current site.

### 11.3 Roman remains

No dateable Roman artefacts or remains were recovered from Trench 4. However the clay deposit [14] overlying the brickearth [15] contained anthropogenic material such as mortar and fragments of ceramic building material and closely resembled [10] from Trench 5 and [3] from Trench 6, both of which contained Roman pottery. [14], [10] and [3] are interpreted as either Roman dumping layers or a Roman period soil horizon. It is likely that these layers were at least seasonally wet and this indicates the likely conditions during the late Roman period that led to the formation of the later marsh deposits.

In Trench 6 a slightly different sequence was observed. Archaeological remains overlying the natural brickearth included a Roman dump/levelling layer [3]. Truncating this layer was an unidentified shallow rectangular pit (see Fig 2), overlain by another Roman dump/levelling layer [2]. The greater frequency of finds and the later date attributed to the assemblage from this trench suggests that there may have been later localised Roman activity further to the south of the site.

No clear evidence of Roman extra-mural activity, such as buildings or burials, was observed on this site.

### 11.4 Medieval remains

The expected late Roman to medieval marsh deposits were observed between 109.25m ATD and 109.40m ATD in the evaluation trenches and Borehole 1. These levels are similar to those observed at the Finsbury Circus shaft site (XRZ10) where the marsh was identified between 108.89 and 109.64m ATD. The brown fibrous organic marsh was probably formed at some time after the 2nd century AD. No dateable finds were recovered from the marsh deposits, and it is assumed that these layers belong to the medieval Moorfields Marsh observed on other sites in this area. Plant and fauna remains recovered from bulk sampling show that the landscape would have been at the very least seasonally, if not permanently, wet during the period of its formation. Any overlying consolidation deposits such as those observed at Finsbury Circus will have been removed by the building of the basements for 91 to 109 Moorgate. No cut features

representing attempts to drain the marsh were observed (eg ditches/gullies) in any of the evaluation trenches.

### **11.5 Post-medieval remains**

No post medieval remains were encountered during the evaluation or the borehole watching brief. This is most likely the result of the level at which the modern basement has truncated the site.

### **11.6 New Objectives for fieldwork**

This section suggests additional objectives for any further fieldwork on the site (in addition to those in section 6), based on the results of this fieldwork.

- At what date was the Roman brickearth dumping laid down, and does it cover the whole site or was it localised ?
- What was the nature and date of the extra-mural activity which took place on the area of this brickearth dumping (eg occupation, industry, or burial) ?
- How, and at what date did the Moorfields Marsh form ? Does this vary across the Crossrail Moorgate site, eg in Moorfields, Fore Street, etc ?

(N.B. no further geoarchaeological sampling is required from the immediate vicinity of the trial trenches in the former basement of 91–101 Moorgate, but it will be from areas outside it, especially where the deposits are less heavily truncated).

## **12 Recommendations for appropriate mitigation strategy**

The evaluation and boreholes have shown that much of the basement area of 91 to 109 Moorgate has been truncated to depths where only between 0.44m to 0.70m thickness of archaeological remain survive, and at a number of locations (Trench 1 and Borehole 2) archaeological remains have been completely removed by deep foundations.

No unforeseen archaeological deposits of national significance were exposed by the evaluation trenches or the boreholes. Therefore the mitigation strategy of preservation by record remains appropriate.

In the light of these results, the Crossrail design archaeologist will produce recommendations for further work to mitigate the impact of the Moorgate Shaft and other Crossrail works.

## **13 Publication and dissemination proposals**

The watching brief and evaluation results will initially be disseminated via this report; the supporting site archive of finds and records (including digital data) and by incorporation into the wider predictive deposit modelling for the Crossrail scheme. Any publication proposals will be considered in relation to later fieldwork on this site, and also the wider context of archaeological potential and results within the Crossrail scheme.

A summary report will be published in the London Archaeologist excavation round up, and also published on the LAARC website.

## **14 Archive deposition**

The site archive containing original records and finds will be stored temporarily with MOLA pending a future decision over the longer-term archive deposition and public access process for the wider Crossrail project.

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## 17 NMR OASIS archaeological report form

**OASIS ID: molas1-112781**

### Project details

Project name Crossrail Moorgate Shaft

Short description of the project In the four evaluation trenches at the future shaft location, natural geology (Brickearth) was overlain by a mixed wetland clay deposit containing occasional Roman material such as pottery sherds and mortar fragments. A single cut feature of an unknown date was seen in evaluation trench 6 cutting this layer. Above this a dark heavily organic marsh deposit was observed in three of the evaluation trenches. All archaeological remains above this marsh deposit have been truncated by the modern concrete basement slab.

Project dates Start: 25-11-2010 End: 09-09-2011

Previous/future work No / Not known

Any associated project reference codes XSP10 - Sitecode

Type of project Field evaluation

Site status None

Current Land use Other 2 - In use as a building

Monument type NONE None

Significant Finds POT Roman

Methods & techniques 'Sample Trenches'



Development type Rail links/railway-related infrastructure (including Channel Tunnel)

Prompt Direction from Local Planning Authority - PPS

Position in the planning process After full determination (eg. As a condition)

### Project location

Country England

Site location GREATER LONDON CITY OF LONDON CITY OF LONDON 91-109 Moorgate

Postcode EC2

Study area 1000.00 Square metres

Site coordinates TQ 32713 81639 51.5175638787 -0.08705992376660 51 31 03 N 000 05 13 W Point

Height OD / Depth Min: 8.65m Max: 8.95m

### Project creators

Name of Organisation MOLA

Project brief originator Crossrail

Project design originator MOLA

Project Elaine Eastbury



director/manager

Project supervisor Matthew Ginnever

Type of sponsor/funding body Client

Name of sponsor/funding body Crossrail

**Project archives**

Physical Archive recipient LAARC

Physical Archive ID XSP10

Physical Contents 'Ceramics'

Digital Archive recipient LAARC

Digital Archive ID XSP10

Digital Contents 'Survey','other'

Digital Media available 'Images raster / digital photography','Images vector','Spreadsheets','Survey','Text'

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Entered by Matthew Ginnever (mginnever@museumoflondon.org.uk)

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## 18 Appendices:

### 18.1 Roman Pottery

*Amy Thorp*

Seven sherds of pottery were recovered from evaluation Trench 6 (Context [2]). Aside from one small abraded sherd of Late Iron Age flint-tempered ware (FLIN), these are all Roman in date. The Roman material also shows signs of abrasion and may have been disturbed from the original place of deposition. The assemblage is dated AD 150–200 based on a sherd of an east Gaulish samian Dragendorff form 33 cup (SAMEG 6DR33); interestingly this is the best preserved sherd from the group. The range of fabrics present includes black-burnished wares typical of the 2nd-century AD.

From evaluation Trench 5 a total of five sherds of Roman pottery were recovered from context [10]. The contexts dates to AD 120–160 from sherds of black-burnished ware 2 (BB2) and Verulamium region white ware (VRW). The material is typical of Hadrianic early Antonine deposits from the City of London. The pottery recovered in from evaluation Trench 6 was slightly later (AD 150–200), but still indicates a period of activity within the 2nd-century AD.

### 18.2 Plant Remains

*Anne Davis*

Four environmental bulk samples were taken from two similar sequences in Trenches 4 and 5. Samples [10]{10} (Tr 5) and its equivalent [14]{9} (Tr 4) are thought to come from Roman dumping/levelling or proto-marsh deposits, while samples [9]{5} (Tr 5) and [13]{6} represent the formation of Moorfields Marsh in the late Roman or medieval periods. The samples were processed by flotation, and the flots assessed to determine the presence and nature of plant remains and any other biological material present.

No flot was generated from sample {9}, but that from {10}, though small, included a reasonably large and diverse assemblage of waterlogged plant remains. The majority of these were seeds from aquatic and wetland plants such as crowfoots (*Ranunculus* subgen. *Batrachium*), pondweed (*Potamogeton* sp.), celery-leaved crowfoot (*Ranunculus sceleratus*) and sedges (*Carex* spp.), suggesting that the ground was already wet, with frequent standing water, at this time. A number of plants of dryer disturbed ground were also represented, including fumitory (*Fumaria* sp.), buttercups (*Ranunculus acris/repens/bulbosus*), henbane (*Hyoscyamus niger*), and elder (*Sambucus nigra*). Occasional fig (*Ficus carica*) seeds, charcoal fragments and a charred oat (*Avena* sp.) suggest an element of domestic dumping.

Samples [9]{5} and [13]{6} contained very similar assemblages, dominated by freshwater mollusc shells and seeds of aquatic and wetland plants, with plant epidermal tissue, probably from roots or rhizomes and monocot leaves. Seeds of golden dock (*Rumex maritimus*) and crowfoots (*Ranunculus* subgen. *Batrachium*) were particularly numerous, and those of dry ground plants relatively rare, suggesting that the area was almost universally wet and marshy by this time, probably with long-standing pools of water. Both these samples contained ostracods as well as mollusc shells, and all three included occasional fragments of insect exoskeleton.

Further study of the large plant and invertebrate assemblages from samples {5}, {6} and {10} would provide more detailed information on the development of Moorfields Marsh, and help to reconstruct the environmental conditions prevailing at different stages of its development.

## 18.3 Zoology

Alan Pipe

### 18.3.1. Introduction and methodology

Wet-sieving and flotation of bulk samples [9] {5} and [13] {6} from XSP10 yielded assemblages of well-preserved mollusc shell. Visual inspection, using a binocular microscope, indicated that all derived from freshwater species. This short report identifies the species present and their approximate relative abundance and indicates their ecological implications for interpretation of local habitat and conditions. Identification followed Macan 1977. Interpretation followed Davies 2008; and Kerney 1999. Table 1 shows species-composition, relative abundance for each sample.

### 18.3.2. Table

Table 1: Wet-sieved freshwater mollusc shell from XSP10 [9] {5} and [13] {6}

| CONTEXT                        |                                | [9]    | [13]   |
|--------------------------------|--------------------------------|--------|--------|
| SAMPLE                         |                                | {5}    | {6}    |
| SPECIES                        | COMMON NAME                    |        |        |
| <i>Bithynia tentaculata</i>    | common bithynia                | common | common |
| <i>Lymnaea peregra</i>         | common/wandering pond snail    | common | common |
| <i>Lymnaea palustris</i>       | marsh pond snail               | 1      | 1      |
| <i>Bathyomphalos contortus</i> | twisted ram's-horn             | common | common |
| <i>Planorbis planorbis</i>     | marginated ram's-horn          | common | common |
| <i>Gyraulus crista</i>         | nautilus ram's-horn            | 1      | nil    |
| <i>Segmentina nitidus</i>      | shiny ram's horn               | 1      | nil    |
| <i>Anisus leucostoma</i>       | button/white-lipped ram's-horn | nil    | few    |

### 18.3.3. The fauna

For both samples, the mollusc fauna derived entirely from pond snails Lymnaeidae and ram's-horn snails Planorbidae; both families show considerable *inter*-specific differences in terms of ecological requirements and, therefore, habitat implications. All species identified from the samples are common and widespread in suitable habitats throughout lowland south east England.

Sample [9] {5} produced a mollusc fauna derived from seven snail species; mainly common bithynia *Bithynia tentaculata*, common or wandering pond snail *Lymnaea peregra*, twisted ram's-horn *Bathyomphalos contortus* and marginated ram's-horn *Planorbis planorbis* with single examples of marsh pond snail *Lymnaea palustris*, nautilus ram's-horn *Gyraulus crista* and shiny ram's-horn *Segmentina nitida*.

Sample [13] {6} produced a mollusc fauna derived from six snail species; mainly common bithynia *Bithynia tentaculata*, common or wandering pond snail *Lymnaea peregra*, twisted ram's-horn and marginated ram's-horn *Planorbis planorbis* with a single shell of marsh pond snail *Lymnaea palustris* and a few shells of button or white-lipped ram's-horn *Anisus leucostoma*.

Common bithynia *B. tentaculata* occurs in slow-moving, well-oxygenated hard water, particularly in muddy-bottomed situations with dense growths of aquatic plants (Kerney 1999, 39).

Common/wandering pond snail *L. peregra* is a ubiquitous species in all kinds of hard and soft waters. It is a rapid colonist of new, man-made habitats and is tolerant of brackish water and mild pollution (Kerney 1999, 56).

Marsh pond snail *Lymnaea palustris* is a mainly lowland species living in stagnant or slowly moving water including those liable to summer drying (Kerney 1990, 53).

Twisted ram's-horn *B. contortus* occurs in hard and soft water in a wide variety of aquatic habitats ranging from stagnant drains to well-vegetated clean running water. It avoids situations liable to seasonal drying (Kerney 1999, 63).

Margined ram's-horn *P. planorbis* is found in all kinds of well-vegetated aquatic habitats of lowland type but is especially characteristic of hard-water shallow pools and swampy ditches liable to dry up in summer; it is often associated with marsh pond snail *L. palustris* and button/white-lipped ram's-horn *A. leucostoma* (Kerney 1999, 58).

Nautilus ram's-horn *G. crista* is a minute species found in hard and soft water in a range of situations ranging from slow-flowing rivers to weedy ditches except for those liable to dry up (Kerney 1999, 67).

Button or white-lipped ram's-horn *A. leucostoma* is a lowland species with some preference for hard water. It is found in a wide variety of aquatic habitats but is most typical of swampy pools and ditches especially those liable to summer drying (Kerney 1999, 60).

Shiny ram's-horn *S. nitida* occurs today mainly in drainage ditches in marsh levels, usually in clean, hard, well-vegetated waters with a rich associated fauna. Now effectively extinct over most of England except for East Anglia, Kent and Sussex, it was common around London until the 19th century. Reasons for the decline may include pollution and reduction in water level; surviving populations prefer uncleared ditches (Davies 2008, 22) in areas of traditional grazing with low phosphate and nitrate enrichment (Kerney 1999, 69).

#### 18.3.4. Habitat implications

Although eight species of freshwater snail were recovered from samples [9] {5} and [13] {6}, four species; common bithynia, common/wandering pond snail, twisted ram's-horn and margined ram's-horn, provided virtually all of the shell count. Common/wandering pond snail is a ubiquitous, ecologically catholic species tolerant of hard and soft water and of some degree of pollution, the other species are predominantly hard-water snails with a preference for well-oxygenated and vegetated situations. Margined ram's-horn, unlike the other three species, prefers situations liable to summer drying. The less commonly recovered species are also divided between those able to tolerate seasonal drying (marsh pond snail, button/white-lipped ram's-horn) and those tending to avoid it (nautilus ram's-horn, shiny ram's-horn). Overall, the mollusc assemblage suggests a well-vegetated still or slow-flowing, well vegetated water body with permanent areas predominant over others more susceptible to seasonal drying. Although common/wandering pond snail is a major component of the fauna, the ecological requirements of the species-diversity of the bulk of the assemblage suggest that there was no gross pollution.

The predominant species-composition of each sample; common bithynia, common/wandering pond snail, twisted ram's-horn and margined ram's-horn, suggest an early (primary) stage in the development of reed swamp but with some less abundant species; marsh pond snail and button/white-lipped ram's-horn, also indicative of a later stage of successional development into *Glyceria* (sweet grass) reed swamp (Davies 2008, 27).

#### 18.3.5. Bibliography

Davies, P, 2008 *Snails: archaeology and landscape change* Oxford. Oxbow Books

Kerney, M, 1999 *Atlas of the land and freshwater molluscs of Britain and Ireland* Colchester. Harley Books

Macan, T T, 1977 A key to the British fresh- and brackish-water gastropods *Freshwater Biological Association scientific publication no. 13*

## 18.4 Geoarchaeology

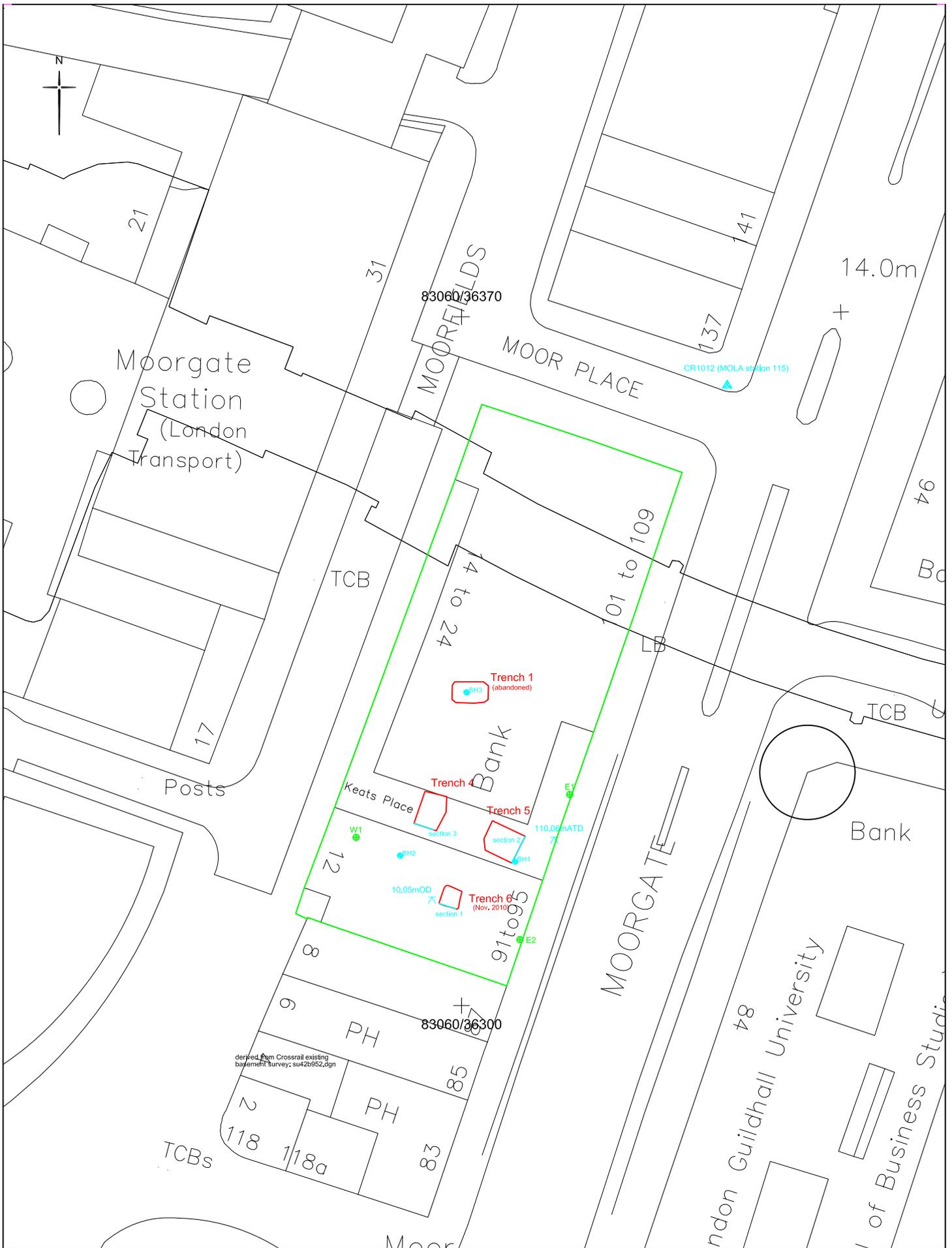
*Graham Spurr*

A geoarchaeological visit was made to 91 to 109 Moorgate, London EC2 to assess the natural stratigraphy present in Trenches 4 & 5 and its potential. The stratigraphy in both trenches consisted of approximately 0.5m of organic clays lying over Pleistocene brickearth deposits. The organic clays [13] & [14] from Trench 4 and [9] & [10] from Trench 5 represent increasingly wet conditions developing into a marsh across the local area. Previous archaeological investigations in the vicinity such as Broad Street Place (Harward, 2004) indicate these deposits are associated with the Moorfields Marsh and Walbrook river system. The sediments have the potential to preserve both macrofossil and microfossil environmental data (in particular pollen and diatoms) which would allow the reconstruction of the environmental conditions associated with the development of the marsh over time. To this end, monolith samples were taken from both trenches along with 8 litre bulk samples for palaeo-environmental assessment. Furthermore, the data retrieved through the archaeological and geoarchaeological investigation will be used to augment the current geoarchaeological deposit model for the area.

Harward, C, 2004 *6 Broad Street Place, London EC2: An archaeological post-excavation assessment and updated project design*, MoLAS unpublished report



## **Annex 1: Figures**



**Fig 1 Location of Evaluation Test Pits and Boreholes**

- ▭ Site outline
- ▭ Location of evaluation test pit
- ▲ 10.24mOD TBMs
- ▲ 100 Crossrail derived control
- Borehole locations

0 1:500 @ A4 25m

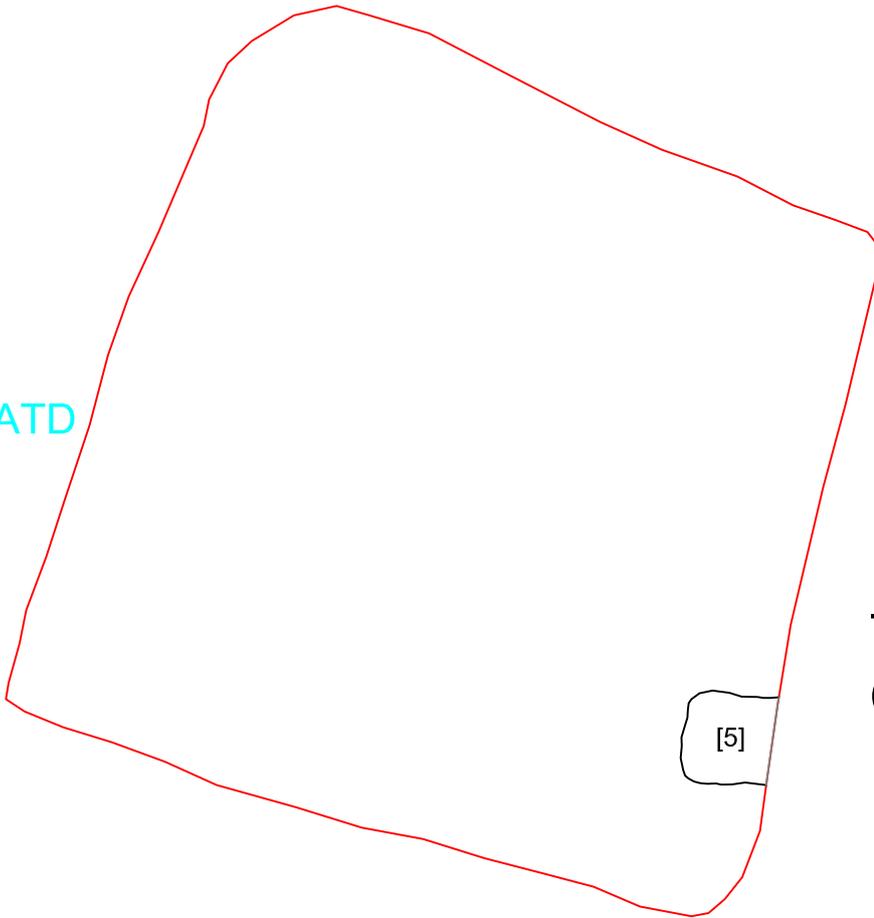
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83059/36313



110.05m ATD



Trench 6  
(Nov. 2010)

83059/36309



Fig 2 Plan of pit cut [5], Trench 6

-  Trench edge
-  Archaeological features
-  TBMs

0 1:20 @ A4 1m



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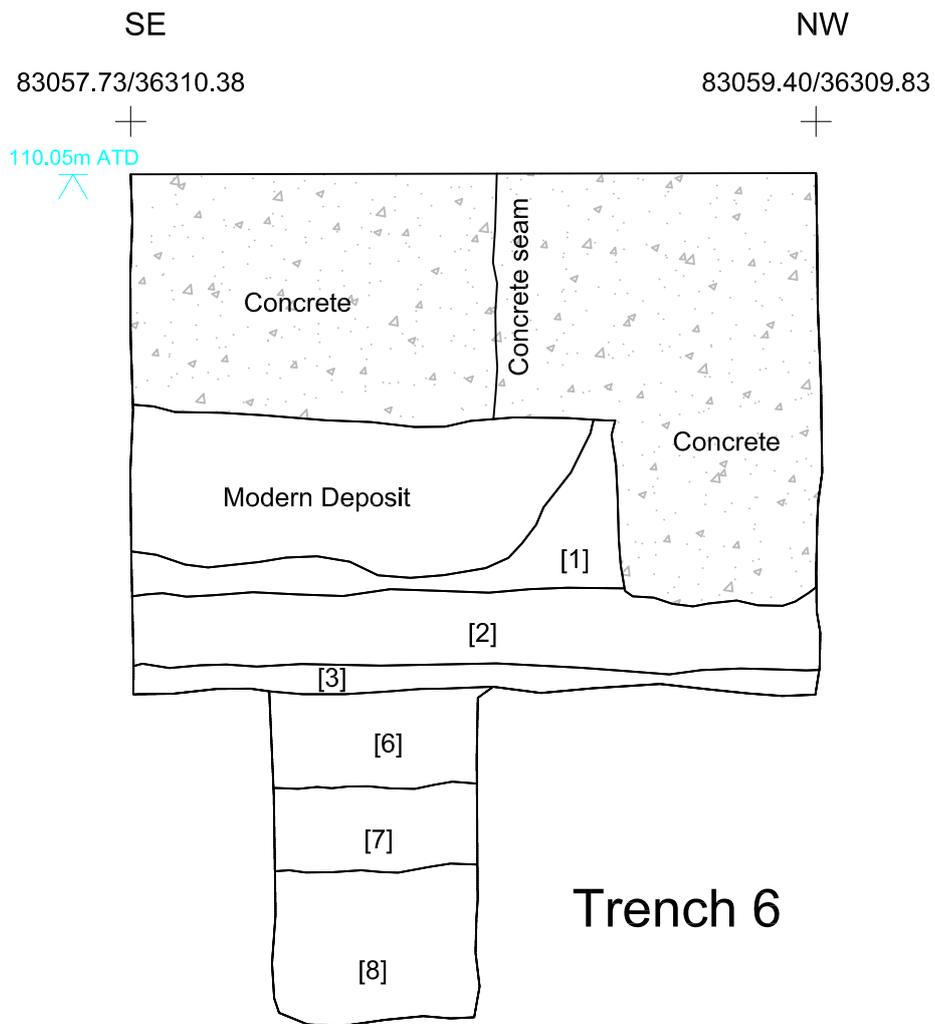
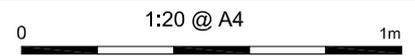


Fig 3 Section 1:North-East facing section of trench 6

- Trench edge
- Archaeological features
- 110.24mATD  
^ TBM (m ATD)



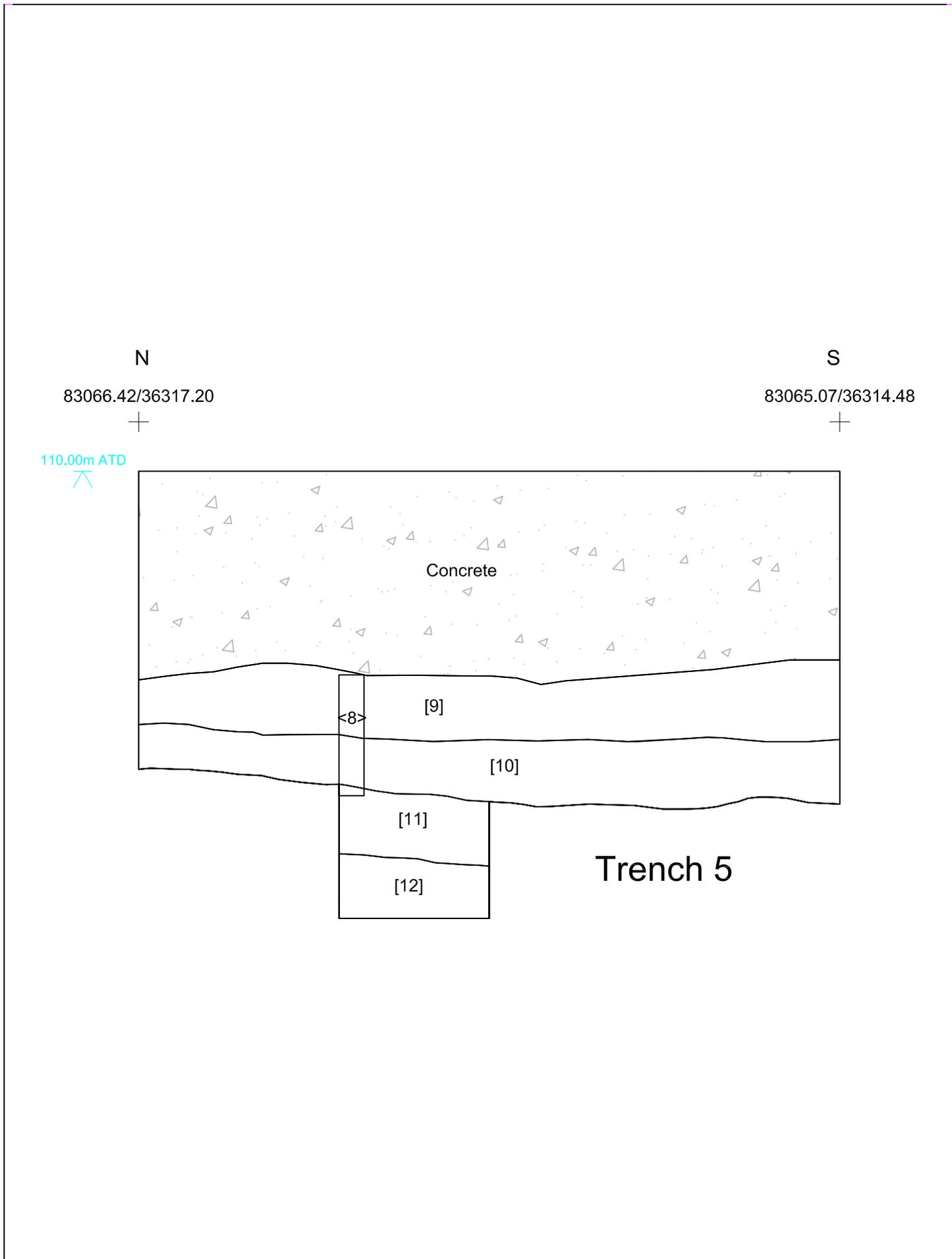


Fig 4 Section 2: West facing section of Trench 5

- Trench edge
- [2] Archaeological features
- <11> Monolith tin
- 110.24mATD  
^ TBM (m ATD)

0 1:20 @ A4 1m



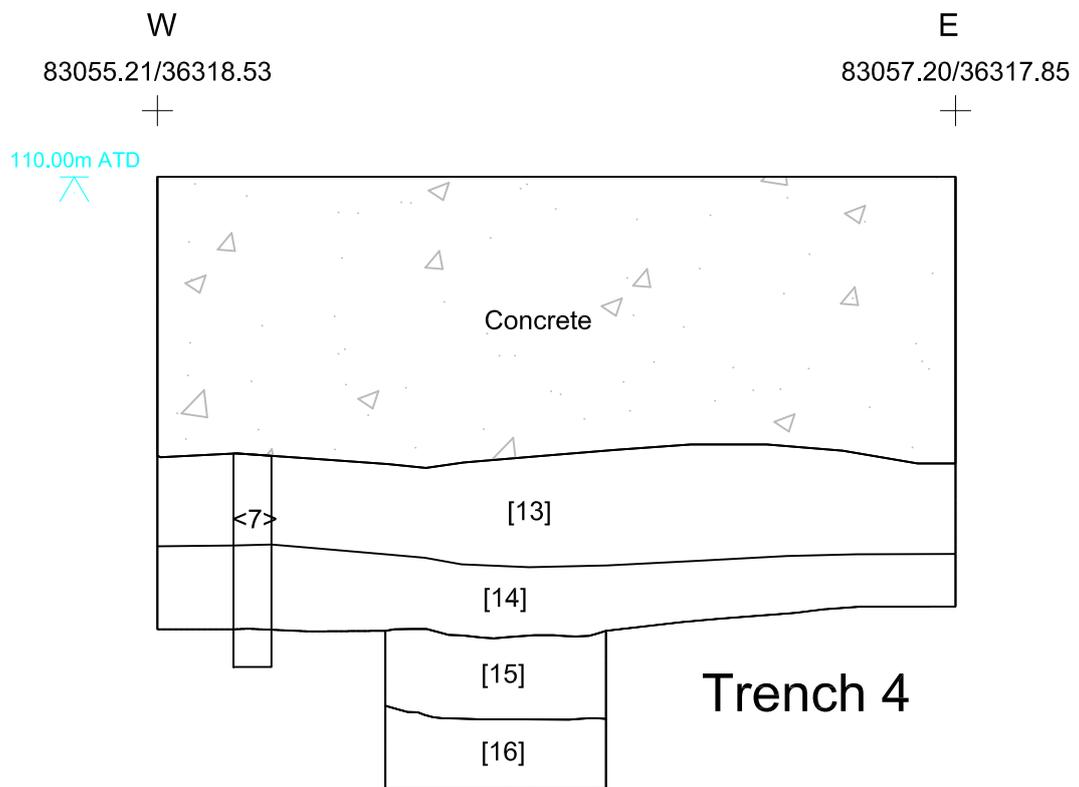


Fig 5 Section 3: North facing section of Trench 4

- Trench edge
- [2] Archaeological features
- <11> Monolith tin
- 110.24mATD  
^ TBM (m ATD)

0 1:20 @ A4 1m