C257 ARCHAEOLOGY CENTRAL
Fieldwork Report
Archaeological Watching Brief
Gas Main Trial Trenches, London Wall (XSZ11)

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Non technical summary

This report presents the results of archaeological monitoring carried out by the Museum of London Archaeology (MOLA) on three gas main trial trenches in London Wall, London EC2, in the City of London. These took place in the vicinity of a Scheduled Monument, a section of the Roman and medieval City Wall (L026P). The report was commissioned from MOLA by Crossrail Ltd. This work is being undertaken as part of a wider programme of mitigation along the Crossrail route.

The trial trenches were excavated by the groundworks contractor under close continuous archaeological supervision and monitoring (watching brief). Care was taken throughout the works to avoid damage to the Scheduled Monument should it have been exposed. The trenches were dug to between 0.30m and 3.90m below the existing road surface, revealing modern utility trenches, which sealed three truncated 17th to 19th-century brick structures.

No remains of the City Wall (a Scheduled Monument) were encountered.

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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 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. As part of these works a new Crossrail station will be constructed in the Liverpool Street and Moorgate areas of the City of London. In order to construct the station a large number of existing utilities will be diverted in advance of construction.

The initial phase of the watching briefs related to the City Wall, a Verizon utility trench at the junction of Old Broad Street and London Wall, was covered in an earlier separate report (Crossrail 2012a).

This fieldwork report describes the results of phases 2 and 3 of an archaeological watching brief carried out in the Liverpool Street Station area by Museum of London Archaeology (MOLA) under Crossrail contract C257 Archaeology Central.

The second phase included one gas main trial trench which was dug in London Wall (street), opposite the junction with Blomfield Street (see Figure 1, Figure 2 and 7.1), and monitored on 12/05/12 and on 13/05/12. This trench was not named by the contractor, and has been designated 'Trench A' by MOLA in this report. The subsequent gas main trenches, Trench 1 and 2, formed the third and final phase of the watching brief, and were monitored between 21/06/12 and 30/06/12. Trench 1 was located between the junctions with Coleman Street and Moorgate, while Trench 2 was located east between the junctions of Moorgate and Copthall Ave (see Figure 1, Figure 3 and 7.1).

These trenches were all positioned in the vicinity of the City Wall (Scheduled Monument (LO26P), and therefore required close archaeological monitoring, in accordance with discussions with English Heritage (see Appendix 2).

The Roman and medieval City Wall is often referred to as London Wall; but since this is also a modern road name, the historic structure is referred to in this report as the City Wall, reserving 'London Wall' for the road.

The approximate western and eastern ends of the watching brief site are at Ordnance Survey National Grid References 532675 181555 and 532917 181505. All fieldwork was conducted between 12/05/12 and 30/06/12, supervised by Simon Davis, Robert Hartle, and Rachel English.

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.

Task	Principal Contractor	Date
• **General Watching Brief** (three gas main trial trenches on London Wall)	C305 Dragados-Sisk JV	Started 12 May 2012, Completed 30 June 2012

The event code (site code) is **XSZ11**. The code also applies to the first phase (Crossrail 2012a).

2 Planning background

Crossrail is being built under the powers of the Crossrail Act (2008), which disapplies various pieces of legislation, and replaces them with alternative provisions. Those pertinent to these works are:

- The Crossrail Act contains clauses that disapply the usual statutory controls for works that affect Scheduled Monuments. The Ancient Monuments and Archaeological Areas Act 1979 is modified by Schedule 9 (Paragraph 4) of the Crossrail Act 2008 in respect of works authorised by the Act. Alternative provisions are set out within a Scheduled Monument Deed: Crossrail: Works affecting scheduled monuments in the City of London (Crossrail, 2008a). Consequently, the Nominated Undertaker (Crossrail) has signed the Deed relating to works affecting scheduled monuments in the City of London (Crossrail Act 2008), hereafter referred to in this document as 'the Deed', with the Secretaries of State and English Heritage. The Deed requires details of works that may affect Scheduled Monuments to be approved by the Secretaries of State.
- It was anticipated that none of the trenches would fall directly within the area of the Scheduled Monument (LO26P). Therefore, it was determined, by Crossrail Project Archaeologist Jay Carver in agreement with English Heritage, that it would not be necessary for the full method statement process to be enacted in accordance with the Deed. However, all appropriate contingencies were in place to prevent damage to the City Wall should it be encountered (see Appendix 2). MOLA was commissioned to monitor these works on behalf of Crossrail.
- The principles of Planning Policy Guidance 16 (PPG16)(DoE, 1990) are encompassed within the Crossrail Environmental Minimum Requirements (EMR; Crossrail 2008b), in particular Annex 2: Planning & Heritage Memorandum, and the Crossrail Generic Written Scheme of Investigation (Crossrail 2009a). PPG16 was replaced by Planning Policy Statement 5 (PPS5)(DCLG, 2010), itself superseded by the National Policy Planning Framework (NPPF)(DCLG, 2012).

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).

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

4 Previous work relevant to archaeology of site

The principal previous Crossrail studies are as follows:

- Crossrail, February 2005a *Environmental Statement*
- Crossrail, February 2005b *Assessment of Archaeology Impacts, Technical Report. Part 2 of 6, Central Route Section, 1E0318-C1E00-00001*, [Specialist Technical Report (STR)]
- Crossrail, 2008a *Crossrail: Works affecting scheduled monuments in the City of London* [Scheduled Monument Deed]
- Crossrail, 2008b *Utilities Diversions: London Wall, Moorgate, Blomfield Street, Old Broad Street, Bishopsgate, Past Observations Of City Wall* [Detailed desk based assessment (DDBA) for the City Wall only]
- Crossrail, 2010 *Archaeological Watching Brief & Evaluation, Utilities trial trenches, Liverpool Street and London Wall*, Revision 2.0. Museum of London Archaeology. [Fieldwork report]
- Crossrail, 2012 *Archaeological Watching Brief, Verizon Utility Trench, Old Broad Street and London Wall (XSZ11)*, Revision 2.0. Museum of London Archaeology. Doc. No. C257-MLA-X-RGN-C101-50001 [Fieldwork report for phase 1].

5 Topographical and historical background

The natural geology consists of Pleistocene Taplow terrace gravels, generally *c* 3.5 to 6m below modern ground levels, which forms the base of the archaeological sequence. Brickearth (Langley Silt complex), overlaying terrace gravels, may survive here in localised areas. The site is situated in the broad, shallow, valley of the former Walbrook stream. However, the natural geology lies too deep to have been reached by these works.

5.1 Archaeological and Historical Background

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

The following summary of the archaeological background concentrates on those elements likely to be affected by the trial trenches, ie those likely to survive within *c* 1.60m of modern ground level in the area of the trench (the predicted maximum depth).

5.1.1 Roman Period (AD 50 to 450)

When the boundary of the Roman city of *Londinium* was formally marked by a wall in *c* AD 200, this ran approximately east to west, either along the line of the modern road named London Wall, or a short distance to the north (see the reconstructed line of the wall in Figure 1). The wall divided the urban area of the city to the south from extra-mural areas to the north. The wall was constructed from Kentish ragstone with tile courses, around a rubble and mortar core. The watching brief areas were situated at the northern limit of the Roman city of *Londinium*; the trenches were positioned immediately south of, and within, the City Wall, in the area that would very probably have been occupied by an intra-mural road in the Roman and later periods. There is, therefore, only a low potential for significant activity such as occupation or industry on the site until the well after the medieval period.

5.1.1.1 The City Wall

Remains of Roman and medieval wall along London Wall (road), from Moorgate to Blomfield Street, have been designated a Scheduled Monument (LO26P), which has been mapped by English Heritage. The Roman and medieval City Wall was identified during the Crossrail EIA (Environmental Impact Assessment) as being a resource of high importance. The need to avoid or minimise potential impacts on the City Wall has been taken into consideration by Crossrail.

The extent of survival of the buried parts of the wall is uncertain. The wall has been observed surviving up to 0.3m to 0.4m below ground level in a number of places, but in others severely truncated remains only survived at widely varying levels, depending on the extent of later damage. At points this was as much as 3.25m below ground level, possibly 3.7m in one unreliable record.

A desk-based assessment commissioned from MOLA by Crossrail in 2008 (Crossrail 2008b) examined the existing archaeological and antiquarian data on the location and depth of the City Wall in the relevant area, in order to produce a refined

prediction of the route. The most important revision of earlier mapping comes from the area around the former postern gate at the junction of Blomfield Street and London Wall, where it was seen that the previous mapping of Scheduled Monument (LO26P) was inaccurate in detail, and the wall ran in a straight line westwards across this junction, immediately to the north of the Schedule mapping.

Excavations in 1961 (GM108) revealed a section of wall on London Wall, west of Moorgate and near the location of Trench 1. However, the depth of this section is unclear and the reliability of location information is considered poor (Crossrail 2008b; see Figure 3). In 1930, a tunnel for telephone cables exposed the City Wall at 4ft below street level (*c* 1.22m) for a length of more than 105ft (*c* 32m), immediately east of the junction of London Wall and Moorgate (GM253), and north of the location of Trench 2 (see Figure 3). In the vicinity of Trench A, sections of the City Wall were exposed at the eastern side of the junction of Blomfield Street and London Wall, during an excavation at Blomfield House (BLM87) in 1988, and also recorded by Compass Archaeology in a watching brief for Thames Water in 2008 (WBH06)(see Figure 2).

Crossrail watching briefs and evaluation (XRF09) in 2009 confirmed the 2008 mapping of the City Wall in the Blomfield Street area. Of the two trenches (MOR19 and MOR18) dug west and east of the junction with Moorgate, in the vicinity of Trenches 1 and 2, only one contained a section of the City Wall (see Figure 3). Of the three trenches (LIV16, 25 and 26) dug at the junction of Blomfield Street and London Wall, two contained sections of the City Wall (see Figure 1). In MOR18, the wall survived to 112.04m ATD (0.5m bGL (below ground level)). At the intersection of LIV26 and LIV16, the top of the wall survived to 111.42m ATD (1.17m bGL).

5.1.2 Medieval Period (AD 450 to 1540)

Whilst the Moorfields Marsh would have inhibited human activity in this area north of the wall during the medieval period, repairs and reconstruction of the wall included the addition of new exits from the City at Moorgate (the Moor Gate) and a postern (small gate or doorway) at what would become Blomfield Street. As mentioned in 5.1.1, the trenches are in the area of the intra-mural road, which ran east to west and abutted the southern face of the wall.

5.1.3 Post-medieval (AD 1540 to 1900)

The area between Moorgate and Bishopsgate gradually filled in with buildings between the 16th and 18th centuries, with the exception of the open Moor Field lying west of Blomfield Street, which survived as open ground. The area along the southern face of the City Wall remained an intra-mural road.

Parts of the City Wall, notably the gates at Moorgate and Bishopsgate, were rebuilt or refaced in brick during the 17th-century, but from the mid 18th-century onwards, large portions of the wall, and eventually the gates, were demolished to ground level. In 1675, the Bethlem Hospital moved to new buildings in Moorfields designed by Robert Hooke, immediately north and outside the wall (see Figure 7).

6 Aims and objectives

The prime purpose of the watching brief was to prevent damage to the Scheduled Monument, if it survived in these locations, in order for it to be preserved *in situ*. Secondly, archaeological recording was to provide information on the presence, absence, and survival quality of the City Wall (within the limited area and depth of the trench) or other archaeological deposits. The purpose of the fieldwork was set out in the archaeological Method Statement (Crossrail 2012b, Section 3.3).

7 Methodology of site-based and off-site work

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

- Crossrail *Method Statement Archaeological Watching Brief London Wall (corner of Blomfield Street) Utility Trial Pit* Revision 2.0, Doc. No: C257-MLA-X-RGN–CRG02-50111, 2012)
- Crossrail *Written Scheme of Investigation* [WSI] (Doc. No. CR-SD-LIV-EN-SY-00001, 2009)
- Corporation of London Department of Planning and Transportation, 2004 *Planning Advice Note 3: Archaeology in the City of London, Archaeology Guidance*
- Museum of London *Archaeological Site Manual* (MoL 1994)

7.1 Watching Brief Methodology

The following methodology, as agreed with English Heritage, was implemented during the C305 utility trial works. All on-site archaeological work was carried out in accordance with correspondence between the Crossrail Project Archaeologist and English Heritage (Appendix 2) and the MOLA/Crossrail method statement (Crossrail 2012b).

The trial trenches were all positioned in the vicinity of both the predicted alignment of the City Wall and the schedule mapping (see Figure 2), therefore, suitable care was taken throughout the process of excavation and other fieldwork to avoid damage to the Scheduled Monument. A continuous archaeological watching brief was in place during all excavation works.

Trench 1 was dug over the course of six days, while Trench 2 and Trench A were each dug during one weekend. All followed road closures by C305 subcontractors JB Riney and Forefront Utilities. The contractors removed the modern road surface and the concrete sub-base using machines. Excavation beneath the sub-base and the removal of modern material was conducted carefully by the contractor with hand tools or machine under the close archaeological supervision and inspection of an experienced Senior Archaeologist.

Contingencies designed to protect the City Wall were in place should it, or other archaeological deposits, be encountered. Under no circumstances would the works be allowed to impact the City Wall. In particular, English Heritage instructed that

hammered/piled trench sheets were not to be used as trench support, as there was a risk that these could damage the monument at a lower depth.

Excavation would have ceased if the archaeologist had determined that archaeological deposits, in particular the City Wall, had been reached. The attending archaeologist would have then exposed, recorded and surveyed any archaeological remains, which if significant would have then been left *in situ*. If it was present, the contractor would not have been allowed to disturb or remove any part of the City Wall in order to complete the specified works. If the presence of the City Wall had prevented the completion of works, then the pit would have been moved until a suitable space was identified.

A protective geotextile membrane and a layer of sand would have been installed over any remains of the City Wall before the trench was backfilled and reinstated. The specification for protective materials for preservation *in situ* of the City Wall (Scheduled Monument) was supplied by the English Heritage Inspector of Ancient Monuments (Jane Sidell) to MOLA in advance of evaluation fieldwork in 2009. The same specification was applied in this case:

- Geotextile: water-porous geotextile
- Sand: effectively iron free, pale coloured (in the 7.5 YR, 10YR and 2.5 YR Munsell chart colour bracket), non-calcareous, relatively clay free, with particle size of no less than 98% below 63 microns and no more than 2% above 2mm, Loss on ignition value to be no more than 2%, e.g. ‘Kingsley No 1’.

The predicted depth of excavation for the trial trenches was between approximately 1.50 and 1.60m below ground level. In practice, the trenches were dug to a depth of between 400mm and 3.90m below ground level (see 8).

The limited archaeological remains present were recorded using the methods in the Museum of London *Archaeological Site Manual* (1994). The locations of all features and deposits were recorded by the Senior Archaeologist using local baselines. The reference points for these baselines, a limited number of levels were subsequently surveyed by MOLA surveyors, to an accuracy of at least 1cm (see Figure 1). Following the completion of recording, the trench was backfilled and the road surface re-instated.

8 Results and observations including stratigraphic report and quantitative report

Three trenches were monitored and the results are tabulated below.

See Figure 1 *for trench locations*

8.1 Trench A

Photo 1 Location of Trench A at the junction of Blomfield Street (top left), looking north-east.

Trench A *(see Figure 1, Figure 2, Photo 1 and Photo 2)*	
Location	In the roadway of London Wall, *c* 3m south of the north pavement, at the junction of Blomfield Street.
Dimensions	3.20m (north to south) x 3.40m (east to west) x 0.40 to 1.80m deep
LSG grid coordinates	83264 36192
OS National grid coordinates	532917 181505
Modern Ground Level	Road surface = 112.50m ATD (east) to 112.48m ATD (west)
Modern subsurface deposits	Tarmac and concrete 300 to 400mm thick, overlaying modern utility trenches with sand or gravel backfills.
Level of base of archaeological deposits observed and/or base of trench	Base of trench: 110.70m ATD
Natural geology	Not reached

Extent of modern truncation	The full depth and area of the trench
Archaeological remains	**Dating Evidence, Finds, and Samples**
Red brick wall [3] at 111.25m ATD.	Brick of 18th to 19th-century date
Re-deposited sandy silt [2] with modern debris, including fragments of modern concrete, wood and rope. At *c* 112.10m ATD.	Probable pre-19th-century soil which was re-deposited in the 20th-century during the installation of utilities. No finds.
Interpretation and summary	
An unidentified truncated section of 18th to 19th-century red brick wall [3] (see Figure 1) was found at the limits of excavation. This wall was sealed by intercutting modern utility trenches backfilled with sand, gravel or re-deposited post-medieval soil [2] (see Figure 2). The base of these intrusions was not reached. No remains relating to the City Wall (Scheduled Monument LO26P) were encountered.	

Photo 2 Trench A with intercutting gas pipe and telecommunication duct trenches beneath the concrete, backfilled with sand, gravel or re-deposited soil [2], sealing a truncated c *18th to 19th-century red brick wall [3]. Looking east.*

8.2 Trench 1

Photo 3 Location of Trench 1 on London Wall (centre), looking south-west.

Trench 1 ***(see Figure 1, Figure 3, Photo 3 and Photo 4)***	
Location	In the roadway of London Wall, across the south pavement line, between the junctions of Coleman Street and Moorgate.
Dimensions	3.60m (north to south) x 3.90m (east to west) x 1.20 to 3.90m deep
LSG grid coordinates	83023 36249
OS National grid coordinates	532675 181555
Modern Ground Level	Road surface = 112.57m ATD (south) and 112.65m ATD (north) Pavement = 112.69m ATD
Modern subsurface deposits	Tarmac and concrete 200 to 400mm thick, overlaying modern utility trenches with sand or gravel backfills.
Level of base of archaeological deposits observed and/or base of trench	Base of trench: 108.67m ATD (3.90m bGL)
Natural geology	Not reached
Extent of modern truncation	1.0 to >2.5m bGL The full extent of modern truncation/intrusions was not determined.

Archaeological remains	Dating Evidence, Finds, and Samples
Red brick floor [12]. At 108.67m ATD (3.90m bGL).	Access to the trench was not possible when this feature was revealed. Therefore, the brick could not be inspected or measured in order to date them.
Grey brown clay sandy silt [5], occasional small gravel, animal bone fragments, charcoal and mortar flecks. At 110.07m ATD (2.50m bGL).	Brick and peg tile fragments – *c* 17th to 18th-century.
Grey brown clay silt [4], occasional animal bone fragments, charcoal and mortar flecks. At 111.27m ATD 1.30m bGL.	Brick and peg tile fragments – *c* 17th to 18th-century. Pottery: One sherd of glazed redware – late 16th to 17th-century. One residual sherd of Central Gaulish Samian (SAMCG) ware – AD 120 to 250.
Interpretation and summary	
A red brick floor [6] was discovered at the base of the trench at 108.67m ATD (3.90m bGL). This was not fully investigated since entering the trench was not possible at that time. Moreover, this floor was not broken out but left *in situ*, therefore no bricks were recovered from the feature for dating. However, the rough appearance of these bricks, and the apparent absence of frogs in the bricks, may suggest a 17th to 18th-century date. Above the floor were two dumps of clayey silt [4] and [5], containing *c* 17th to 18th-century material. If [6] is a cellar floor, these deposits may be deliberate backfills when the cellar became disused. If this feature is a backfilled cellar it may abut and/or cut into the City Wall further north beyond the trench limit. No remains relating to the City Wall (Scheduled Monument LO26P) were encountered. Modern utility trenches truncated and sealed the sequence.	

Photo 4 Machine dug sondage within Trench 1, showing a red brick floor at 3.90m bGL. Note: the trench was inaccessible and a closer examination and record of this feature was not possible at this time. East at top.

8.3 Trench 2

Photo 5 Location of Trench 2 on London Wall, looking north-west.

Trench 2 ***(see Figure 1, Figure 3, Photo 5 and Photo 6)***	
Location	In the roadway of London Wall, on the south pavement line, east of the junction with Moorgate.
Dimensions	2.70m (north to south) x 3.55m (east to west) x 2.20m deep (maximum)
LSG grid coordinates	83110 36229
OS National grid coordinates	532763 181537
Modern Ground Level	Road surface = 112.56m ATD (west) and 112.45m ATD (east)

Modern subsurface deposits	Tarmac and concrete 300 to 400mm thick, overlaying modern utility trenches (including gas main cut [11], with backfills containing sand, gravel and/or re-deposited post-medieval soil [7], [8], [9] and [10]).
Level of base of archaeological deposits observed and/or base of trench	Base of trench: 110.55m ATD
Natural	Not reached
Extent of modern truncation	The full depth and area of the trench
Archaeological remains	**Dating Evidence, Finds, and Samples**
Wall [12], built with random courses of limestone, ragstone and red brick in a hard grey white mortar. At 110.55m ATD (1.90m bGL).	Red brick *c* 18th-century
Interpretation and summary	
A small truncated section (*c* 500mm x 200mm) of *c* 18th-century masonry [12] was found at the limits of excavation (110.55m ATD or 1.90m bGL). This possible wall foundation was built with random courses of limestone, ragstone and *c* 18th to 19th-century red brick in a hard grey white mortar. Extensive intercutting modern utility trenches (including gas main cut [11]) sealed the wall, with backfills containing sand, gravel and/or re-deposited post-medieval soil [7], [8], [9] and [10] (see Figure 6). The full extent of modern intrusions was not determined. No remains relating to the City Wall (Scheduled Monument LO26P) were encountered.	

Photo 6 Trench 2, showing small section of c 18th to 19th-century foundation [12], truncated by modern utility trenches (gas main to the right) and sealed by modern backfills, looking east.

9 Conclusions

No significant archaeological remains were exposed during these works. In particular, **no remains of the City Wall (Scheduled Monument LO26P) were encountered**.

The proposed location of the Trench A had been approximately 5 metres to the north of the English Heritage Scheduled Monument mapping, but in the field it was positioned further to the south. This as-dug location was found to be 2 metres into the area of the schedule mapping, but *c* 1.50 metres to the south of, ie *outside*, the MOLA 2008/9 reconstruction of the line of the scheduled City Wall (Figure 1, from MOLA 2008b/2009b). Therefore, it was most unlikely to affect the City Wall.

The size of Trench 1 was increased several times during the course of excavation in order to locate the gas main. However, these extensions were southward, into the pavement, and, since they were away from the predicted line of the wall and the Scheduled monument area, did not increase the risk of encountering the City Wall.

The trenches all revealed extensive intercutting modern utility trenches beneath the road surface, with backfills including modern sand and gravel and/or re-deposited soil (see Figure 4 to Figure 6 and Photo 2, Photo 4 and Photo 6). However, these backfills sealed a truncated section of *c* 18th or 19th-century brick wall in Trench A (see Figure 2). This wall was not fully exposed during these works and, therefore, its form and function was unclear. It may possibly be part of a cellar or culvert.

In Trench 1, a narrow sondage (*c* 0.5m wide) was dug deeper at the centre of the trench in an attempt to locate the gas main. This revealed archaeological deposits [4] and [5], which were interpreted as possible backfills when a brick floor [6] was seen beneath them at 3.90m below ground level. This feature was interpreted as a possible cellar floor, given its depth and *c* 17th to 19th-century date (see 8.2). Thus, the overlaying deposits [4] and [5] were perhaps deliberate backfills of a cellar when it became disused. If this floor is part of a cellar, then the cellar may belong to a property within a series of buildings which stood at this location between the 18th-century and the mid-20th-century (see Figure 7, *however, note that it is not possible to accurately locate the utilities trenches on the historic map, because of distortions compared with modern Ordnance Survey mapping*). However, the confirmation of this feature as a cellar floor will remain impossible without additional excavation, to identify side walls for example. Also, it is not possible at this time to determine if the relationship of this feature with the City Wall, potentially located further north beyond the trench limit.

In Trench 2, a small truncated section of *c* 18th to 19th-century masonry [12] was found at the limits of excavation. This possible wall foundation was built with random courses of limestone, ragstone and *c* 18th to 19th-century red brick in a hard grey white mortar. The form and function of this masonry is unclear but could be part of foundations associated with 18th-century modifications to the main buildings and southern boundary wall of the Bethlem Hospital (see Figure 7).

The watching brief has demonstrated that the City Wall does not survive in the footprint of these trial trenches at these depths. As the City Wall was not encountered, the predicted line of the City Wall can neither be confirmed or disproved by these works. The discovery of truncated fragments of 17th to 19th-century structural features is a minimal contribution to predictive modelling of other archaeological remains. Although largely negative, these results provide additional data on modern deposits and truncation within this area. However, the full extent of

modern truncations, which were not bottomed, remains unknown, beyond the area of investigation and at greater depths beneath it.

10 Publication and dissemination proposals

The watching brief results will initially be disseminated via this report and the summary in the annual round up published in London Archaeologist and on the London Archaeological Archive and Research centre (LAARC) website.

The supporting site archive of finds and records (including digital data) will be incorporated into the wider predictive deposit modelling for the Crossrail scheme. Publication requirements will be considered by the Project Archaeologist with the results of later mitigation fieldwork on this site, and also the wider context of archaeological potential and results within the Crossrail scheme.

11 Archive deposition

The site archive containing original records 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.

12 Bibliography

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13 Acknowledgements

The author would like to thank [redacted] (JB Riney) and [redacted] (Forefront Utilities) for their assistance on site, as well as C305 Manager [redacted] and [redacted]. The fieldwork was commissioned and managed for Crossrail by Jay Carver.

The watching brief was conducted by the author, Rachel English (MOLA Senior Archaeologist) and Simon Davis (MOLA Project Officer). Catherine Drew (MOLA geomatics) produced the figures. Pottery dating by Amy Thorp and Nigel Jefferies (MOLA Specialists). The fieldwork was managed by MOLA Assistant Contract Manager Nicholas Elsden.

14 NMR OASIS archaeological report form

OASIS ID: molas1-126593

Project details

Project name	Crossrail Utility Trial Pit, London Wall (XSZ11)
Short description of the project	An archaeological watching brief on three gas main trial trenches in London Wall (between the junctions with Coleman Street and Blomfield Street). This followed a previous phase involving a watching brief on a utility trench in Old Broad Street (molas1-117511). The trenches on London Wall revealed truncated sections of circa 17th to 19th-century brick walls and floors between 0.30 and 3.90m below the existing road surface. These features were not fully exposed but were possibly the remnants of backfilled cellars or culverts. Although the monitoring was carried out to prevent damage to the City Wall (Scheduled Monument (LO26N and LO26P)), no remains relating to the City Wall were encountered. The area was found to have been extensively disturbed by numerous modern utilities.
Project dates	Start: 12-05-2012 End: 30-06-2012
Previous/future work	Yes / No
Any associated project reference codes	XSZ11 - Sitecode
Type of project	Recording project
Site status	Scheduled Monument (SM)
Current Land use	Transport and Utilities 1 - Highways and road transport

Project location

Country	England
Site location	GREATER LONDON CITY OF LONDON CITY OF LONDON Crossrail Utility Trial Pit, London Wall
Postcode	EC2
Study area	12.00 Square metres
Site coordinates	TQ 32917 81505 51 0 51 30 58 N 000 05 03 W Point TQ 32675 81555 51 0 51 31 00 N 000 05 15 W Point

Project location

Country	England
Site location	GREATER LONDON CITY OF LONDON CITY OF LONDON Crossrail Utility Trial Pit, London Wall

Postcode	EC2
Study area	12.00 Square metres

Project creators

Name of Organisation	MOL Archaeology
Project brief originator	Crossrail
Project design originator	Crossrail
Project director/manager	Nicholas Elsden
Project supervisor	Robert Hartle
Type of sponsor/funding body	Local authority controlled infrastructure development company
Name of sponsor/funding body	Crossrail

Project archives

Physical Archive Exists?	No
Digital Contents	'Stratigraphic','Survey'
Digital Media available	'Images raster / digital photography','Text'
Paper Contents	'Stratigraphic','Survey'
Paper Media available	'Context sheet','Correspondence','Matrices','Notebook - Excavation',' Research',' General Notes','Photograph','Plan','Report','Section','Survey '

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	C257 ARCHAEOLOGY CENTRAL Fieldwork Report Archaeological Watching Brief Gas Main Trial Trenches, London Wall (XSZ11)
Author(s)/Editor(s)	Hartle, R
Date	2012
Issuer or publisher	Museum of London

Place of issue or publication	London
Description	A4 report
Entered by	Robert Hartle (rhartle@museumoflondon.org.uk)
Entered on	16 July 2012

Appendix 1: Figures

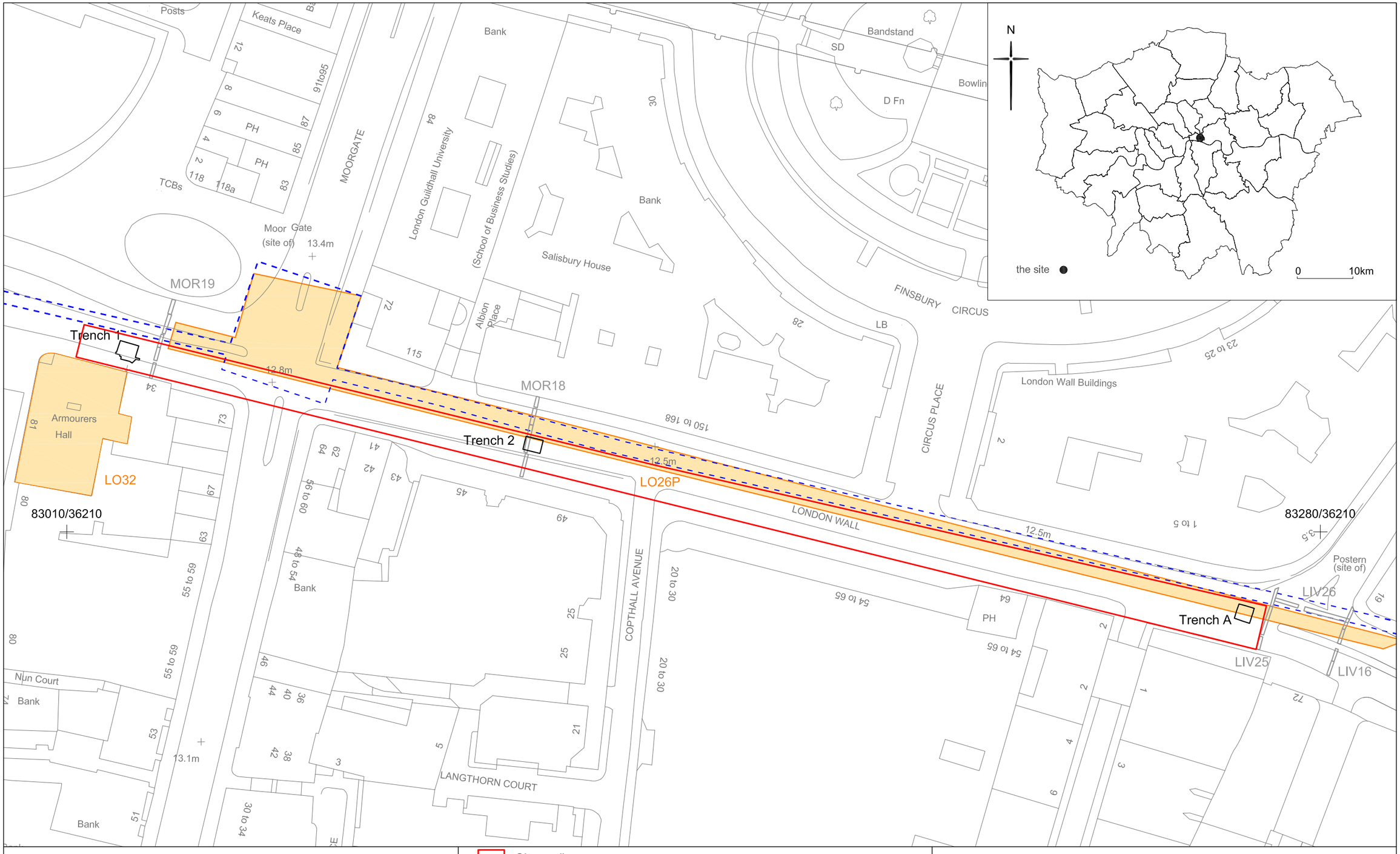

Fig 1 Location of trenches

- Site outline
- Current trench edges
- 2009 Crossrail trenches (XRF09)
- Scheduled Monument (London City Wall)
- 2008 Reconstruction of London City Wall location

0 1:800 @ A3 50m

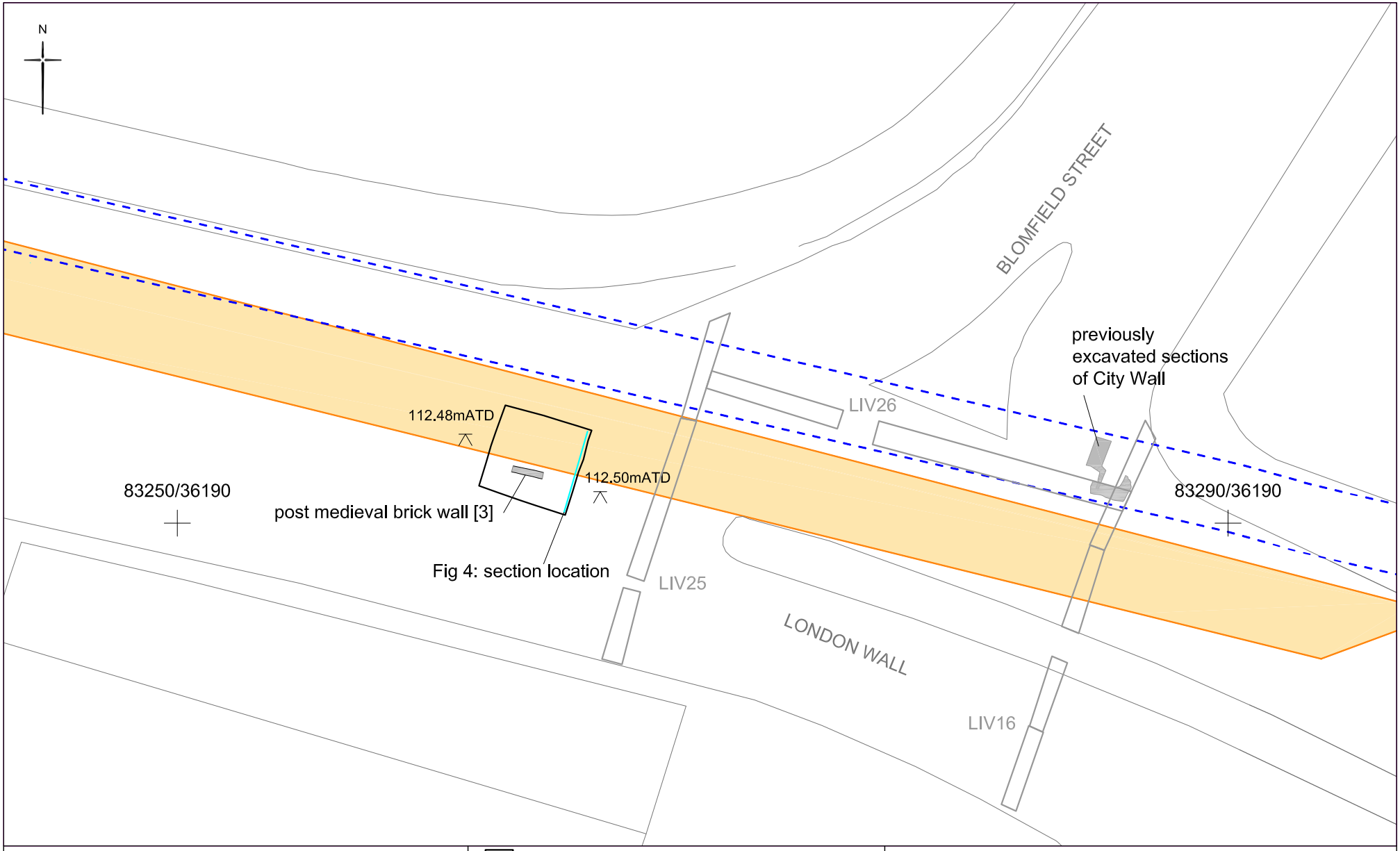

Fig 2 Location of Trench A

- Current trench edge
- 2009 Crossrail trenches (XRF09)
- [3] Archaeological features
- Scheduled Monument (London City Wall)
- 2008 Reconstruction of London City Wall location

1:200 @ A4

0 10m

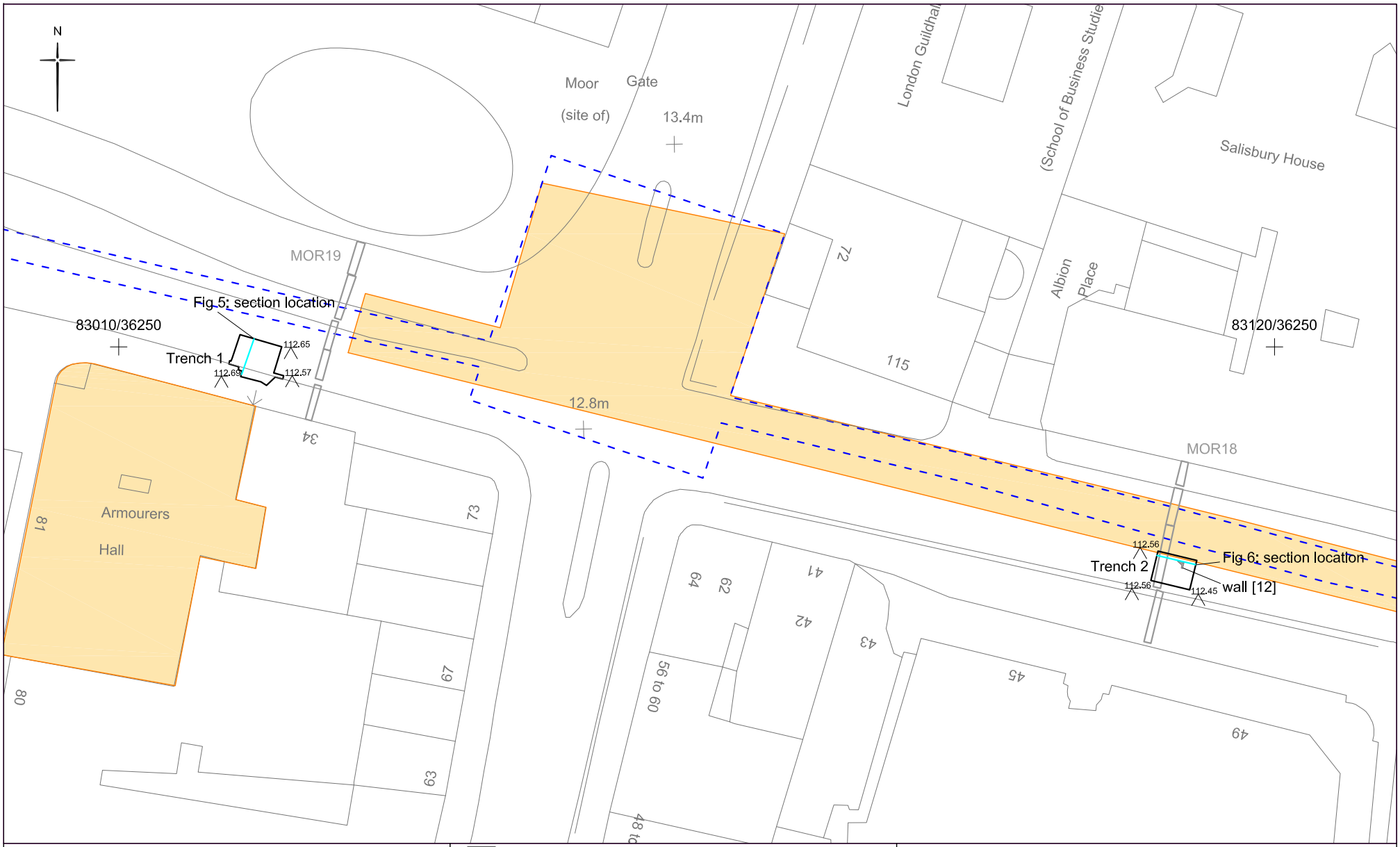

Fig 3 Locations of Trenches 1 and 2

- Current trench edge
- 2009 Crossrail trenches (XRF09)
- [3] Archaeological features
- Scheduled Monument (London City Wall)
- 2008 Reconstruction of London City Wall location

1:500 @ A4

0 25m

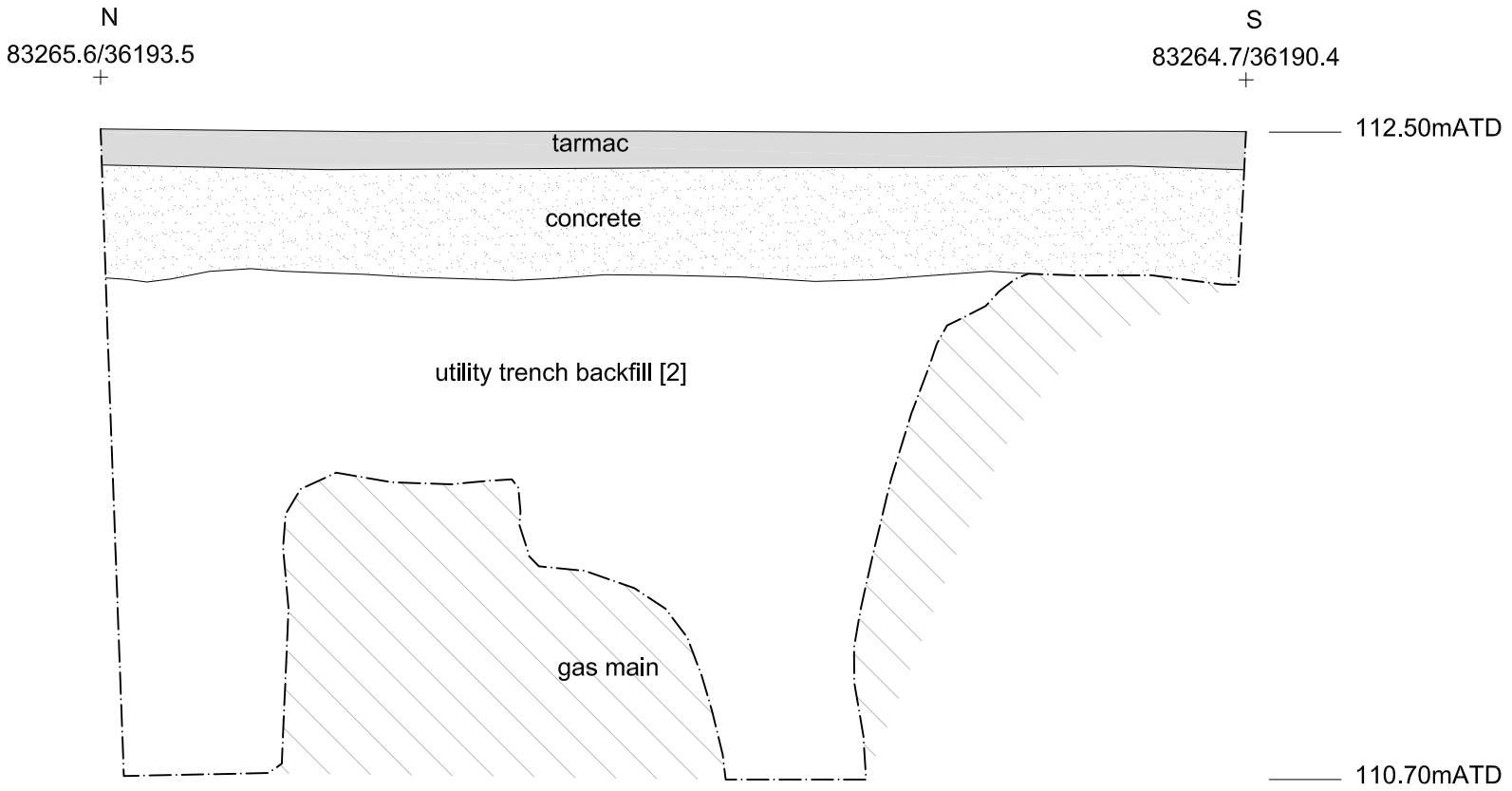

Fig 4 West-facing section of trench A

Limit of excavation

Services and backfills

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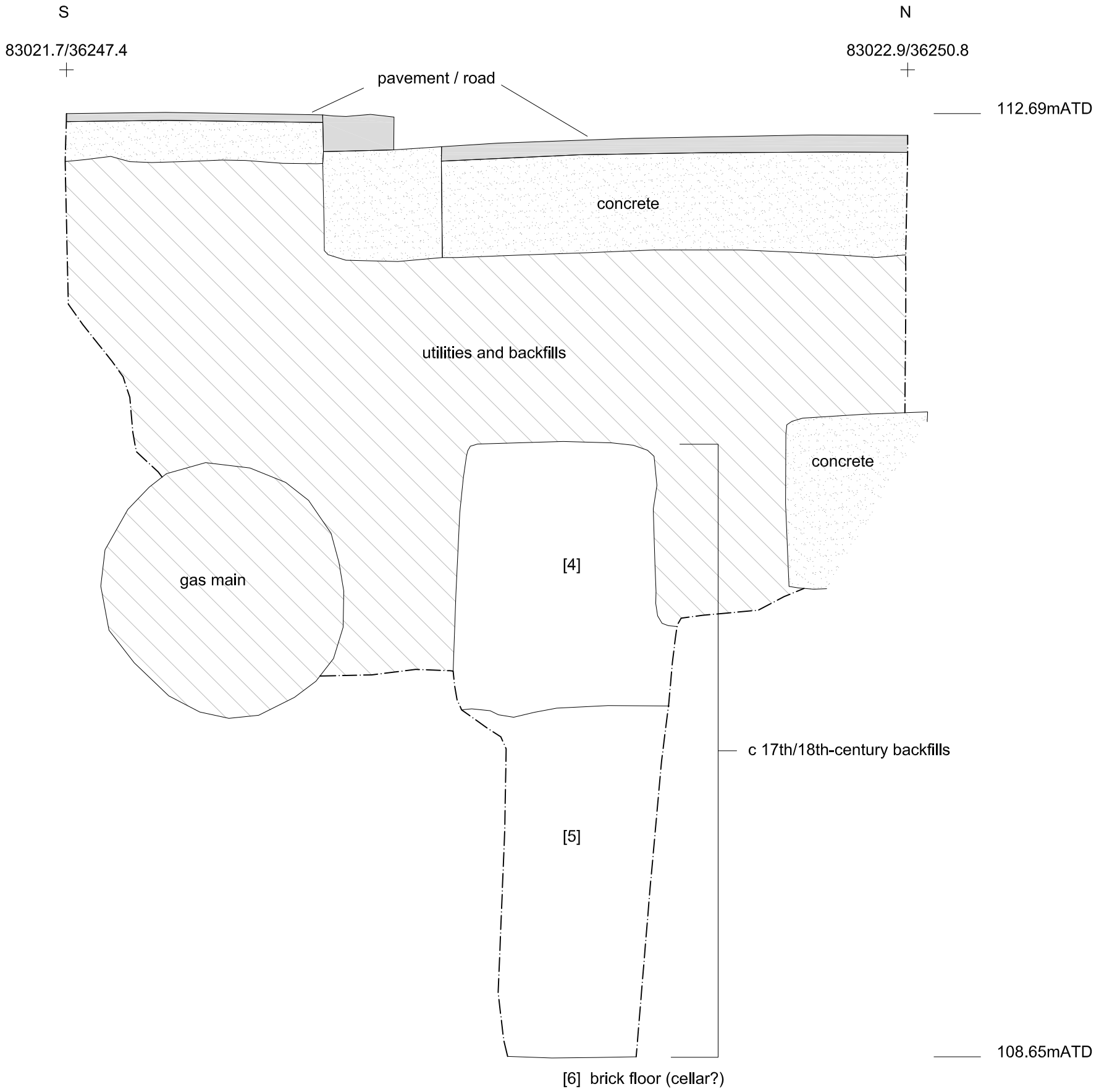

Fig 5 East-facing section of Trench 1

Limit of excavation

Services and backfills

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0 1m

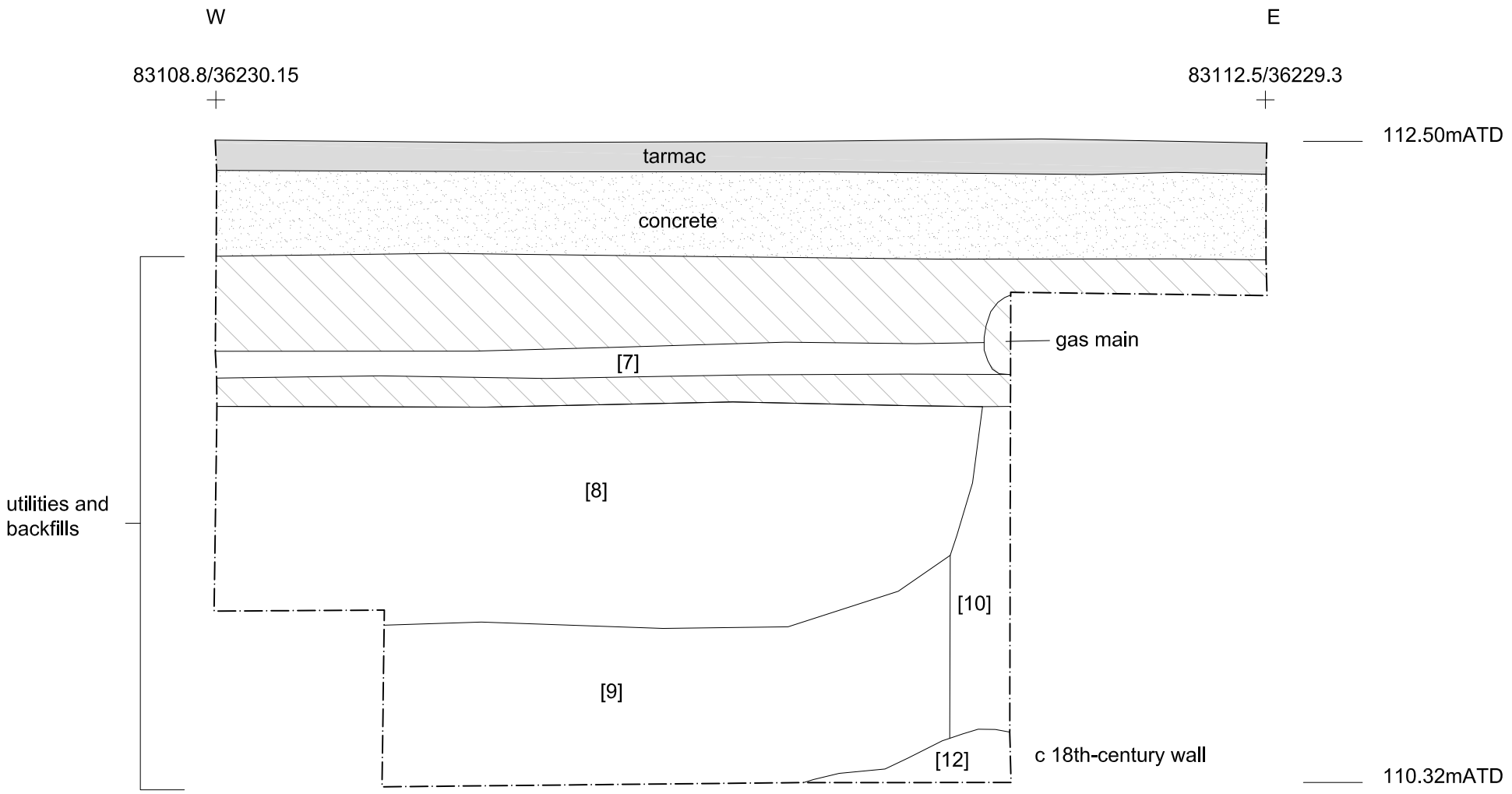

Fig 6 South-facing section of Trench 2

Limit of excavation

Services and backfills

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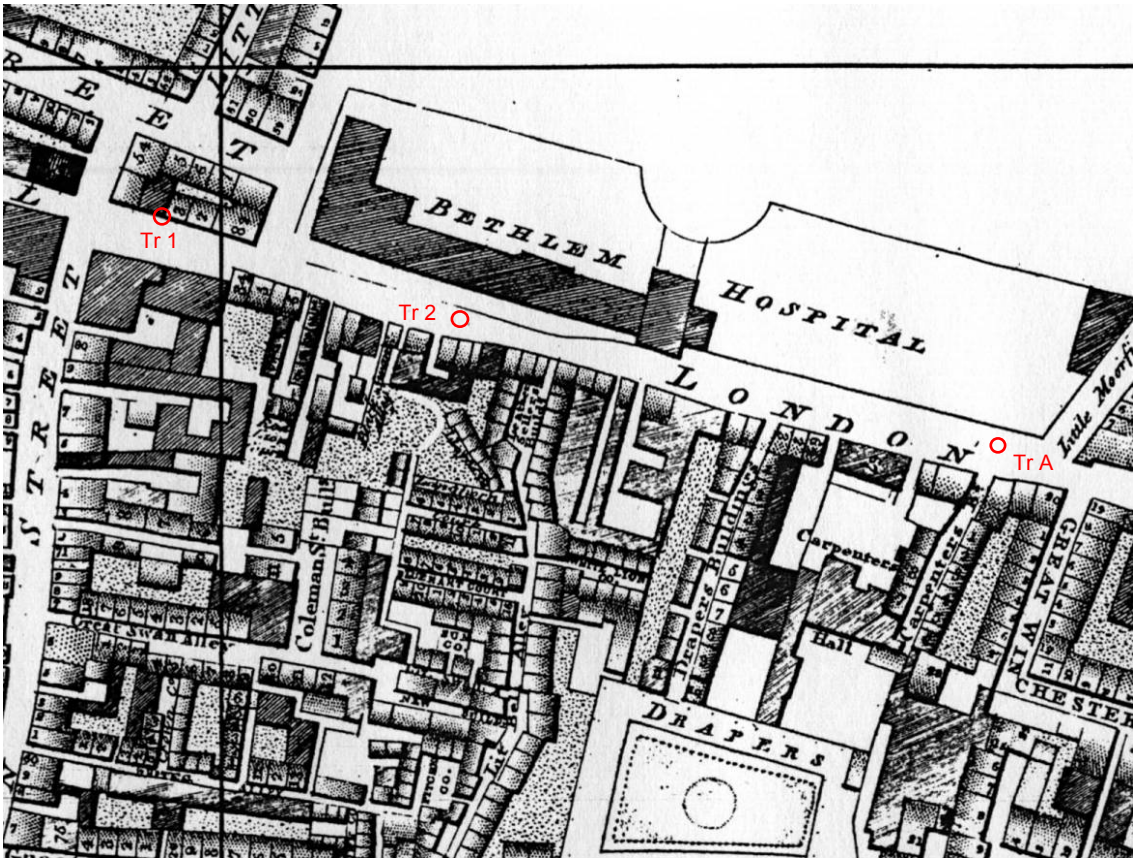

Figure 7 *Horwood's map of 1799*

○ Very approximate locations of utilities trenches (map distorted compared with modern surveys)

Appendix 2: Letter to EH from Crossrail Project Archaeologist 09.05.12

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our Ref:	C305-XRL-T1-COL-CRG03-50001 rev2	contact	Jay Carver
your Ref:		tel	020 3229 9258
Date	10 May 2012	email	jaycarver@crossrail.co.uk

Jane Sidell
Inspector of Ancient Monuments
English Heritage
1 Waterhouse Square
138-42 Holborn
London
EC1N S2T

Ref: Crossrail – Project Archaeologist's assessment of works required at London Wall for utility inspection C305

Dear Jane
Please find below my assessment of works required to inspect utilities at London Wall. The works are planned to commence 12 May 2012 and last discontinuously at weekend until 23 May. A single trial pit that is close to the scheduled monument is planned and an archaeological response is proposed below. Two other trial pits are well outside of the scheduled area and are not anticipated to require any archaeological response. The archaeological mitigation section below shall be included in the contractor's method statement and site teams will be fully briefed.

I would be grateful for your views on this and my conclusion that there would be little value in applying the full method statement process in accordance with the Heritage Deed, at this stage. As described in the methodology below, if remains are revealed and maybe subject to any damage, a method statement would be submitted to yourselves and the Secretaries of State for consideration.

Yours sincerely

Mr J J Carver
Crossrail Project Archaeologist

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Crossrail – Project Archaeologist's assessment of works required at London Wall for utility inspection C305

Prepared by Jay Carver for submission to English Heritage 9 May 2012

Background

C305 Dragados Sisk joint venture together with their sub-contractors, will be carrying out trial holes on London Wall and Coleman Street to expose a 36" gas mains and place CCTV cameras into the mains to establish their condition. These works are to ensure the utilities are of a condition to withstand the passing of the tunnel boring machine.

Previous Investigations

3 trial trenches (Fig 1) were hand excavated to expose existing utilities. The 36" gas main was discovered in LIV16 and LIV25 offset from the kerb line in the eastbound carriageway at a depth of 1450mm. The works were reported on by MOLA (Fig 2a/b/c).

In LIV16 remains of the London Wall SM were identified c750mm below ground level to the north of the gas main alignment (Fig 3). No remains of the City Wall were identified in LIV25 (Fig 4).

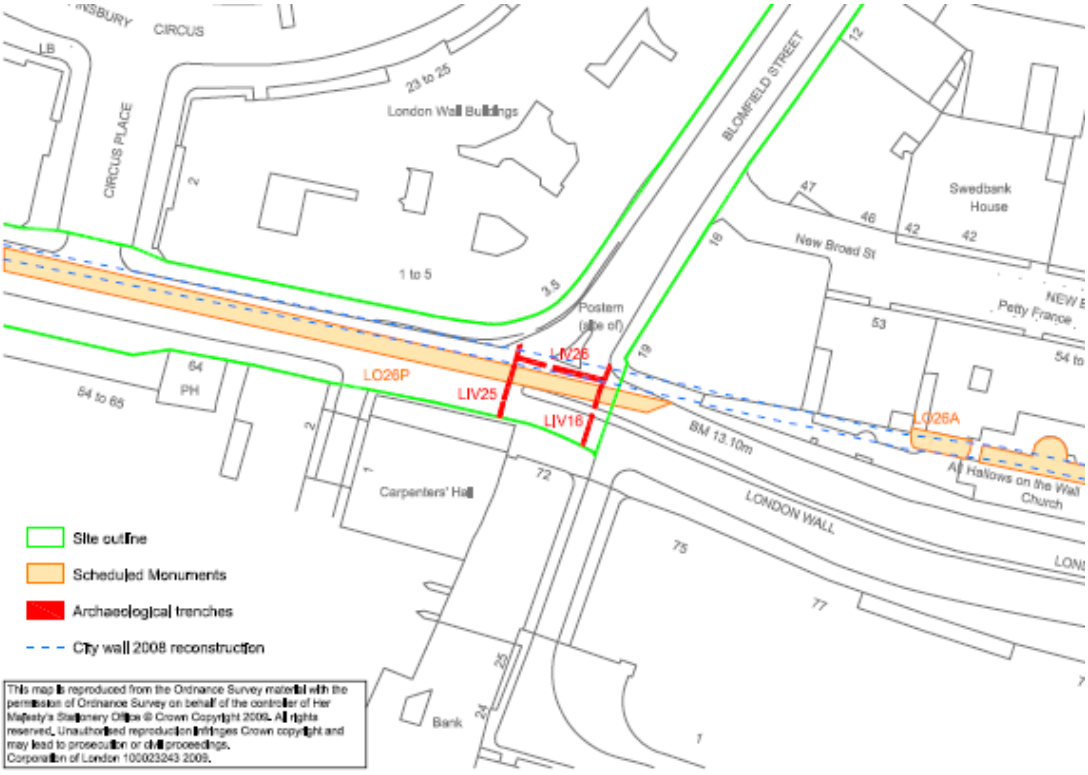

Fig 3 Trench location (east)

Figure1 – location of LIV26, 25 and 16

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Trial Trench LIV26 (Fig 8 & Fig 10)	
Location	Junction of London Wall and Blomfield Street
Dimensions	16.0m x 0.6m x 1.8m deep
Modern ground level	*c* 12.40–12.58m OD
Base of modern fill/surface	Tarmac and concrete 300–500mm thick (from 12.52m–12.58m OD west to east)
Modern subsurface deposits	Cables, pipes etc to base of trench in parts
Level of base of archaeological deposits observed and/or base of trench	1.8m bGL base of trench.
Natural observed (truncated/not truncated ?)	Not reached
Extent of modern truncation	1.2m–1.8m bGL
Archaeological remains	**Date**
The city wall [6]. Part of this section of wall was recorded in trench LIV16 (above). See LIV16 for the description, and Fig 8 and Fig 10.	Undated
Trench interpretation and summary	
This trench was designed to follow the line of the city wall exposed in LIV16. It uncovered the masonry remains to the point at which it had been truncated by a modern water main. West of the water main was a manhole, and west of that the width of the trench was reduced to fit between services. Collapsing sides required excavating the trench deeper than the intended depth, to 1.8m bGL. No evidence of the city wall or the later postern gate were found in this western area of the trench, but modern batteries in backfill indicated the location of headings dug below the level of ducts. It is possible that remains survive at a lower depth than this.	

Figure 2a – MOLA trial pit records LIV 26

Trial Trench LIV25	
Location	Junction of London Wall and Blomfield Street
Dimensions	13.3m x 0.6m x 1.7m deep
Modern ground level	12.40–12.45m OD
Base of modern fill/surface	Road: Tarmac on a concrete bed 500mm thick, from 12.40m OD north, 12.52m OD at junction with LIV26, and 12.45m OD south
Modern subsurface deposits	Cables, pipes etc occupy the full depth of the trench which varied from 0.73m in the south carriageway (limit caused by the density of services, to 1.7m in the north carriageway.
Level of base of archaeological deposits observed and/or base of trench	1.7m bGL (max) base of trench.
Natural observed (truncated/not truncated ?)	Not reached
Extent of modern truncation	1.7m bGL
Archaeological remains	**Date**
No *in-situ* remains, but a single ashlar corner block of a yellowish limestone (not retained) was possibly from part of the post-medieval postern gate	17th- or 18th-century (onset of using ashlar corner blocks)
Trench interpretation and summary	
The entire depth of this trench has been disturbed or reworked by services. An 18-inch and a 36-inch gas main were observed in the vicinity of the projected line of the city wall. This, together with the adjacent area of LIV26 may indicate a potential route for diverting services, if they can avoid the gas mains.	

Figure 2b – MOLA trial pit records LIV 25

Trial Trench LIV16 (Fig 8 & Fig 9)	
Location	Junction of London Wall and Blomfield Street
Dimensions	14.5m (not including the central reservation – not dug) x 0.6m x 1.5m deep
Modern ground level	Road surface varies 12.53m OD (north) 12.58m OD (adjacent city wall remains) and 12.37m OD (south)
Base of modern fill/surface	Road: Concrete and tarmac 0.5m bGL
Modern subsurface deposits	Cables, pipes, etc continued to 1.5m bGL except where the remains of the city wall were observed. The top of a BT manhole was exposed at the bottom of the trench in the south carriageway.
Level of base of archaeological deposits observed and/or base of trench	1.55m bGL base of trench.
Natural observed (truncated/not truncated ?)	Not reached
Extent of modern truncation	0.8m–1.55m bGL
Archaeological remains	**Date**
A firm dark brown silt [5], at 0.8m bGL (11.78m OD). This overlay:	Unknown
A disturbed or reworked section of masonry [7] 200mm north–south at, or about the same level, to the north of and stratigraphically above:	Unknown
The city wall [6] 1.2m east–west and 500mm north–south, 380mm deep made of ragstone rubble <300mm across, set in hard yellow lime mortar. The top of the wall lay at 11.42m OD (1.17m bGL). Part of this section of wall was recorded in trench LIV26 below (Fig 8 and Fig 9).	Undated
Trench interpretation and summary	
All three contexts can be regarded as part of the Scheduled Monument, which therefore survives to 0.80m below ground level (11.78m OD). The city wall has previously been observed east of LIV16 beneath the adjacent pavement cellars of 85 London Wall. The earliest fragment of the city wall [6], at 11.42m OD, is consistent with the Roman construction of the wall, of ragstone rubble poured into a retained core with hard yellow lime mortar. The vertical face may imply that this is near the true edge of the original wall, here at a tangent to London Wall road, and that the facing blocks have been removed for reuse. The exposure was too small to determine whether the fragment of masonry that lay above it [7] was part of the original construction or a modification of the wall. The silt on top was a later deposit marking the disuse of the wall [5]. Elsewhere, modern truncations had removed deposits to below the base of the trench.	

Figure 2c – MOLA trial pit records LIV 16

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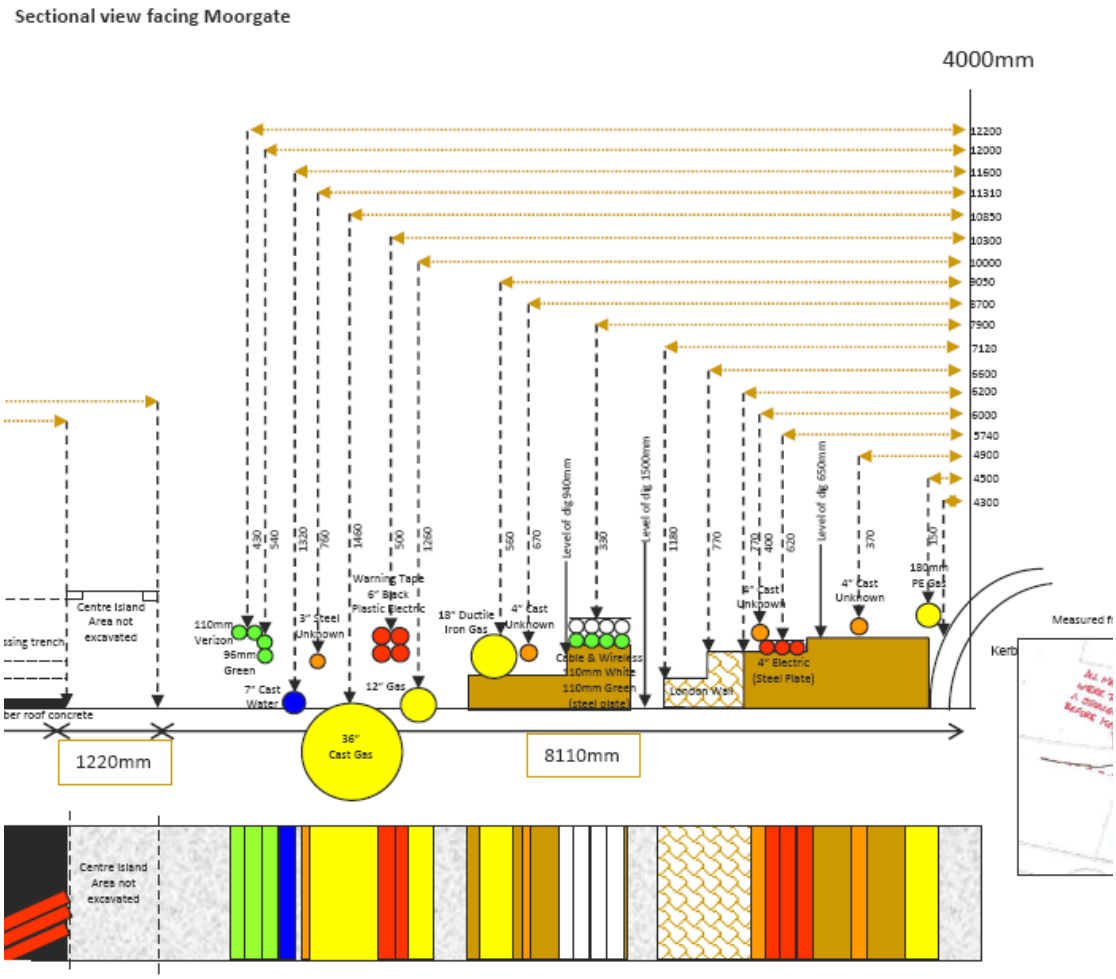

Figure 3 West facing section LIV16 –London Wall remains located

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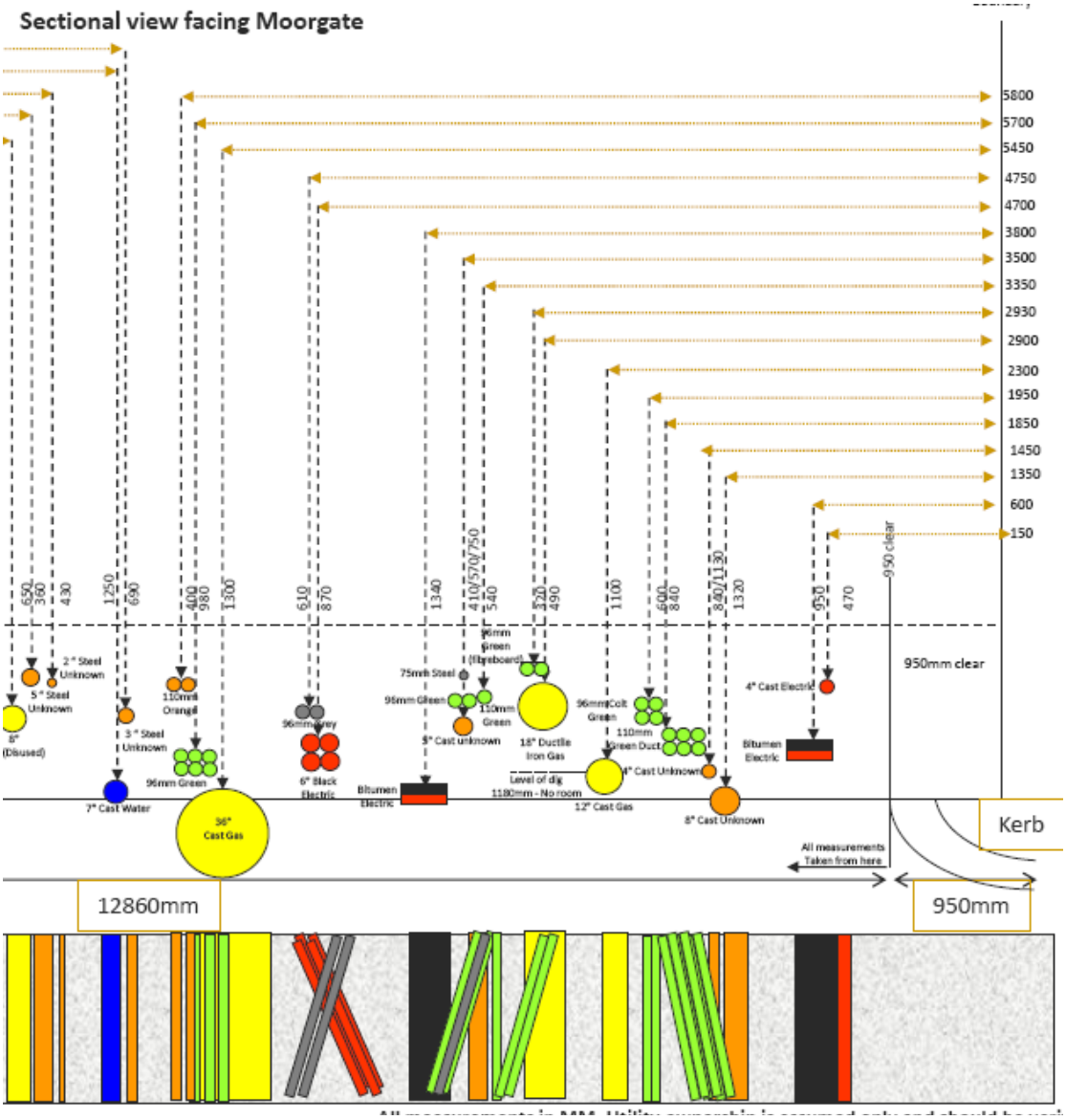

Figure 4 West facing section LIV25 –London Wall

Scope of C305 works

Description of Works

As part of the Crossrail works the 36” CI MP main in London Wall (Corner Bloomfield St) London is predicted to be subject to stresses caused by the tunnelling works. The settlement assessment shows that the joints on this main may fail due to excessive

pull out and rotation. It is known that these joints were internally sealed in the late 70's early 80's and a CCTV survey is required to determine the following:

1. The location and number of joints in the affected area.
2. Confirmation that all joints in the affected area have been internally sealed
3. The condition and likely current effectiveness of the internal seal.
4. Any other factors that may effect the integrity of the main

DSJV have sub – contracted these works to JB Riney Ltd who shall be sub - contracting Forefront Utilities Ltd to carry out excavation works, BPE Specialised Drillings Ltd to drill and tap the gas main therefore allowing Synthotech Ltd safe access the insert their CCTV camera to carry out the survey .Traffic Management shall be implemented on DSJV behalf by Blue Arrow Traffic Management Ltd.

National Grid Gas shall be the third party to whose specification and works procedures we have to adhere.

Pre-start Activities

- All personnel are to report to the site manager/supervisor prior to commencement of work and to be Site Safety Inducted on Site Safety Rules, Emergency Procedures.
- All operatives will sign induction log after completing the site safety induction and will be issued a list of emergency/contact numbers. Records of all inductions will be kept on site.
- Ensure that the approved NGG Non-Routine Operational Procedure Form (NRO) is in place.
- Ensure traffic management system is in place to ensure adequate exclusion area.

Methodology

- The JB Riney Site Agent, Forefront Utilities Site Agent and Traffic Management Supervisor are to tour the site and agree and re-confirm the work sequence.

- The Traffic Management system will be set up as per the Traffic Management Plan in Appendix E and heras fencing and chapter 8 barriers shall be erected to create the worksite area.

- The contractors shall refer to drawings / plans supplied by DSJV, Crossrail and / or utility companies to assess existing known buried apparatus.

- The area is to be CAT-scanned by a competent operator, using a calibrated CAT Scanner, trace out findings on footway and carriageway surface in waterproof spray paint. Refer to HSG 47 for further information.

- A separate Permit to Dig Form authorised by the JB Riney Site Agent will then be completed for each trench and **no** work will be undertaken without this form being signed.

- Saw cut and then break up existing bituminous surfacing (approximately 100mm deep) concrete sub base (approximately 300mm deep) and dispose.

- Carefully excavate by hand and suction excavator 2 no. trial pits 2500mm wide by 2500mm long by approximately 1500- 1600mm deep to locate and expose the 36" cast iron medium pressure gas main on the north side of London Wall (Proposed Locations shown in Fig 5). This element of the works will have an approved temporary works design.

- Excavate a further trial pit (Fig 6) 1 No. at Coleman Street.

- Flame retardant overalls are to be worn by all operatives and visitors whilst in the confines of the site boundary during the excavation process.

- Where excavation is unstable ground an appropriate trench support system shall be installed. This element of the works will have an approved temporary works design. Note: No sheet piles to be pushed or hammered into ground to protect any archaeological remains that may survive at a lower level.

- Where it is not physically possible to install system (due to congested nature of trench with services or other circumstances) operatives to exit excavation and advise engineer / Site Agent and await further instructions.

- Upon successful completion of the excavation BPE Specialised Drillings will drill and tap the 36" cast iron gas main enabling Synthotech to insert the CCTV camera into the main.
- A National Grid Gas Engineer will be on site during the drilling and CCTV elements of the works.
- Upon successful completion of the CCTV survey BPE Specialised Drillings will then plug the holes in the main.
- An approved ITP will be in place for these works.
- Reinstate the excavation in layers removing the temporary propping and sheeting system as the reinstatement progresses. Reinstate the excavation to match existing as per HAUC specification build up as follows;

a) Cover all services with a 200mm surround of Thanet Sand and compact

b) Lay Hazard Warning Tape above covered services

c) Fill trench void with MOT Type1 compacting in 200mm layers up to 400mm from surface level

d) Lay 300mm C40 grade dry lean mix concrete to Type1 formation up to 100mm from surface level

e) Lay 100mm of Hot Rolled Asphalt wearing course in two layers.

- Clear site of Plant and Material
- De-establish TM and cancel permit.

Specialist Activities

Excavations in London Wall and Coleman Street to expose the 36" CI MP main. Drill one 6" hole using an Iris Stop drilling base, insert a CCTV camera through the base valve and internally survey approximately 200m of main.

Withdraw camera and fit Non Tap completion plug when survey is completed.

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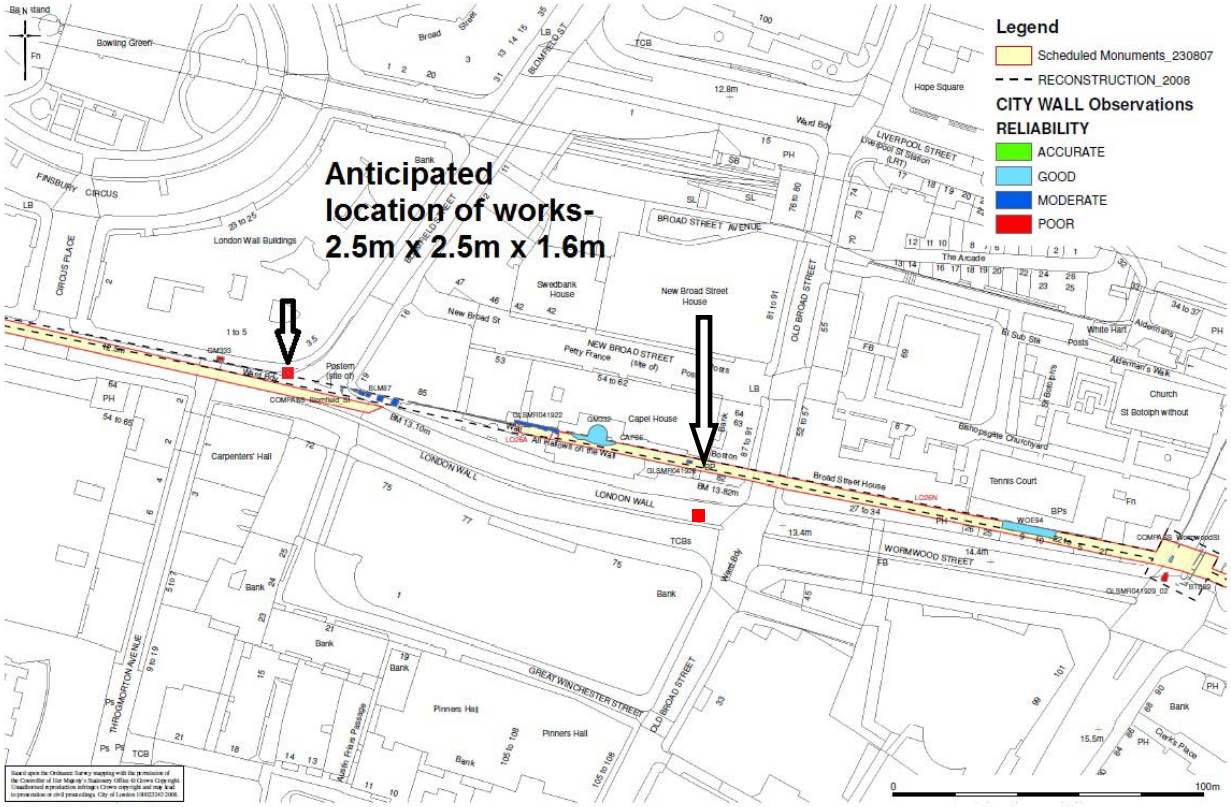

Figure 5: Location of trial pit North side of London Wall (left Blomfield) and outside 82 London Wall (right) to expose 36" gas main

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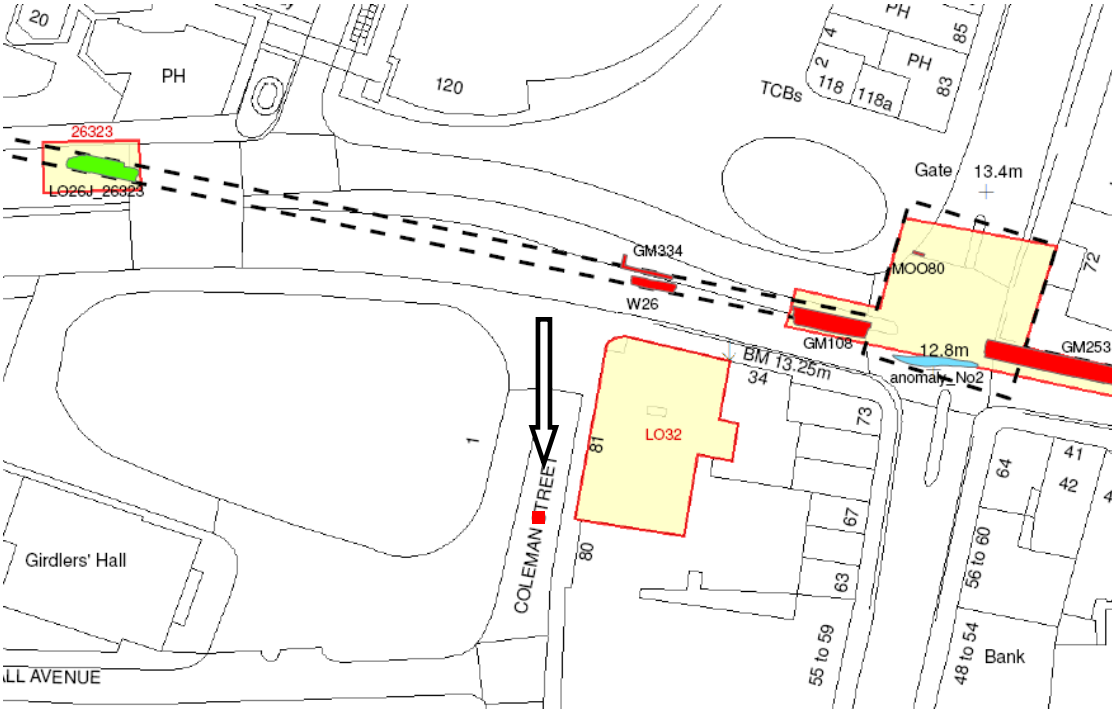

Figure 6: Location of trial pit at Coleman St (Arrow to red square)

Archaeological Mitigation

No archaeological impacts are anticipated for the trial pits at at Coleman Place, and outside of No. 82 London Wall to the south of All Hallows Church. However, the archaeologist from MOLA shall be on call as per usual Crossrail procedures should any archaeological remains be discovered.

There is a low probability, given the previous opening up at the location and known insertion of gas main, that the trial pit on the North Side of London wall at Blomfield St shall expose remains of the scheduled monument, The City Wall (LO26P). In order to expose the gas main and carry out the works specified above the contractor shall not disturb or remove any part of the scheduled remains even if they are unexpectedly exposed.

Any proposed trench support system shall avoid use of piled or hammered sheet piles to ensure there is no unplanned damage to the monument at a lower (unseen) depth.

A watching brief shall be conducted by MOLA Crossrail contract C257 to ensure that there is no unauthorised disturbance to the monument. The C257 archaeologist shall

provide a site briefing to the teams advising them of the types of remains that maybe expected prior to commencement of the works.

If any part of the monument is revealed by the works the following scope shall apply:

a. The remains shall be photographed, surveyed and recorded and a report prepared by the MOLA archaeologist.
b. The Crossrail Project Archaeologist shall be informed. He shall contact English Heritage to offer them the opportunity to inspect the remains prior to their reinstatement (unless traffic management consents require the remains to be immediately reinstated).
c. Remains shall be protected by a geotextile membrane and layer of sand (d) during reinstatement to the satisfaction of the Archaeological Contractor, Employer's Archaeologist and English Heritage.
d. The specification for protective materials for preservation in situ of the City Wall (Scheduled Monument) were supplied by the English Heritage Inspector of Ancient Monuments (Jane Sidell) to MoLA in advance of the evaluation fieldwork in 2009. The same specification shall be applied as follows:

• Geotextile: water-porous geotextile
• Sand: effectively iron free, pale coloured (in the 7.5 YR, 10YR and 2.5 YR Munsell chart colour bracket), non-calcareous, relatively clay free, with particle size of no less than 98% below 63 microns and no more than 2% above 2mm, Loss on ignition value to be no more than 2%, e.g. 'Kingsley No 1'.

If any part of the monument is revealed by the works, and disturbance to the remains would be required to complete the works to the gas main, a full method statement must be prepared and submitted for approval under Schedule 9 of the Crossrail Act 2006 before the works can be carried out.

Response from English Heritage

From: STABLER, Kim [mailto:Kim.Stabler@english-heritage.org.uk]
Sent: 10 May 2012 15:44
To: Jay Carver
Cc: SIDELL, Jane; Mike Court; 'Stubbs, Kathryn'
Subject: London Wall gas main investigations May 2012

Jay

Thanks for sending the below through, and for our phone conversations.

I can see what is proposed, and the submitted information does make clear the governance structure for the works, how this fits in with the Heritage Deed and what measures will be enacted should archaeological deposits, particularly the scheduled monument, be observed during the course of works. As I understand the proposals, however, there should not be any instance in which the scheduled monument is directly affected.

I have a few comments, and on the understanding that these are addressed, would be able to support the specification and the commencement of works this coming weekend.

1. I would question the 'anticipated' location of works at Blomfield Street. From our conversation, I understand that this flexibility is needed in order to ensure the services are exposed, as their locations are not 100% known. However, we actually do know that the scheduled monument is NOT in LIV 25 but the gas main IS - and that this has been very accurately surveyed. I would therefore suggest that the test pit required in this area could simply re-open the previous one, where the potential for encountering archaeological deposits has already proven to be negligible. Regardless, there does need to be a MOLA team member in attendance, as you've outlined.

2. I would suggest that the paragraph of the method statement regarding shoring (penultimate bullet point on page 9) is amended to make clear that hammered sheets, or similar, are not to be used to avoid causing damage to archaeological deposits that may be situated below the base of the test pits.

3. It is unfortunate that the MOLA City Wall assessment has not yet been updated to capture the data recovered in test pits LIV 16, 25 and 26, as this information would have been useful in assessing the present proposals.

4. I would agree that there is no need for monitoring of the test pit opposite 82 London Wall given the distance from the monument. Should the location change this will have to be revisited. I have no comment on the need for monitoring on the Coleman Street location, as this is not relevant to the monument. I would assume that Kathryn will be in touch should she have concerns regarding this location.

Please forward on the amended specification tomorrow, so we have in to hand before works start on the weekend.

Many thanks,

Kim

Kim Stabler | Archaeology Advisor
Direct line: 020 7973 3215

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138-142 Holborn | London EC1N 2ST

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END