

C254 – Archaeology West

Archaeological Watching Brief at Lord Hill's Bridge

Fieldwork Report

CRL Document Number: C254-OXF-T1-RGN-CRG03-50193

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Summary

During late August 2011 and continuing intermittently through to early January 2012, Oxford Archaeology/Gifford (now Oxford Archaeology/Ramboll) carried out a Targeted Archaeological Watching Brief on land beneath and adjacent to Lord Hill's Bridge, City of Westminster, London W2. The work was undertaken on behalf of Crossrail Ltd, prior to stabilisation and tunnelling work associated with the Crossrail Project.

Pleistocene deposits, similar to those observed during the excavation of the Crossrail Royal Oak Portal, were recorded at the western limit of the investigation area. The upper sequence of these deposits sloped up towards the east and appeared to have been truncated by the present railway cutting.

The excavations also revealed two sets of 19th century brick foundations associated with an earlier phase of Lord Hill's Bridge.

Additional modern structures associated with the railway were identified during ground reduction work, including a suspected concrete service/utilities channel and parts of a possible platform. The Marcon Sewer was also observed running east-west through the area of investigation.

1 Introduction

1.1 Scope of Work

- 1.1.1 Oxford Archaeology/Ramboll (OA/R) undertook an Archaeological Targeted Watching Brief at Lord Hill's Bridge, City of Westminster, London W2. Centred on TQ 257816.
- 1.1.2 The programme of work, which was commissioned by Crossrail Ltd, commenced in August 2011 and continued intermittently to early January 2012.
- 1.1.3 The work was undertaken in advance of grouting operations intended to increase the stability of Lord Hill's Bridge prior to tunnelling during Crossrail construction.
- 1.1.4 This document is a full Fieldwork Report in line with Section 8F of the Specification for Evaluation and Mitigation (CR-PN_LWS_EN_SP_0001) and follows on from an interim report (C254-OXF-T1-RGN-CRG03-50116) written by OA/R and issued in 2012.
- 1.1.5 The work program consisted of three stages of work broken down as;
 - Stage 1. Trial pits excavated parallel to the northern abutment of Lord Hill's Bridge in an area extending beneath and approximately 10 m either side of the current bridge in order to expose earlier bridge abutments.
 - Stage 2. Trial trenches excavated from the Crossrail Royal Oak Portal, at 15 m intervals, in order to investigate underground services between chainage 512 and 690. Trenches excavated perpendicular to the permanent way to a depth of 1.5 m below ground level.
 - Stage 3. Excavation and removal of the Marcon sewer, between chainage 512 and 640, to a depth of 3-4 m below existing ground surface.

1.2 Location

1.2.1 The area investigated lies beneath and to the west of Lord Hill's Bridge. The brick built northern retaining wall of the present railway cutting forms the site's northern boundary. The Permanent Way of London Underground's Hammersmith and City Line runs along the site's southern edge. The Tunnel Head of the Crossrail Royal Oak Portal marks the limits of the site to the west (Figure: 1).

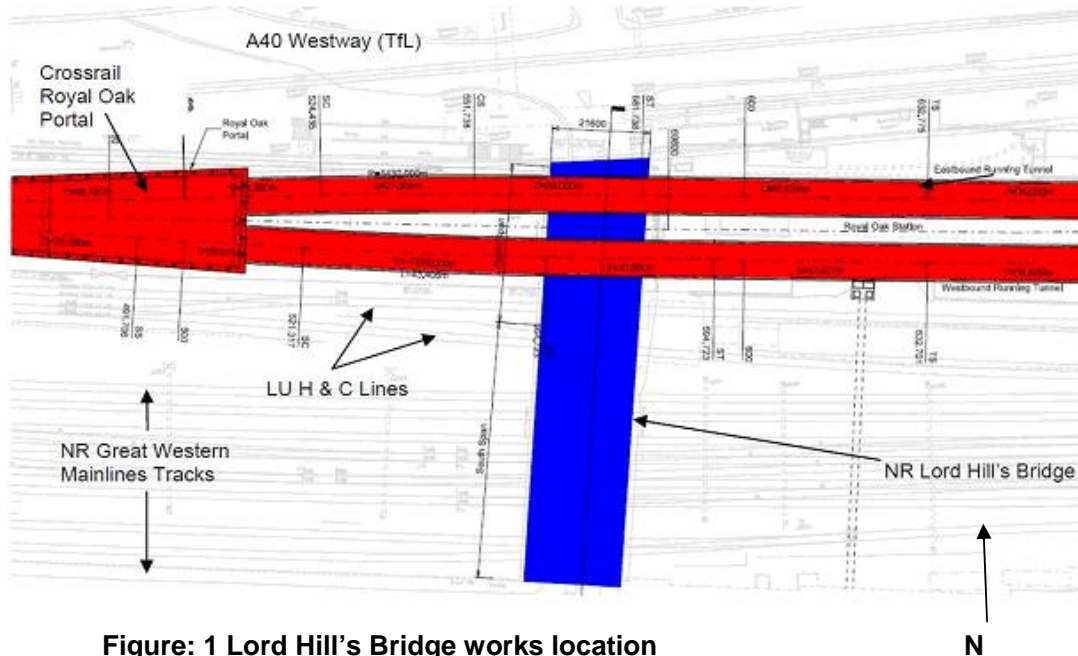


Figure: 1 Lord Hill's Bridge works location

Planning Background

- 1.2.2 The overall framework within which the archaeological work took place is set out in the Environmental Minimum Requirements (EMR) for Crossrail (3rd Draft November 2007). (<http://www.crossrail.co.uk/the-railway/getting-approval/parliamentary-Bill/environmentalminimum-requirements-including-crossrail-construction-code>).
- 1.2.3 The requirements being progressed follow the principles of Planning Policy Guidance Note 16 on archaeology and planning (1990), superseded by PPS5 as of 23 March 2010. The National Planning Policy Framework (NPPF) (DCLG 2012) has subsequently replaced Planning Policy Statement 5.
- 1.2.4 The strategy for archaeological works is set out in the Crossrail Generic Written Scheme Investigation (WSI) (Document No. CR-PN-LWS-EN-SY-00001). The Generic WSI presents the strategy for archaeology design, evaluation, mitigation, analysis, dissemination and archive deposition that will be adopted for the design and construction of Crossrail and provides a general statement of objectives, standards, and structure for the planning and implementation of archaeological works.
- 1.2.5 Crossrail produced a specification for the archaeological works. This was set out in a Site Specific Written Scheme of Investigation (SSWSI) produced by Iain Williamson and Suzanna Pembroke (Document No: C122-OVE-T1-RGN-CR076_PT001-50001).
- 1.2.6 Subsequent to this OA/R produced an Archaeology Method Statement (C254-OXF-T1-GMS-CRG03-50005, OAG16188.R31) in response to the SSWSI. This was approved by the Crossrail Project Archaeologist in regard of archaeological content and by the

Principal Contractor, Bam-Ferrovial-Kier (BFK), in relation to Health and Safety requirements.

2 Archaeological Background

- 2.1.1 The archaeological and historical development of the Royal Oak East and Paddington Central worksites, which includes the area of Lord Hill's Bridge, has been set out in the Detailed Desk-based Assessment (Document No. CR-SD-CT1-EN-SR-00002) and is summarised in the SS-WSI *Crossrail Design Consultant Framework C122 – Bored Tunnels SS-WSI Addendum for Archaeological Targeted and General Watching Brief during Investigative Trial Holes and Abandoned Foundation Removal at Lord Hill's Bridge C122-OVE-T1-RGN-CR076_PT001-50001- Revision 1.0*. This study, which included a historic map regression exercise, is summarised and included below.
- 2.1.2 There is limited evidence of human activity in the area from the Prehistoric, Roman and Medieval periods and the area appears to have been essentially rural in character. The medieval village of Westbourne Green, situated c. 500 m to the north of the site being the main focus of occupation in the general vicinity.
- 2.1.3 Rocque's map of 1746 (not illustrated) shows the study area located within a field system south of Westbourne Green Village.
- 2.1.4 During the 18th century the area became increasingly built up with a number of large houses, Westbourne Manor, Westbourne Park, and an up graded road system.
- 2.1.5 More rapid development occurred in the 19th century with housing spreading into the area from the already built up areas to the south and east. Development of the area was further speeded up with the construction of the Grand Union Canal between 1801 and 1805.
- 2.1.6 Greenwood's map of 1824 (not illustrated) shows the early development of the area. The Grand Junction Canal running to the north of the site is connected through to Paddington. In addition a wide road marked as "to Harrow" is shown running northwards from Paddington Village. Despite some development the area is still rural in nature.
- 2.1.7 The construction of the canal was followed by the construction of the Great Western Railway (GWR) from the 1830s; both of these had a considerable impact on the area. The canalisation of the Westbourne River into the Ranelagh Sewer in the 1870s was also a significant event at the time.
- 2.1.8 From 1836 the GWR increasingly dominated the area. The construction of railway tracks in extensive cuttings and the Lord Hill's Bridge appears to have resulted in the removal of much of the grounds of Westbourne Park, although the house itself survived to the south of the railway. The Harrow Road was realigned slightly towards the north and a tollgate marked on Greenwood's map at the junction of Harrow Road and Black Lion Lane also appears to have been demolished.
- 2.1.9 Lord Hill's Bridge is named after General Sir Rowland Hill, the 1st Viscount Hill, one of the Duke of Wellington's most trusted commanders, who lived locally at Westbourne Place. It was designed by Isambard Kingdom Brunel and originally constructed between 1835 and 1837 by the GWR to carry Black Lion Lane (now called Portchester Road) over the newly built railway. The original bridge comprised five brick arches, two of which were replaced with a hog's-back steel girder structure in 1906-7.
- 2.1.10 The remains of four brick foundations, which the report suggested were from Brunel's bridge, were identified during a programme of trial hole investigation conducted by Birse Rail in 2009 (Document No. CRL1-NRI-C-RGN-B071-00001). The top of the brick foundations were recorded at approximately 500 mm below the existing ground surface,

each measuring approximately 1200 mm (L) x 700 mm (W) and were spaced at 4.15 m centres. What appeared to be London Clay was recorded in the base of the trial pits approximately 1.0 m below the existing ground level (121.90 m ATD).

2.1.11 On Stanford's map of 1862 (Figure: 5) the rapid development of the area is evident with the area to the north and south of the GWR railway now covered by housing. Lord Hill's House at Westbourne Park had been demolished and replaced by Westbourne Park Villas. At the location of the present Lord Hill's Bridge, Celbridge Place (now called Portchester Road) is shown crossing the railway on an unnamed bridge.

2.1.12 The Ordnance Survey map of 1872 (Figure: 2) shows further development of the railway in the area with the construction of additional lines and the opening of Royal Oak Station in 1871, whose booking office is shown at the southern end of the bridge. This is the first map in which the bridge is called Lord Hill's Bridge. It is shown as a much wider and longer bridge than that depicted on the 1862 map.

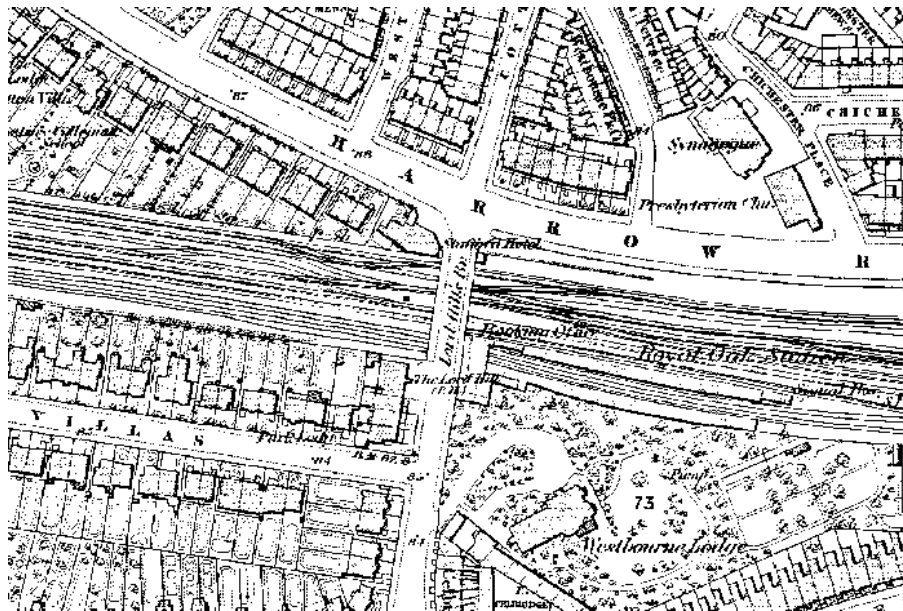


Figure 2: 1872 Ordnance Survey map

2.1.13 Further development of the railway to the south is shown on the 1914 Ordnance Survey map (Figure: 5). All the houses and gardens on the northern side of Westbourne Park Villas have been removed, replaced with an enlarged railway cutting as have the large house and gardens at Westbourne Lodge which now appears as railway yards. The Lord Hill's Bridge is also longer enabling it to cross the enlarged cutting. The addition of tracks to the south now meant that the Royal Oak Station booking office was at the centre of the bridge. Within the GWR cutting a number of unnamed structures are shown built up against the cutting retaining wall to the west and east of the Lord Hill's Bridge.

2.1.14 The present street pattern appears to have changed little since 1914, although the buildings along the Harrow Road to the north of the railway have disappeared beneath the A40 Westway flyover and the railway goods yard to the south east of the Lord Hill's Bridge is no more.

2.2 Previous Work

2.2.1 The SS-WSI reproduced the available geotechnical work in the immediate area of the site. This consisted of a borehole (RT3) located immediately to the east of Lord Hill's Bridge (Exploration Associates 1992) which revealed London Clay deposits lying directly beneath "made ground" at 119.10 m ATD. As well as a borehole (RPO5) and a Window

- Sample (WS112) immediately to the west of the bridge (Document No.CRL-SOI-C2-CRG03-00001 See also drawing C150-CSY-C2-CR076_PT001-00012 in Appendix A).
- 2.2.2 It was suggested in the SS-WSI that the alluvial clay deposits recorded in ROP05, from 121.12m ATD down to 117.92 m ATD and in WS112 from 121.63m ATD and 120.98m ATD was associated with the former course of Westbourne River. Which formerly traversed the area and is now routed through a sewer beneath Ranelagh Bridge approximately 170 m east of Lord Hill's Bridge. The SS-WSI also notes that the alluvium was locally absent in the areas surrounding the Lord Hill's Bridge abutments, but suggests the possibility that it was removed during the construction of the bridge piers it could have survived in the areas between each span.
- 2.2.3 A recent Targeted Watching Brief was carried out by OA/R on excavations related to the construction of the Crossrail Royal Oak Portal to the west of Lord Hill's Bridge (reported within Doc No. C254-OXF-T1-RGN-CRG03-50004). This revealed a sequence of deposits dating to the Pleistocene period, accumulated within a hollow in the London Clay. Faunal remains including reindeer and bison were retrieved from the deposits (Bates *et al* 2012). A western limit to the topographical feature containing the deposits was recorded but not its eastern extent as the deposits extended beyond the location of the Crossrail Portal site.
- 2.2.4 How the two sequences of deposits related to one another was not clear, nor was the origin of the alluvium recorded in the vicinity of Lord Hill's Bridge. Further archaeological monitoring was therefore proposed (see section 5.11 below) to confirm the presence/absence and characterise the alluvial deposit record in ROP5 and WS112.
- 2.2.5 Recording in advance of demolition at the Royal Oak Portal was conducted by MOLA in May 2010 (site codes were XRT10 for ROP [Document Number: C150-CSY-T1-RGN-CR076_PT001-00010]. Non-listed built heritage features at Royal Oak Worksite East and Paddington Central Worksite were assessed by MOLA in January 2010, and those at the Royal Oak Worksite West were assessed by Scott Wilson (Crossrail (Scott Wilson) 2009, Westbourne Park GI Report, WEB-S-0008C.

3 Geology and Topography

- 3.1.1 The solid geology of the area is given as London Clay by the British Geological Survey (BGS, 1996). Overlying superficial deposits, such as the locally present Langley Silts and Lynch Hill Gravels, are not expected to be present because of truncation by the railway cutting in which the site sits.
- 3.1.2 Works carried out by OA/R at the Crossrail Royal Oak Portal, to the west of the site (OA/R 2013 - C254-OXF-T1-RGN-CRG03-50047) revealed water-lain and wind-blown sand and silt deposits of Pleistocene date. These were deposited in a hollow within the London Clay at the eastern end of the Royal Oak Portal at a height of c.120.90m ATD. (Above Tunnel Datum) where Tunnel Datum is calculated as being 100 m above Ordnance Datum e.g. 1 m OD = 101 m ATD).
- 3.1.3 The Lord Hill's Bridge spans a c. 4.40 m deep vertically sided cutting. Beneath the bridge, where the ground surface is relatively flat, the existing ground level is recorded as c. 121.90 m ATD.

4 Research Aims and Objectives

- 4.1.1 The SSWSI (Document No: C122-OVE-T1-RGN-CR076_PT001-50001) contained a number of distinct research and work objectives.

- *The principal aim of the work was to identify and record the original Brunel foundations of Lord Hill's Bridge prior to their removal.*
- *In addition, the presence or absence of Pleistocene deposits identified during previous excavations undertaken by OA/R to the west of Lord Hill's Bridge at Crossrail Royal Oak Portal should be confirmed.*
- *To monitor the excavation and removal of the Marcon Sewer as defined in previous work at Crossrail Westbourne Park and Royal Oak Portal.*

5 Methodology

5.1.1 All archaeological work and the preparation of this report was conducted according to current best practice and accepted professional standards (see OA Fieldwork Manual 1992, Museum of London Archaeological Site Manual 1990), and as outlined in:

- SS-WSI addendum for Archaeological Targeted and General Watching Brief during Investigative Trial Holes and Abandoned Foundations Removal at Lord Hill's Bridge, Document No. C122-OVE-T1-RGN-CR076_PT001-50001
- Archaeological Generic Written Scheme of Investigation, Document No: CR-PN-LWS-EN-SY-00001, 7 July 2009 (AWSI)
- Archaeology Specification for Evaluation and Mitigation (including Watching Brief), Document No: CR-PN-LWS-EN-SP-00001, 26 June 2009, (ASEM)
- Works Information (Volume 1 - General), Document No: CR-SD-PRW-X-RT-00151, 5 June 2009 (WIV1)
- Works Information (Volume 2 - Particular), Document No: CR-SD-PRW-X-ITT-00001, 13 July 2009 (WIV2)
- Crossrail standards and specifications;
- Institute for Archaeologists – Standard and Guidance for archaeological excavation, 2008 (revised);
- Institute for Archaeologists – Standard and Guidance for an archaeological watching brief, 2008 (revised);
- Museum of London collections and archive policies and guidance;
- English Heritage – Geoarchaeology, 2007;
- English Heritage - Archaeological Science at PPG16 interventions: Best Practice Guidance for Curators and Commissioning Archaeologists, 2003;
- GLAAS Archaeological Guidance Papers 1999;
- Corporation of London archaeology guidance – Planning Advice Note 3, 2004; and
- Museum of London Archaeology Service site recording manual (MOLA 1994).

5.2 Fieldwork Techniques

5.2.1 The fieldwork strategy is described in detail in the WSI (Oxford Archaeology/Gifford 2012) but in summary;

5.2.2 The initial phase of works was the excavation of new service trench, running approximately 30 m to the west and continuing under the present bridge. Excavation was carried out by mechanical excavator and hand, this methodology being dictated by the Principal Contractors method statement. During the excavation of this trench the northern abutments associated with an earlier phase of the bridge were exposed. This

- element of work did not require constant archaeological supervision. Subsequent to the initial identification of the abutments a greater archaeological presence was maintained.
- 5.2.3 A constant archaeological presence was maintained during the exposure of the abutments. Every effort was made to ensure any archaeological work was done in a safe and timely manner which caused minimal distribution to the Principal Contractors program of works.
- 5.2.4 The removal of the foundations was carried out using a 12 ton excavator using both bucket and breaker. This work was carried out under intermittent archaeological supervision.
- 5.2.5 In addition to the exposure of the foundations the surrounding area was reduce to allow for the construction of a piling mat, this work was also carried out under archaeological supervision.



Plate 1: Exposure of northern abutments

- 5.2.6 The proposed excavation of 12 trial trenches at 15 m intervals to locate buried services in the area surrounding the bridge was not undertaken. This decision was made by the Principal Contractor. It was deemed there was a low risk of services being an issue in the further works on the site as they would be largely limited to piling and tunnelling.
- 5.2.7 The removal of the Marcon Sewer was carried out under archaeological supervision, with the program of works being dictated by the Principal Contractors method statement. To maintain a safe working environment archaeological access had to be limited to supervision from above, with a safe method of access and egress to the sewer being unavailable. The removal of the sewer was undertaken by 12 ton excavator done in 4 m stages with each stage being back-filled before further excavation.
- 5.2.8 All spoil and upcastings from the excavations were scanned visually for artefacts and ecofacts.

5.3 Recording

- 5.3.1 All observations were undertaken against a unique Event Site Code (XSI10). A continuous unique numbering system was used.
- 5.3.2 All archaeological deposits and features were recorded by means of Oxford Archaeology (OA) pro-forma recording sheets.
- 5.3.3 A complete drawn record, which incorporated, plans and section, was made of the deposits and features uncovered on site. These were drawn at scales of 1:50 or 1:20 for plans and 1:10 for sections.
- 5.3.4 A full photographic record was maintained using 35 mm monochrome and colour, as well as digital formats. The photographic record included photographs and transparencies of all archaeological features and deposits as well as any quaternary deposits, as encountered and shot to illustrate work in progress.
- 5.3.5 The following observations were recorded on a daily basis.
- The Event Code and location of the area observed;
 - The date of the observation;
 - Personnel employed on site;
 - A description of the construction works observed;
 - Any relevant works sub-contractor and personnel undertaking and supervising the construction activity;
 - Depths and extents of excavation works observed;
 - A measure of confidence that any archaeological remains would have been observed and reasons;
 - The areas and horizons (both those containing archaeological or remains of quaternary geological importance and those which do not) unaffected by construction
 - activity (with special reference to archaeological sites identified for preservation in situ);
 - The reasons why any particular area of the works was not observed, and noting those areas not subject to disturbance from construction;
 - Location and description of any archaeological remains; and
 - Location and description of any modern remains.

5.4 Site Survey and Spatial Recording

- 5.4.1 The nature of the works was entirely observational, all setting out of interventions were under the control of the Principal Contractor's approved surveyor. The location, position and depth of the interventions was predetermined and in accordance with the current design drawings (Document Ref C815-VLK-D-DDA-CRT00_MS002-50001, (Drawing number NK016564_0300 (Nov 2010))).
- 5.4.2 The set outs were usually conducted using a Total Station Theodolite (TST) or other suitable automated equipment referenced from approved Crossrail Permanent Ground Marker (PGM) data. Any archaeological drawing points and baselines were surveyed in by the on-site surveyor Eduardo Lamego of BFK. In this instance the survey was done using approved and calibrated equipment. Where survey was not possible, significant

- features were measured and drawn onto reproduced Crossrail issued scaled drawings, with Ordnance Survey references integral.
- 5.4.3 The positions of the trenches and survey points were verified by the OA/R Supervisor on-site through discussion and observation. In this way it was possible to ensure that all trench or excavation limits, and significant archaeology detail were surveyed 'as dug', before leaving the site. A repetition of surveying the interventions was deemed redundant. This therefore meant that data management of raw survey was not necessary.
- 5.4.4 A comprehensive, to scale, digital site plan was provided by the contractor for use by OA/R. This showed all structural features in the area, including present bridge abutments, site limits, the Crossrail Royal Oak Portal tunnel face and associated concrete slab.
- 5.4.5 All levels recorded were taken from known points provided by the principal contractor and recorded as meters Above Tunnel Datum (m ATD).
- 5.4.6 Any deposits or remains of archaeological significance were hand drawn. The bridge abutments were recorded on a temporary site grid, which was then located in relation to the present bridge using tapes and offsetting. All other hand recording was undertaken using at least two datum's points creating a base line from which measurements could be taken. All datum points were located using tapes in relation to features present on the digital plan.
- 5.4.7 Resulting from the contractor's method of removal the Marcon Sewer was located using only the TST; a series of points was taken to map its course, on several occasions heights were taken at the top and the bottom of the structure.
- 5.4.8 Upon project completion all drawings were digital captured comprising of closed polygons, polylines or points and incorporated within the plan provided by the contractor. This was undertaken in accordance with the requirements of GIS construction and OA Geomatics protocols.
- 5.4.9 In all instances, CAD work has, and will follow the guidelines set out in Crossrail's CAD Standards (CR-STD-005 CAD Standards v2) and Crossrail's; *Archaeology Specification for Evaluation and Mitigation (including watching Brief)* (CR-PN-LWS-EN-SP-00001).

6 Results

6.1 Introduction

- 6.1.1 The results of the watching brief is presented below with a more detailed summary of the structures, deposits and features presented in Appendix 1.
- 6.1.2 All heights in this report are quoted in metres Above Tunnel Datum (m ATD). Tunnel Datum is calculated as being 100 m above Ordnance Datum e.g. 1 m OD = 101 m ATD.
- 6.1.3 Three broad phases could be defined across site. This phasing is provisional and may be refined in the light of evidence produced from detailed analysis of the dataset.
- **Phase 1: Prehistoric:** Deposits of laminated sands and brick earth probably relating to a Pleistocene "channel" seen in the Crossrail Royal Oak Portal. Clay deposits possibly relating to the former Westbourne River.
 - **Phase 2: Nineteenth to Twentieth centuries:** Various components and deposits associated with the construction of the 19th century railway cutting, bridge and railway lines. The remains of an extensive brick-built Victorian sewer, referred to as

the Marcon Sewer. This was east-to-west aligned and was seen to truncate the bedding layer for the railway lines.

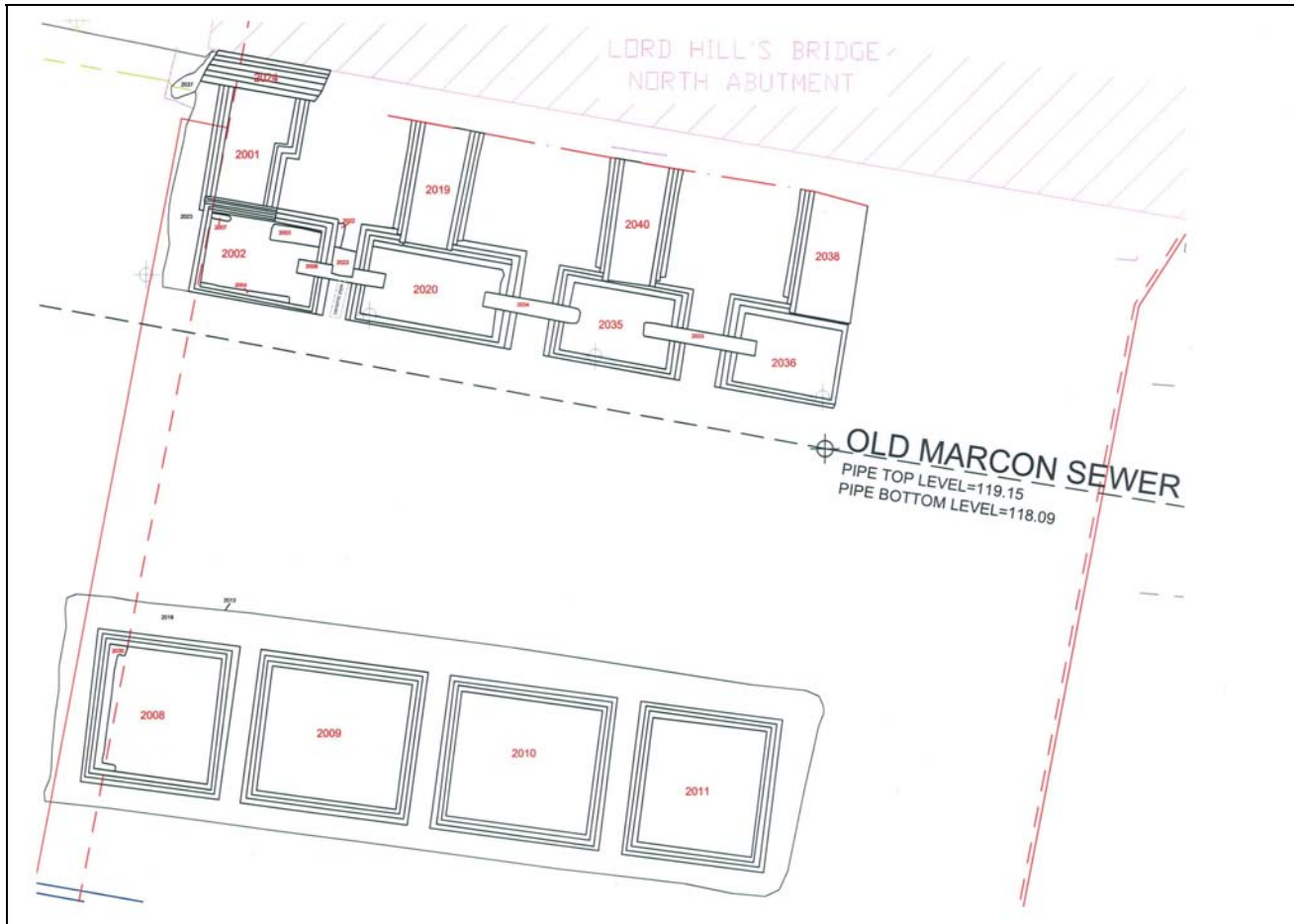
- **Phase 3: Modern:** Various elements relating to the disuse and abandonment of the railway at the end of the 20th.

6.1.4 During the removal of the Marcon Sewer, adjacent to the Crossrail Royal Oak Portal tunnel face, a brick-earth deposit was observed beneath deposits of laminated yellow sands (2053) at approximately 120 m ATD. A deposit of alluvial clay (2012) sealed these probable Pleistocene deposits, which were seen to rise up towards the east. Due to Health and Safety factors (see above 6.27) the exact nature of these deposits could not be confirmed.



Plate 2: The Marcon Sewer in cross section during removal

- 6.1.5 Similar sandy deposits were observed 13 m east of the Crossrail Royal Oak Portal tunnel face, at approximately 121.0 m ATD. However, at this point they lay directly below “made ground” deposits rather than layer (2012).
- 6.1.6 During site reduction a layer of yellow sand gravel (2028) was observed across most of the area. This was overlain by a 0.2-0.3m thick layer of crushed red brick (2017) which in-turn was covered with a black grey ash silt layer (2016). These deposits have been observed throughout the area and were identified during archaeological monitoring at Crossrail Royal Oak Portal. They almost certainly represent the remains of railway track sub bases.
- 6.1.7 These deposits were cut, or were abutted, by two sets of historic bridge foundation abutments (Figure 3). These consisting of coursed brick built on a concrete base; both sets of abutments were cut into alluvial clay (2012).



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Figure 3: Plan of bridge abutments

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- 6.1.8 The southern set of abutments comprised four independent rectangular structures (2008, 2009, 2010 and 2011) running east - west along the southern edge of site and each measuring 3.1 x 2.7 x 0.6 m. These were formed of eight courses of shallow frogged red bricks with a white lime mortar. Each course was offset from the course above with an additional course, creating a series of steps toward the base. A single light grey, sandy concrete foundation block (2018) was observed running underneath all four abutments and was approximately 16 x 4.5 x 1.1 m in size. On the surface of each abutment a band of white mortar ran along the outside edge. A partially surviving wall (2030) on abutment (2008) suggests that further upstanding elements of the abutments have been truncated.



Plate 3: Southern brick abutments (2008 and 2009) from the south east

- 6.1.9 The northern abutments were similar in nature. These were four independent brick rectangular structures (2002, 2020, 2035 and 2036) which were observed running east to west and built upon a single pale grey concrete base (2023). The abutments were constructed of red shallow frogged bricks with a pale white grey, lime mortar using an English bond. The structures each measured 3.05 x 1.7 m at the top and stepped out towards the base. Connecting walls (2004, 2033 and 2034) between each abutment had been constructed of red frogged bricks with a soft light white sandy lime mortar.
- 6.1.10 Four attached structures had been built at right angles to each abutment (2001, 2019, 2038 and 2040). These were built from the same red shallow frogged bricks, but the additional structures had not been keyed in with the east-west foundations and were separated by a gap of 10-30 mm.
- 6.1.11 Both the additional attached structures and the connecting walls had been constructed on a concrete base (2023) that could not be distinguished from that underlying the east-west foundations. That there was no evidence of the bricks being keyed in and the small 10-30 mm gap suggest these are later additions rather than contemporary structures. The use of similar bricks and mortar along with no identifiable change in the concrete base suggest that these additional abutments were constructed within a short period of the original structures. These additional structures are likely to be reinforcements to the

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initial foundations. The smaller nature of the northern foundations compared to the southern may be the reason why only the northern set was amended.



Plate 4: Northern abutment (2002) on left with additional abutment (2001) to the right

- 6.1.12 Both sets of foundations were surrounded by a yellowish brown clay, (2012); this was in turn overlain by a mixed brown dark grey silt ash ballast, fill (2021) to the south and fill (2032) to the north. This was a deliberate dumped deposit placed during the construction of a later bridge in the early 20th century.
- 6.1.13 While reducing the area to the west of the present bridge a circular brick built structure (2042) was recorded. This comprised three courses of bricks and measured 1.24 x 0.28 m. The structure was cut into alluvial clay (2012) and sealed by the layer of crushed brick (2017) which was seen across most of the site. This structure appeared have been heavily truncated. It is likely to be the remains of circular brick drain/soakaway dating to an earlier phase of activity associated with the railway.



Plate 5: Circular drain/soakaway (2042)

- 6.1.14 The Marcon Sewer (2041) was observed running east - west through (and continuing beyond) the work area. The top of the sewer was observed at a depth of 119.15 m ATD and the base approximately 118.09 m ATD. The sewer was formed of two courses of unfrosted red brick with a pale grey white lime mortar in a circular formation, with approximate dimensions of 1.5 x 1 m. The construction trench for the sewer (2046) was cut through the alluvial clay (2012). A deposit of clay, containing brick fragments, which had been generated as upcast during the construction of the sewer had been redeposited over the top of sewer as a backfill (2047). Approximately every 20 m a rectangular manhole associated with the sewer was observed.
- 6.1.15 At the northern limit of site, to the west of the existing Lord Hill's Bridge, a brick and concrete structure was observed (2043). This was built of dark red frosted bricks with yellow sand mortar overlain by a concrete slab. Adjacent to this was a brick structure constructed upon a concrete base with frequent brick inclusions. These structures appeared to be contemporary and may form the base of a platform.



Plate 6: Structure 2043

- 6.1.16 An additional structure (2051) was located 13 m to the east of the Crossrail Royal Oak Portal tunnel face. This was uncovered during ground reduction. It comprised of two parallel walls, running north-south and constructed upon a base of concrete. The walls were bonded with a pale grey-yellow sand mortar. Steel bolts c.0.5 m long were built into the wall spaced 1.6 m apart. The bolts ran the length of both walls. This structure had been heavily truncated at both its northern and southern end, thus its full original extent is unknown. As recorded the structure measured 12 m north - south with two walls c 0.3 m wide and 0.7 m apart and standing 0.54m high. Two cast iron service pipes ran through the structure at its southern limit, the nature of construction suggest a contemporary date. Running perpendicular to the course of the former tracks this structure is likely to have functioned as a service/utilities channel running beneath the rails, with the steel bolts being used to hold railway sleepers in place.



Plate 7: Service/Utilities channel (2051) from north

- 6.1.17 The entire site was covered with a layer of dark grey, silt ballast (2000) which almost certainly represented the last phase of track ballast on site. This in turn was partly covered by a modern tarmac road that represents the last phase of Pre Crossrail activity on site.

6.2 Finds

- 6.2.1 No finds were recovered during the program of works.

6.3 Environmental Sampling

- 6.3.1 Due to the absence of suitable deposits, no environmental samples were taken.

6.4 Constraints

- 6.4.1 The major constraints on the work, and thus the integrity of the stratigraphic record comprised; the tight time frame within which the work had to be completed, the degree of truncation, spatial restrictions (the work was conducted in congested work areas). Health and Safety issues, the trenches were often too deep to allow safe manual access, and the staged nature of the works, which was dictated by the construction process also,

constrained the level of archaeological work on site. Despite this the provision and method of excavation were deemed suitable and appropriate.

7 Assessment of Results in Relation To Investigation Aims

- 7.1.1 At each stage of this project, aims were established as part of the framework of investigation. After the completion of each stage the aims were re-examined and the results checked to see whether the general and site specific objectives had been achieved.
- 7.1.2 Although it is not intended to re-illiterate the detailed findings of this exercise they are briefly outlined below:
- *To identify and record the original Brunel foundations of Lord Hill's Bridge prior to their removal.*
- 7.1.3 A series of brick built abutments, built upon a concrete raft, and were uncovered beneath the present Lord Hill's Bridge. These were recorded by the on-site archaeologist. However, it was not possible to tell if they represent the remains of Brunel's original bridge. Although the stepped brick foundation is characteristic of Brunel's early GWR structures. The fact that they stood on a concrete base, which would be unusual for a bridge built at this time (1835-37), makes it more likely that the foundations date to the (northward) widening of the tracks in the late 19th century.
- *The presence or absence of Pleistocene deposits identified during previous excavations undertaken by OA/R to the west of Lord Hill's Bridge at Crossrail Royal Oak Portal should be confirmed.*
- 7.1.4 A series of laminated sands overlying a layer of brickearth, similar to the Pleistocene deposits uncovered during the Royal Oak Portal excavations, were observed and recorded during work to the west of Lord Hill's Bridge. Although Health and Safety issues made a detailed examination of the deposits impossible, they were clearly seen to slope upward towards the east.
- *To monitor the excavation and removal of the Marcon Sewer.*
- 7.1.5 The excavation and removal of the Marcon Sewer was monitored by the OA/R on site archaeologist and a full record was made of its form and construction methods.

8 Assessment of the Results

8.1 Period

- 8.1.1 The works revealed a series of Pleistocene deposits and a possible warm climate Holocene alluvial deposit.
- 8.1.2 The site also produced deposits and structural remains dating to the 19th and 20th centuries.

8.2 Relative Completeness

- 8.2.1 The uppermost sequence of the possible Pleistocene deposits had been truncated by the Marcon Sewer and Brunel's 2-3 m deep railway cutting.
- 8.2.2 To the east, the probable alluvial clay fill deposits were also truncated by the railway cutting and by the present and earlier brick abutments of the Lord Hill's Bridge.
- 8.2.3 The remains of the railway related structures, track sub-base deposits and the Lord Hill's Bridge abutments had all been partly removed by later railway works.

8.3 Condition

- 8.3.1 The surviving deposits and structures encountered were all in a reasonable state of preservation. All remains were incomplete (see above) but were not so fragmentary as to obscure their form and function. Brickwork was generally in good order and the deposits were uncontaminated.

8.4 Rarity

- 8.4.1 The laminated sands and Brickearth are almost certainly part of a sequence of Pleistocene deposits seen during excavations in the Crossrail Royal Oak Portal, some of which contained fossilised animal bones. Although fossiliferous deposits are known from Trafalgar Square and the Ismaili Centre in South Kensington, pre-Holocene deposits containing vertebrate fossils in central and west London are rare.
- 8.4.2 The remains of the bridge and the associated elements of railway architecture represent evidence of minor interest (though intrinsically unique) in relation to the sequence of GWR construction and replacement work at this location.

8.5 Group Value

- 8.5.1 The value of the earliest deposits from the Lord Hill's Bridge can be described as moderate to high. Primarily due to the survival of a sequence of Pleistocene deposits, associated with an assemblage of cold climate bedded fossil bearing silts and clay-silts, deposited within an undulation in the London Clay, with a sequence of low-energy fluvial deposits, potentially representing interglacial deposits sandwiched between them.
- 8.5.2 The value of the later deposits and structures site can be described as low. Although the area was of a reasonable size there was only a limited amount of in situ sequential deposition and what was present pertained to the mid 19th century development of the railways, of which this was only a small element.

9 Statement of Potential of Archaeology

- 9.1.1 The archaeological remains have little potential for further analysis or dissemination through formal publication.

10 Conclusions and Recommendations

- 10.1.1 London Clay deposits, which were seen at c.120.90m ATD in the western half of the Royal Oak Crossrail Portal, c. 200 m to the west of the Lord Hill's Bridge. And at c. 119.10 m ATD in a borehole to the east of the Bridge, were not observed during the Lord Hill's Bridge watching brief.
- 10.1.2 Instead the watching brief revealed deposits of yellowish brown clay (2012), which around the Lord Hill's Bridge abutments appeared to be at least partly re-deposited. Although its origins are unclear, deposit (2012) was possibly associated with the Westbourne River and is possibly the same deposit as the alluvial clay deposits noted during bore hole operations in the area (See above 3.22). To the west of the Bridge layer (2012) was seen to seal a laminated sand deposit (2035) which in turn covered a possible Brick earth deposit. These deposits similar to the Pleistocene deposits recorded during earlier work within the Crossrail Royal Oak Portal.
- 10.1.3 Due to Health and Safety considerations, only the course of the upper most of these probable Pleistocene deposits (2035) could be followed. This was seen rising up towards the east. This slope could represent the eastern edge of the channel/hollow observed during excavations at the Crossrail Royal Oak Portal, whose eastern extent was not found (Figure: 4).

- 10.1.4 If these deposits are in part of the Pleistocene feature/sequence seen in the Crossrail Royal Oak Portal site, which is described by Bates *et al* as being of “regional and national importance” (Bates *et al* 2013, 14). The Archaeological monitoring of any future excavation or borehole samples, which may provide further information on the extent and stratigraphic sequencing of these deposits, would be essential.
- 10.1.5 The local and regional significance of the early sequence seen at Lord Hill's Bridge rests both with the information it provides in terms of both the terrain modelling studies for past landscapes. Particularly the potential to define and characterise the eastern edge of the “channel” seen in The Crossrail Royal Oak Portal excavations, but also the evidence they can provide on the former extent of the Westbourne River. The information from this current work will be of great interest to those engaged now and in the future in studies of early Britain.
- 10.1.6 The watching brief works have provided evidence of bridge footings pre-dating the existing structure. The concrete base observed under both sets of the recorded brick bridge foundations would be unusual for the primary Lord Hill's Bridge (1835-37) although the stepped brick foundation is characteristic of Brunel's early GWR structures. It is therefore likely that the foundations date to the (northward) widening of the tracks in the late 19th century and the need to increase the span of the bridge.
- 10.1.7 The remains of Lord Hill's Bridge can be reasonably well dated by documentary and cartographic sources to the mid – late 19th century development of the GWR's terminus in west London. Although the maps and plans already examined provide a relatively detailed external plan for this structure, the excavation has provided information on the materials used, the construction techniques employed and the internal layout that would hitherto have remained unknown.
- 10.1.8 A series of layers of track sub base and ballast were uncovered during the programme of works. Other elements of railway architecture were also uncovered, including a brick lined soakaway, a utilities/service channel and the possible remains of a platform. Some of which are possibly the remains of structures show to the west of Lord Hill's Bridge on the 1914 Ordnance Survey map (Figure 5).

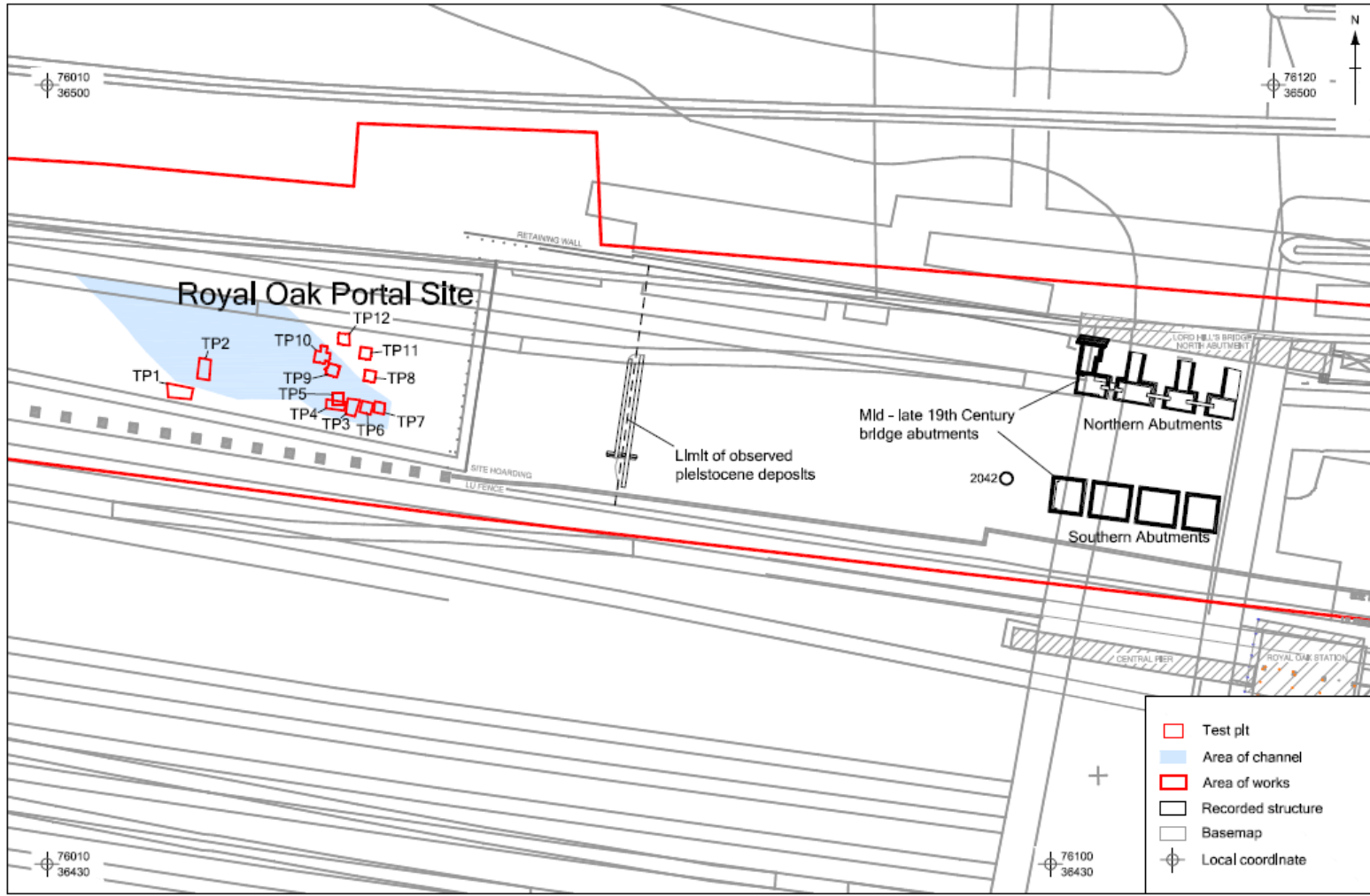


Figure 4: Crossrail - Lord Hill's Bridge

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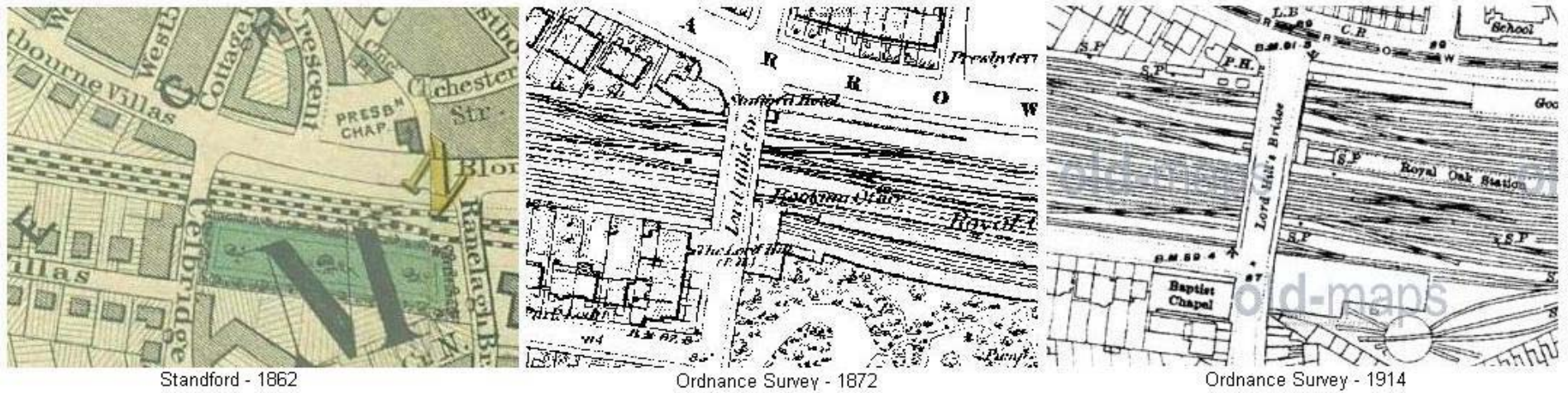


Figure 5: The evolution of Lord Hill's Bridge 1862-1914

11 Publication and Dissemination

11.1.1 The remains uncovered during the project are not of sufficient significance to warrant further publication.

12 The Archive

12.1.1 The complete project archive includes paper context records and indices, permatrace drawings, both black and white and colour photographs, digital plans and photographs.

12.1.2 These will be prepared following the guidelines set out in: *Guidelines for the preparation of excavation archive for long-term storage* (Walker, 1990).

12.1.3 All digital data will be temporarily stored on the server at Oxford Archaeology South offices, which is backed up on a daily basis. For long term storage of the digital data CDs/DVDs will be used and will include the reports, plans scanned images and digital photographs. Each disk will be fully indexed and accompanied by the relevant metadata as provenance.

The archive is currently held at;

Oxford Archaeology

Janus House

Osney Mead

Oxford OX2 0ES

And will be deposited with the Museum of London in due course.

Museum of London Archaeology

Mortimer Wheeler House

46 Eagle Wharf Road

London N1 7ED

Tel: 020 7410 2200

<http://www.museumoflondonarchaeology.org.uk>

13 Acknowledgements

Oxford Archaeology and Ramboll would like to thank Crossrail Ltd for commissioning the work and would also like to thank the Crossrail Project Archaeologist, Jay Carver for his support and guidance.

Thanks are also due to the staff of BFK for their essential on-site support during the work. With particular thanks to BFK's site surveyor [REDACTED].

Richard Brown and Andy Shelly managed the project for OA/R and John Boothroyd, and Gary Evans undertook the fieldwork.

The report was compiled by Gary Evans; and the illustrations produced by Leo Heatley and Hannah Kennedy. The report was edited by Richard Brown.

Appendix 1 Archaeological Context Inventory

Site Code	Context No.	Context Type	Category	Comment
XSI10	2000	Deposit	Layer	Compact, black grey, ballast silt, track sub base
XSI10	2001	Structure	Abutment	Northern brick abutment, addition to 2002
XSI10	2002	Structure	Abutment	Northern brick abutment
XSI10	2003	Structure	Wall	East-west aligned red brick wall on top of 2002
XSI10	2004	Structure	Wall	East-west aligned red brick wall on top of 2002
XSI10	2005	Structure	Wall	Red brick wall cut by manhole 2022
XSI10	2006	Structure	Wall	Red brick wall cut by manhole 2022)
XSI10	2007	Structure	Wall	Red brick wall on top of 2002
XSI10	2008	Structure	Abutment	Southern brick abutment
XSI10	2009	Structure	Abutment	Southern brick abutment
XSI10	2010	Structure	Abutment	Southern brick abutment
XSI10	2011	Structure	Abutment	Southern brick abutment
XSI10	2012	Deposit	Layer	Soft yellowish brown alluvial clay
XSI10	2013	Cut	Construction cut	Cut for construction of southern abutment foundations
XSI10	2014	Deposit	Fill	Backfill of cut 2014 surrounding southern abutment foundations
XSI10	2015	Cut	Robber cut	Cut for removal of 1830s brick foundations
XSI10	2016	Deposit	Layer	Dark grey black, ash silt ballast, track sub-base
XSI10	2017	Deposit	Layer	Crushed red brick, gravel sand, track sub-base
XSI10	2018	Structure	Concrete base	Concrete base for southern abutments
XSI10	2019	Structure	Abutment	Northern brick abutment, addition to 2020
XSI10	2020	Structure	Abutment	Northern brick abutment
XSI10	2021	Deposit	Fill	Backfill of robber cut 2015
XSI10	2022	Structure	Manhole	Brick manhole with ceramic drain
XSI10	2023	Structure	Concrete base	Concrete base for northern bridge foundations
XSI10	2024	Structure	Bridge	1910-1914 bridge
XSI10	2025	Group	Foundations	Northern brick abutments
XSI10	2026	Group	Foundations	Southern brick abutments
XSI10	2027	Cut	Construction cut	Construction cut for northern brick abutments
XSI10	2028	Deposit	Layer	Compact, yellow sand gravel
XSI10	2029	Deposit	Fill	Up-cast brownish yellow, sand clay, backfill of 2027

Site Code	Context No.	Context Type	Category	Comment
XSI10	2030	Structure	Wall	Narrow red brick wall along southern edge of 2008
XSI10	2031	Cut	Robber Cut	Cut for removal of 1830s brick foundations
XSI10	2032	Deposit	Fill	Backfill of robber cut 2032
XSI10	2033	Structure	Wall	Wall joining abutments 2036 and 2035
XSI10	2034	Structure	Wall	Wall joining abutments 2020 and 2035
XSI10	2035	Structure	Abutment	Northern bridge abutment
XSI10	2036	Structure	Abutment	Northern bridge abutment
XSI10	2037	Structure	Bridge	Concrete foundation of present bridge/cutting
XSI10	2038	Structure	Abutment	Northern abutment, addition to 2036
XSI10	2039	Structure	Wall	Wall of present railway cutting
XSI10	2040	Structure	Abutment	Northern abutment, addition to 2035
XSI10	2041	Structure	Sewer	Marcon Sewer
XSI10	2042	Structure	Soak away	Circular brick built soak-away
XSI10	2043	Structure	Siding	Abandoned platform/siding.
XSI10	2044	Deposit	Fill	Soft, sticky, grey blue silty clay, fill of soak-away 2042
XSI10	2045	Cut	Construction cut	Construction cut for soak-away 2042
XSI10	2046	Cut	Construction cut	Construction cut for Marco Sewer
XSI10	2047	Deposit	Fill	Up-cast, brownish yellow clay, backfill of sewer
XSI10	2048	Structure	Concrete base	Concrete foundation of walls [2049] and [2050]
XSI10	2049	Structure	Wall	Western wall of structure [2051]
XSI10	2050	Structure	Wall	Eastern wall of structure [2051]
XSI10	2051	Structure	Service Channel	Structure forming service/utilities channel
XSI10	2052	Structure	Siding	Abandoned platform or siding
XSI10	2053	Layer	Natural	Pleistocene sands
XSI10	2054	Cut	Construction Cut	Construction cut for [2051]

Appendix 2 Bibliography and References

- Bates, M. *et al* 2012 Early Devensian sediments and palaeo-environmental evidence from the excavations at the Royal Oak Portal, Paddington West London, UK. *Proc. Geol Association*
- British Geological Survey 1998 1:50000 series Sheet 256 North London
- Crossrail 2008 Westbourne Park and Royal Oak Portal Site Specific Archaeological Detailed Desk-Based Assessment. Document No. CR-SD-CT1-EN-SR-00002
- Crossrail 2011 SS-WSI addendum for Archaeological Targeted and General Watching Brief during Investigative Trial Holes and Abandoned Foundations Removal at Lord Hill's Bridge. Document No. C122-OVE-T1-RGN-CR076-PT001-50001
- Oxford Archaeology / Gifford 2011 Archaeological Targeted Watching Brief during Investigative Trial Holes and Abandoned Foundation Removal at Lord Hill's Bridge, Archaeology Method Statement. Document No. C254-OXF-T1-GMS-CRG03-50005
- Oxford Archaeology / Rambol 2012 Archaeological Watching Brief at Lord Hill's Bridge, Interim Report. Document No. C254-OXF-T1-RGN-CRG03-50116
- Oxford Archaeology/ Rambol 2013 Archaeological Watching Brief in the vicinity of Westbourne Park and Royal Oak Stations, Paddington, London Targeted and General Watching Brief Fieldwork Report. Document No. C254-OXF-T1-RGN-CRG03-50047

Appendix 3 Summary of Site Details

Client name: Crossrail Ltd

Site name: Lord Hill's Bridge

Site code: XSI10

Grid reference: TQ 257 815

Type of investigation: Targeted Watching Brief

Date and duration of project: 25th August – 16th January, 21 Weeks

Location of archive: The archive is currently held at OA, Janus House, Osney Mead, Oxford, OX2 0ES, and will be deposited with the Museum of London in due course.

Appendix 4 – SMR / HER / OASIS Record forms

OASIS DATA COLLECTION FORM: England

OASIS ID:	oxfordar1-127226
Project details	
Project name	Crossrail, Lord Hill's Bridge
Short description of the project	Starting late August 2011 and continuing through to early January 2012 Oxford Archaeology/Gifford (OAG) carried out a Targeted Watching Brief on the land under and adjacent to Lord Hills Bridge, Paddington. The work was undertaken on behalf of Crossrail prior to stabilisation and tunnelling works. The excavations revealed two sets of brick foundations associated with the original Lord Hills Bridge constructed by Brunel during the 1830s. The Marcon sewer was observed passing E-W longitudinally through the area of investigation. Pleistocene deposits were recorded at the western limit and terminated within the area of investigation. Additional structures identified during ground reduction work included a suspected modern utilities trench.
Project dates	Start: 20-08-2011 End: 15-01-2012
Previous/future work	No / Not known
Any associated project reference codes	XSI 10 - Sitecode
Any associated project reference codes	XSI 10 - Museum accession ID
Type of project	Recording project
Site status	None
Monument type	NONE None
Significant Finds	NONE None
Investigation type	'Watching Brief'
Prompt	Schedules 9, 10 and 15 and the Environmental Minimum Requirements



	(EMR) of the Crossrail Bill
Project location	
Country	England
Site location	GREATER LONDON CITY OF WESTMINSTER PADDINGTON BAYSWATER AND KNIGHTSBRIDGE Lord's Hill Bridge
Study area	414.00 Square metres
Site coordinates	TQ 6112 6466 51.3575970986 0.314346391529 51 21 27 N 000 18 51 E Point
Project creators	
Name of Organisation	Oxford Archaeology
Project brief originator	Crossrail
Project design originator	Oxford Archaeology/Gifford
Project director/manager	R. Brown
Project supervisor	J Boothroyd
Project archives	Oxford Archaeology
Physical Archive recipient	Museum of London
Physical Archive ID	XSI 10
Physical Contents	'Ceramics'
Physical Archive notes	bricks
Digital Archive recipient	Oxford Archaeology
Digital Archive ID	XSI 10
Digital Contents	'Stratigraphic'
Digital Media available	'Images vector', 'Text'
Paper Archive recipient	Museum of London
Paper Archive ID	XSI 10
Paper Contents	'Stratigraphic'
Paper Media available	'Context sheet', 'Diary', 'Matrices', 'Photograph', 'Report', 'Section', 'Unpublished Text'
Project bibliography	
Publication type	A forthcoming report
Title	Archaeological Watching Brief at Lord's Hill Bridge
Author(s)/Editor(s)	Boothroyd J
Date	2012



Issuer or publisher	Crossrail
Place of issue or publication	unknown
Description	Client report
Entered by	Nicola Scott (n.scott@oxfordarch.co.uk)
Entered on	24 May 2012

OASIS:

Please e-mail [English Heritage](#) for OASIS help and advice

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