C131 - PADDINGTON INTEGRATED PROJECT

ARCHAEOLOGY SITE-SPECIFIC WRITTEN SCHEME OF INVESTIGATION

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C131 - Paddington Integrated Project

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☐	Code 2.	Not Accepted. Revise and resubmit. Work may proceed subject to incorporation of changes indicated
☐	Code 3.	Not Accepted. Revise and resubmit. Work may not proceed
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1 Executive Summary

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

The strategy for developing the next stage of evaluation has been developed in the Crossrail Generic Written Scheme of Investigation (WSI) (Crossrail 2008f); it presents the strategy for archaeology design, evaluation, mitigation, analysis, dissemination and archive deposition that will be adopted for the design and construction of Crossrail. The Generic WSI provides a general statement of objectives, standards, and structure for the planning and implementation of archaeological works (Feb 08, version 1.0 section 3).

This site specific WSI addresses the works required for C131 Paddington Integrated Project (hereafter referred to as PIP). The archaeological specification for C130 Paddington Station are set out in the site specific WSI Document No. C130-SWN-Z-RSI-B071-00001. The location of the PIP worksite is shown on Figure 1.

PIP has been established to deliver an integrated proposal for the northern part of Paddington Station, incorporating the aspirations of CRL, London Underground (LU), Network Rail (NR) and Transport for London (TfL). The PIP proposal occupies an area on the north side of the mainline Paddington Station, which consists of:

- The LU Hammersmith & City (H&C) line station (under license to LU from NR)
- The Triangle site – bounded by Bishops Bridge Road Bridge, the towpath of the Grand Union Canal and the H&C station; and
- The remainder of the site, which forms part of the existing NR freehold (primarily as the London Street Deck site)

The PIP scheme proposes the following:

- A ramp from Bishop's Bridge Road Bridge to provide access to the taxi facility;
- A taxi facility on the London Street Desk including Vertical Circulation Core (VCC) at the eastern end connecting the taxi facility to the eastern end of Paddington station adjacent to Platform 12;
- A reconstructed H&C Line station;
- Improved pedestrian access to Paddington station from the canal towpath including a new entrance that will also provide access to the new H&C station; and
- Provision to accommodate a future commercial development over the ramp, part of the H&C station and other parts of the Triangle site.

At the PIP Triangle Worksite constraints on the Critical Path programme has necessitated a design change since the previous issue of this SS-WSI. The proposed trial trench evaluation (PSC04 Activity ID AAPIP10150) has been replaced by a Targeted Watching Brief on the area of archaeological potential;

- Targeted Watching Brief (TWB) will be undertaken during the C271 ground reduction of the upper triangle site to identify and record the extent and survival of any

archaeological remains, in particular those associated with the construction of the Grand Union Canal and Great Western Railway (including the upper goods yard and GWR Coal Depot) that would be removed by ground reduction of the upper triangle site from c.129m ATD to 125m ATD.

During the C272 Main Works Package intrusive construction activities including excavation of the escalator and lift shaft bases, thickened slabs along new wall lines, new drainage runs and new manholes/inspection chambers, have the potential to disturb or remove sections of a granite sett surface laid during the 1908-1912 construction of the milk ramp and fourth span works. The granite setts are listed as part of the curtilage of the Grade I Paddington Station structure and will require archaeological monitoring and recording comprising a programme general and targeted watching brief. The purpose of the watching brief will be to identify, expose and record the granite sett surface which survives at *c.* 122.5m ATD and any associated archaeological remains.

This SS-WSI addresses the scope, specification, timing and order of works and the deliverables required to successfully integrate the archaeological aspects of the works into the project phasing.

Glossary of Abbreviations

ATD	Above Tunnel Datum
CRL	Crossrail Ltd
GLSMR	Greater London Sites and Monuments Record
OSBM	Ordnance Survey Bench Mark
TBM	Temporary Bench mark
PGM	Permanent Ground Marker

2 Project Background

2.1 Introduction

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

2.1.2 The strategy for archaeological works has been set out in the Crossrail Generic Written Scheme of Investigation (WSI) (Document Reference 14022008-44ES-P2Z). 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.

2.1.3 This site specific WSI addresses the archaeological works required for C131 PIP contracts C271 Piling and Groundworks Package and C272 Main Works Package.

2.2 Purpose and Objectives of the SS-WSI

2.2.1 The purpose of this site-specific WSI is to describe the PIP construction impacts on the archaeological and Non-listed Built Heritage resource; to summarise the local baseline archaeological conditions and specify in detail the archaeological mitigation measures required for the site, including the priority, order and timing of the archaeological works within the overall construction programme.

2.2.2 The specific objectives for the SS-WSI are set out in the Archaeology Specification for Site-Specific WSIs. Document Number: CR-PN-PRW-EN-PD-00009 (Crossrail, 2008f) and restated below:

- To define the specification for the archaeological work, the recording that is required, and the collection and disposal strategy for finds;
- To set out the scope of archaeological work in sufficient detail for it to be quantified, implemented and monitored;
- To reflect the nature of archaeological remains likely to be found and the nature of the development impact, whilst allowing sufficient flexibility for variable site conditions;
- To comply with the controls set out in the Environmental Minimum Requirements (EMR) for Crossrail, including the requirement on the nominated undertaker to use reasonable endeavours to adopt mitigation measures that will further reduce any adverse environmental impacts caused by Crossrail, insofar as these mitigation measures do not add unreasonable costs to the project or unreasonable delays to the construction programme.

2.2.3 In accordance with Crossrail Policy, 'archaeology' is taken to include resources below-ground (including remains of archaeological, palaeo-environmental and quaternary geological importance) and above-ground non-listed built heritage structures (Crossrail, 2008h).

2.3 Site Description

2.3.1 The Paddington Integrated Project has been established to deliver an integrated proposal for the northern part of Paddington Station, incorporating the aspirations of CRL, London Underground (LU), Network Rail (NR) and Transport for London (TfL). The PIP works are proposed to occupy an area on the north side of the mainline Paddington Station, which consists of:

- The LU Hammersmith & City (H&C) line station (under license to LU from NR);
- The Triangle site – bounded by Bishops Bridge Road Bridge, the towpath of the Grand Union Canal and the H&C station; and
- The remainder of the site, which forms part of the existing NR freehold (primarily as the London Street Deck site);

2.3.2 The PIP scheme comprises the following:

- A ramp from Bishop's Bridge Road Bridge to provide access to the taxi facility;
- A taxi facility on the London Street Desk including Vertical Circulation Core (VCC) at the eastern end connecting the taxi facility to the eastern end of Paddington station adjacent to Platform 12;
- A reconstructed H&C station;
- Improved pedestrian access to Paddington station from the canal towpath including a new entrance that will also provide access to the new H&C station; and
- Provision to accommodate a future commercial development over the ramp, part of the H&C station and other parts of the Triangle site.

2.3.3 The location of the PIP worksite is shown on Figure 1.

2.3.4 The London Street Deck and the Hammersmith and City Line station form part of the curtilage of the Grade I Listed Paddington Station; and as such the works in those locations are not considered further in this document. The Triangle Site (Figure 2) falls under no heritage designation (Crossrail 2009c).

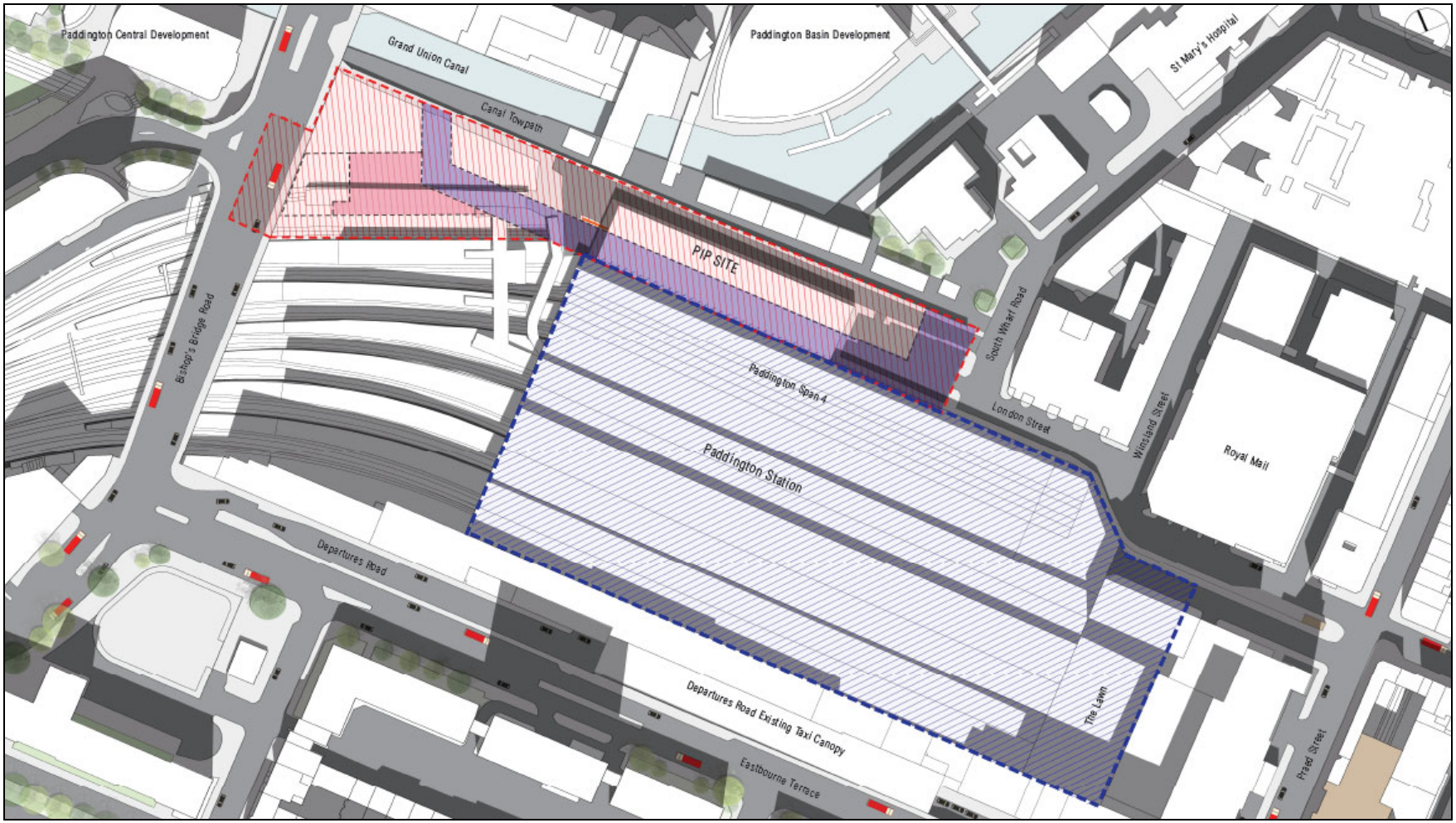

Figure 1 PIP Worksite

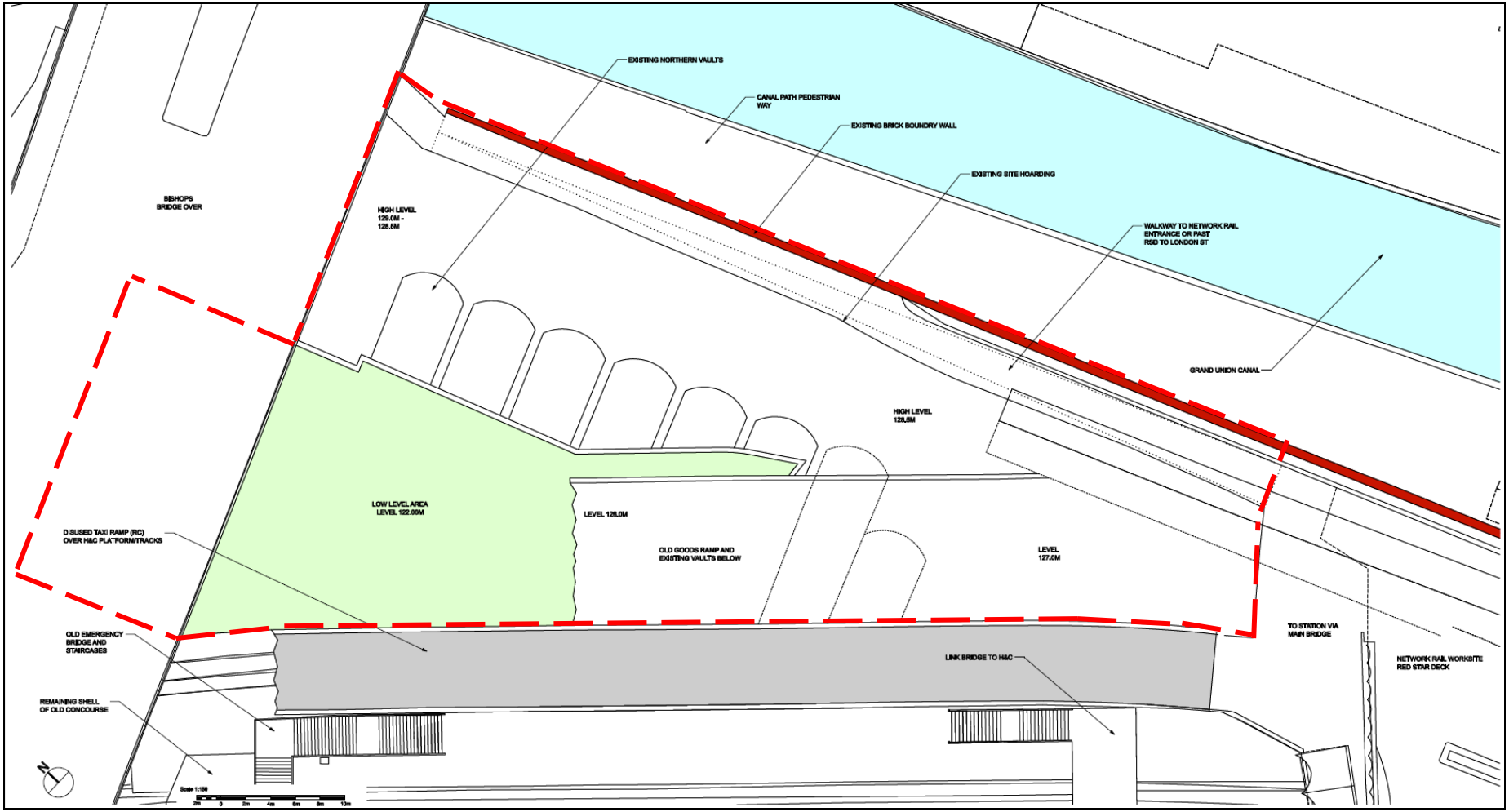

Figure 2 PIP Triangle Site (prior to start of works)

2.4 Summary of Previous Crossrail Studies

Previous Ground Investigations

2.4.1 Ground investigations were carried out by Soil Consultants Ltd in 2007 in relation to the Paddington Triangle Development and comprised three cable-percussion boreholes; a series of eight hand-dug trial pits; and a small diameter horizontal core through the back wall of one of the vaults (see section 2.5 for further information regarding the results of these investigations).

Package 16A Ground Investigations

2.4.2 Package 16A ground investigations are currently ongoing. However, the preliminary logs from early boreholes have been provided and are considered in the description in section 2.7 below.

Package 17a Watching Brief

2.4.3 Archaeological monitoring of Ground Investigation works, Package 17a, has been carried out at 4-18 Bishops Bridge Road. The results have been reported in the MoLA document and incorporated into the WSI as required. The full results of this investigation are reported in:

Crossrail 2009a. MDC2 Archaeological Monitoring of Ground Investigations, Package 17a, Test Pit 208, January 2009.

2.5 Geology and Topography

2.5.1 The PIP site is located between Paddington Station and railway tracks to the south, Bishops Bridge Road to the west, the Grand Union Canal to the north and London Street to the east. Incremental development and redevelopment of the site since the mid 1800s has resulted in the highly varied topography of the Triangle Site (Figure 3) today, which is currently arranged on two levels - the upper level covers about two thirds of the site area and is approximately at the same level as London Street (c. 128m ATD), the lower level is approximately 6m lower (122m ATD) and at a similar level to the railway platforms to the south (Soil Consultants Ltd 2007). The historic development of the site is detailed in section 2.6.

2.5.2 Lynch Hill Terrace Gravels overlie much of the Paddington area. These were recorded at a height of c.123m ATD to 123.5m ATD in Eastbourne Terrace and Praed Street, respectively. The superficial River Terrace Deposits vary in thickness across the site.

2.5.3 2007 ground investigations by Soil Consultants Ltd, comprising three cable-percussion boreholes; a series of eight hand-dug trial pits; and a small diameter horizontal core through the back wall of one of the vaults were carried out within the Triangle Site (Figure 3).

2.5.4 The investigation confirmed the general sequence of Made Ground and Terrace Deposits overlying London Clay. Made Ground was encountered in all boreholes and trial pits to a maximum depth of 5.6m Below Ground Level (BGL) in BH4, probably due to the construction of various retaining walls, vaults and the shunt tunnel. However, in BH3,

there was only 1.7m of Made Ground overlying potentially undisturbed terrace deposits, exhibiting a sequence of alluvial sandy clays (possibly brickearth) up to 7.2m BGL (121.5m ATD). A 0.3m thickness of possible brickearth was also encountered underlying Made Ground in BH4. Deposits of this type were not encountered in BH1 or any of the trial pits.

2.5.5 Preliminary borehole logs from Package 16A (boreholes P26; 27; and 29) also demonstrate surviving alluvial and river terrace deposits within the upper triangle area. Table 1 shows the deposit survival within the PIP triangle site.

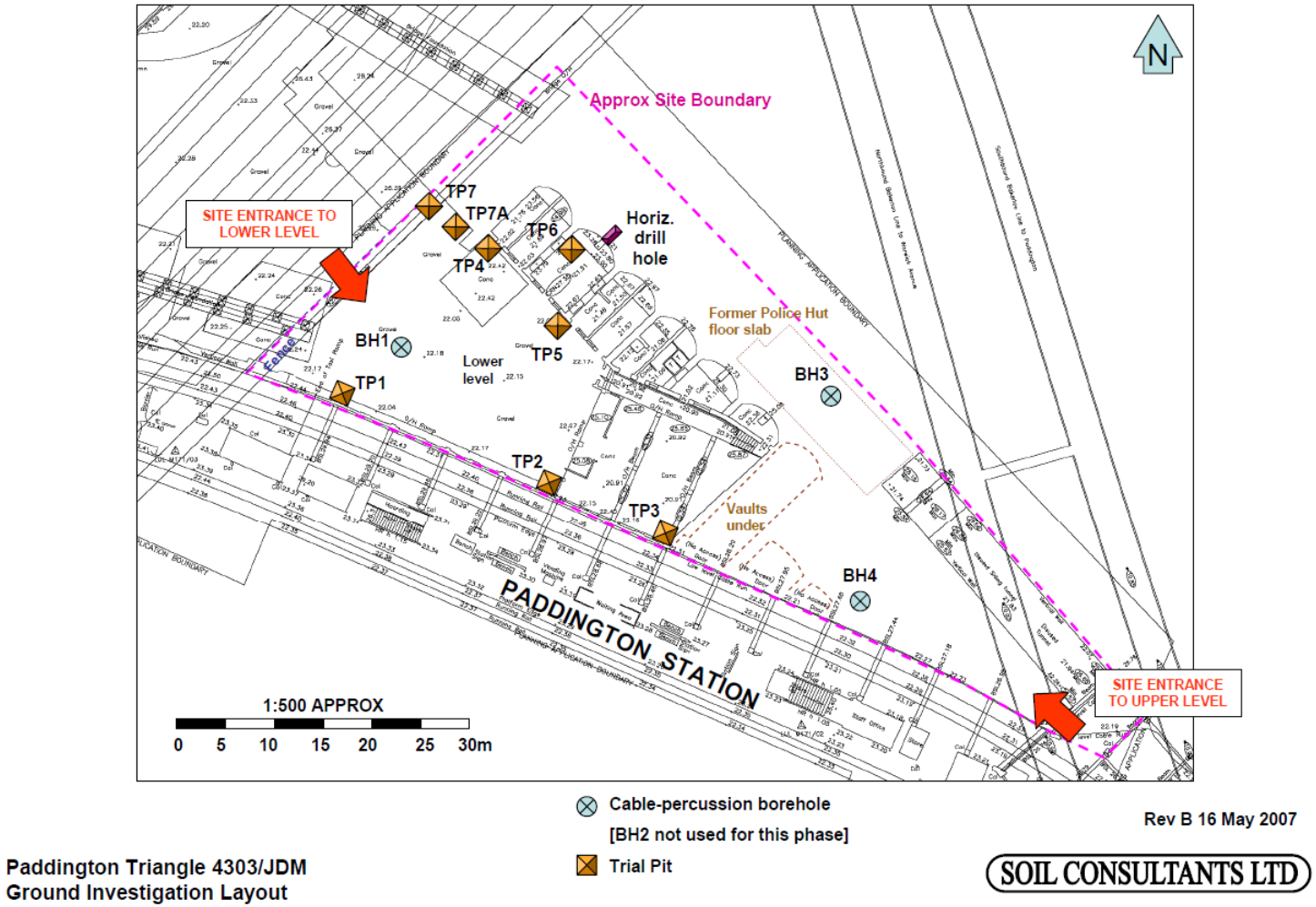

Figure 3 Location plan of 2007 Ground Investigations (Soil Consultants Ltd 2007)

2.6 Archaeological and Historical Development of the Site

2.6.1 There is no evidence of prehistoric or Roman deposits recovered to date within the vicinity of Paddington Station.

2.6.2 Paddington evolved from a medieval village into a suburb within central London, situated on the junction of Roman Watling Street and the road to Harrow. During the 16th and 17th centuries it was still a small settlement centred around a village green. In 1756 Marylebone Road was constructed to connect Islington to Paddington and this gave rise to increased housing, commercialism and industrialisation of the area, particularly with the construction of the Grand Union Canal in 1801. A water conduit is located in Westbourne Terrace and is associated with the diversion and culverting of the Westbourne River.

2.6.3 The PIP site comprises the London Street Deck ('Red Star Deck'), built in 1908-12, the Hammersmith and City Line Station, opened in 1933, and the Triangle Site, bounded by Bishops Bridge Road, the Grand Union Canal towpath and the H&C Line Station. Refer to Annex 4 for a detailed description of the historic development of the PIP triangle site.

2.6.4 Paddington Station was built in a cutting with the embanked Grand Union canal located immediately to the north. Prior to 1845, the PIP site was occupied by the canal embankment, the cutting, and an approach ramp from London Street to the passenger and goods shed.

2.6.5 The following historic construction activities will have partially or completely removed archaeological deposits:

- Construction of the cutting - Boreholes at track level within the cutting demonstrate that archaeological deposits have been truncated to the level of the London Clay (see section 2.5).
- Construction of new ramps and vaults into the existing canal embankment - Boreholes in the lower triangle area demonstrate that archaeological deposits have been completely truncated.
- Construction of the London Street area - Boreholes at track level in the lower triangle demonstrate that archaeological deposits along London Street have probably been completely truncated.
- Bishops Road Bridge - The construction of the original, 1930s and current 2005 bridges will have partially or completely truncated archaeological deposits at the locations of its footings and piers.
- The Shunt Tunnel – construction of the shunt tunnel will have completely removed archaeological remains within its footprint.

2.6.6 Boreholes in the upper triangle area encountered a sequence of alluvial sandy clays which suggest that the top of the canal embankment probably represents the original ground level of the site,

2.6.7 The historic development of the site (see Annex 4) and borehole data from the upper triangle area demonstrates that the canal embankment, although partially truncated in the late 19th century by the construction of a goods depot ramp, has survived in part. The embankment probably represents the ground level of the area prior to the railway cutting

being excavated, which is now roughly at the level of the upper part of the Triangle Site. Therefore archaeological deposits could survive within the upper triangle in the area northeast of the vaults (Figure 4). Geotechnical boreholes (P26; 27; 29; and BH3) from the upper triangle demonstrate surviving alluvial/terrace deposits (possibly brickearth). Similar brickearth deposits were also identified on the opposite side of the canal during geotechnical investigations (MLO71037).

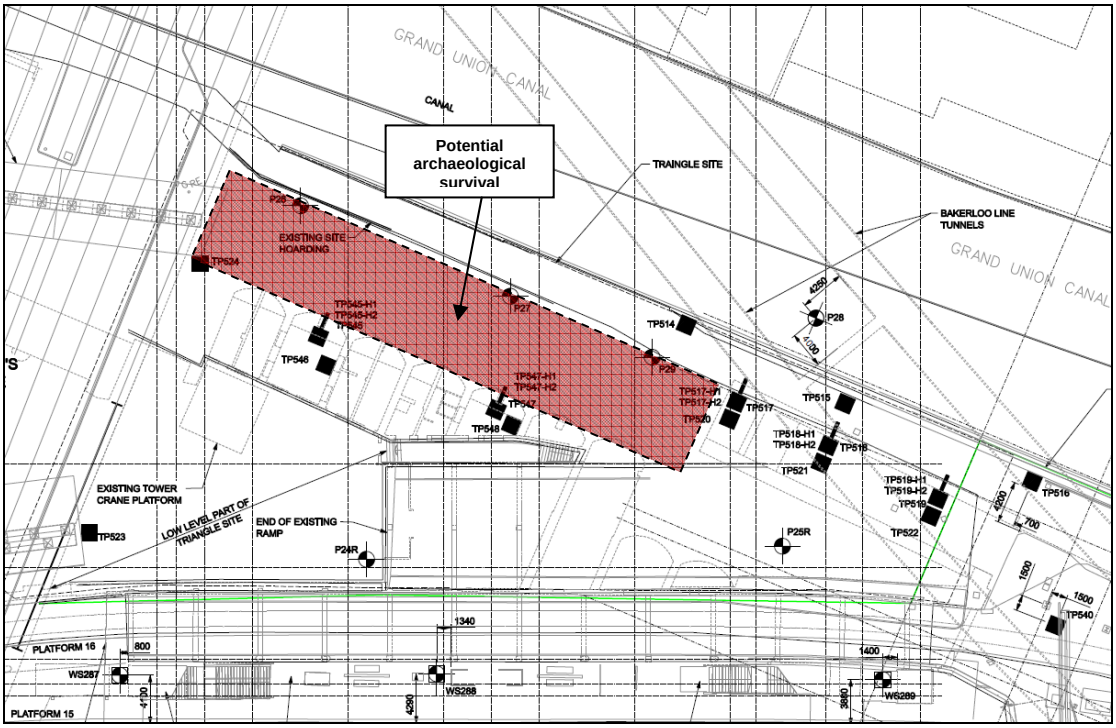

Figure 4 Approximate area of archaeological potential

2.7 Deposit Survival

PIP Triangle Site

2.7.1 Table 4 below sets out the borehole data from within the PIP Triangle Site, the locations of which are shown on Figure 3.

Table 1 Borehole data from within the PIP Triangle site

Borehole/ Test Pit	Location	Ground Level	Base of Made Ground	Base of River Terrace Deposits (Natural Surface)	Notes
P29A	Upper Triangle	128.74	125.44	124.04	Made Ground (brick, gravel, concrete) and layers of organic odour mixed layer (possible redeposited alluvium), atop alluvial deposits (brickearth) overlying Lynch Hill Gravel
P26A	Upper Triangle	128.84	126.84	123.39	Made Ground (brick, gravel, concrete) and layers of organic odour mixed layer (possible redeposited alluvium), atop alluvial deposits (brickearth) overlying Lynch Hill Gravel
P27	Upper Triangle	128.64	126.34	124.44	Made Ground (brick, gravel, concrete) and layers of organic odour mixed layer (possible redeposited alluvium), atop alluvial deposits (brickearth) overlying Lynch Hill Gravel
BH3	Upper Triangle	128.7	127	121.5	Made ground (mixed sandy clay with ash and concrete fragments) over sandy clay (brickearth)
P28	Towpath	130.07	127.57	123.67	Made ground (brick, mixed blackened wood fragments, strong organic odour) overalluvial deposits (brickearth) overlying Lynch Hill Gravel
BH1	Lower Triangle	122.3	118.6	None	Made ground (brown sandy rubble, brick), onto London Clay

2.7.2 The boreholes in Table 1 demonstrate that no archaeological deposits survive in the lower triangle, but that the upper triangle has not been significantly truncated by the incremental development in the area. The upper triangle therefore demonstrates a potential for post-medieval archaeology relating to the industrial development of the site, including the construction of the Grand Union Canal, Brunel's Railway and the Great Western Coal Depot. There is also a potential for earlier archaeological deposits from the prehistoric to medieval periods cut into the brickearth deposits.

C272 Platform 12 and Vertical Circulation Core

2.7.3 Three trial pits excavated as part of the Package 16A ground investigation revealed evidence for a granite sett floor surface surviving within the curtilage of the listed station structure. The trial pits (TP527, TP543 and TP544) were located in the back of house area to the north of Platform 12 (Figure 5) in the vicinity of the former milk ramp.

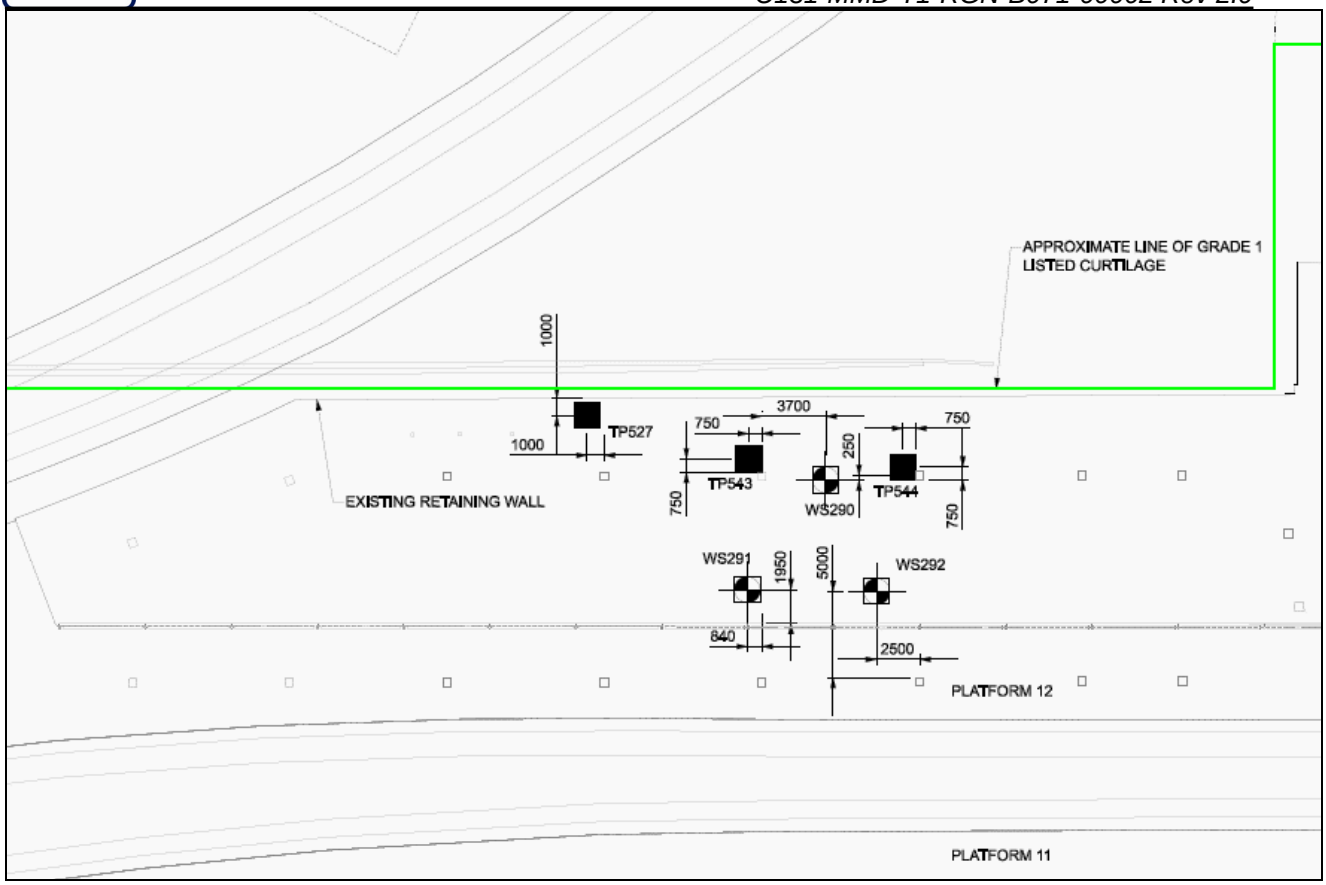

Figure 5 Trial pit location plan

2.7.4 The three trial pits revealed a uniform stratigraphic sequence of made ground bisected by the granite setts surface which survive at approximately one metre below the existing ground level and overlie a strong concrete slab. The deposit sequence of the trial pits is summarised below in Table 2.

Table 2 Trial pit deposit sequence from Platform 12 and VCC area

Deposit Description	Top of Deposit and (Thickness)
Black non cement screed with coarse ash and clinker over strong light grey concrete. **Made Ground**.	*c.*123.53m ATD (200mm)
Reddish yellow fine to coarse sand, over dark brown and black gravelly fine to coarse sand with clinker, brick, flint, coal, sandstone, glass and slag inclusions. **Made Ground**.	123.33m ATD (850 - 880mm)
Dark grey igneous setts with tar mortar.	122.45 – 122.48 m ATD (100 - 150mm)
Reddish yellow fine and medium sand. **Made Ground**.	122.43m ATD (20 - 50mm)
Strong light grey concrete. **Concrete Slab**.	122.38 - 122.41m ATD (200 - 260mm)
Yellow slightly gravelly sand. **Made Ground**.	121.99 – 122.13m ATD (350 - 1040mm)

2.7.5 The granite setts and concrete slab are likely to represent the carriage way surface at the base of the milk ramp which was laid between 1908 and 1912 as part of the London Street Deck and Fourth Span improvements to the station. The surface may have extended along the complete length of the back of platform twelve allowing access for milk carts to load and unload milk churns directly from the platform edge.

Archaeological Potential

2.7.6 There is **low potential** for Palaeolithic remains in the area. If located, any features or artefacts will have a **low importance** if they are redeposited; this may become **high importance** if significant in situ remains were present (although on current evidence this is considered to have a low probability).

2.7.7 There is a **low** to **medium potential** for Roman or medieval remains to be located although these would have a **moderate** to **high importance** were they to be identified. NB. Possible medieval dumping was identified in TP208 during Package 17A Ground Investigations at Bishops Bridge Road (Crossrail 2009a).

2.7.8 There is a high potential for post-medieval archaeology relating to the construction of Brunel's Railway to be located within the construction area, and of earlier railway works in general. Where this can be positively dated to be part of Brunel's construction these remains are likely to be of **moderate** to **high importance**.

3 Construction Impacts and Mitigation

Summary

3.1.1 The PIP scheme comprises:

- A ramp from Bishop's Bridge Road Bridge to provide access to the taxi facility;
- A taxi facility on the London Street Deck including Vertical Circulation Core (VCC) at the eastern end connecting the taxi facility to the eastern end of Paddington station adjacent to Platform 12;
- A reconstructed Hammersmith & City (H&C) Line station;
- Improved pedestrian access to Paddington station from the canal towpath including a new entrance that will also provide access to the new H&C station; and
- Provision to accommodate a future commercial development over the ramp, part of the H&C station and other parts of the Triangle site.

3.1.2 The PIP worksites broadly comprise:

- The LU H&C line station (under license to LU from NR)
- The Triangle site – bounded by Bishops Bridge Road Bridge, the towpath of the Grand Union Canal and the H&C station; and
- The remainder of the site, which forms part of the existing NR freehold (primarily as the London Street Deck site).

3.1.3 The PIP construction works are being undertaken in two contract packages; C271 Piling and Groundworks Package which includes the demolition and foundation enabling works at the PIP Triangle Site and existing H&C Line Station and C272 Main Works Package which comprise the construction of the new LU Hammersmith & City Line Station, Network Rail taxi deck and Vertical Circulation.

C271 Works Construction Sequence

Site set-up and initial ground works

3.1.4 This stage involves site set up and preparation to the point that bulk excavation can be carried out. Activities at this stage comprise:

- Construct new boundary retaining wall
- Alterations to Shunt Tunnel
- Demolish vaults
- Demolish remaining section of old Goods Ramp

3.1.5 Further information regarding these activities is set out below.

Retaining Wall

3.1.6 A secant pile wall will be constructed to allow excavation and construction of the ramp and Over Site Development (OSD) foundations at basement level (in a later phase after the PIP Crossrail works have been completed). The piled wall will consist of hard/soft secant piles (supported with a mid-height bench) Bulk excavation of the Triangle Site will partially or completely remove archaeological deposits within its footprint, if present.

Shunt Tunnel

3.1.7 Alterations to the shunt tunnel, currently comprising either partial demolition, filling and piling, would affect non-listed built heritage, see Table 3 for further details.

Vaults to be Removed

3.1.8 All the vaults in the Triangle Site are to be completely demolished, resulting in a loss of non-listed built heritage assets. See Table 3 for further details regarding non-listed built heritage.

Remaining Goods Ramp

3.1.9 The goods ramp is to be removed to allow the foundation works and new taxi ramp construction resulting in a loss of non-listed built heritage assets. There will be no archaeological deposits affected by the demolition of the goods ramp. Refer to C131 Paddington Integrated Project Heritage Statement, Listed Building Consent, Application Form ref. WES/4/2/H2. Document Number C131-MMD-T-XST-B071-00008 regarding mitigation for the listed elements of the Goods Ramp to be removed.

Bulk Excavation

3.1.10 Following on from construction of the retaining secant pile wall, the ground in-between the northern vault and the secant pile wall will be reduced to c. 125m ATD. A row of sheet piles will then be pressed in parallel to the secant pile wall. The northern vaults will then be demolished and the area of the Triangle Site to the south of the sheet pile wall will be reduced to c. 122m ATD. Note: The strip of site in-between the secant pile wall and the row of sheet piles is to remain at c. 125m ATD as a 'bench' to support the secant pile wall.

Demolitions

3.1.11 The following structures will be demolished within the triangle site:

Table 3 Demolitions within the Triangle Site

Feature	Location
Northern vaults	Adjacent to the new site accommodation area.
Old goods ramp	Adjacent to the LU H&C boundary wall (already partially demolished)
Vaults east of goods ramp	Concrete vaults under goods ramp area
Partial demolition of the shunt tunnel	West and south wall to be partially demolished

Further work within the Triangle Site

3.1.12 Main works within the Triangle Site, including main piling and foundations, construction of the H&C Line station and new taxi ramp will either take place after potential archaeological deposits have been truncated by ground reduction to 122m ATD or for areas reduced to 125m ATD potential archaeological deposits will not be further disturbed. Following completion of the ground reduction, construction impacts within the triangle site will not require further archaeological mitigation and are therefore not discussed further in this SS-WSI.

C272 Main Works

3.1.13 Other construction activities relating to PIP, such as the works affecting the London Street Deck and the construction of the Vertical Circulation Core (VCC) are to be carried out within the curtilage of the Grade I Listed Paddington Station. Refer to C131 Paddington Integrated Project Heritage Statement, Listed Building Consent, Application Form ref. WES/4/2/H2. Document Number C131-MMD-T-XST-B071-00008 (Crossrail 2009) for details regarding impacts to the Listed Building and proposed mitigation measures.

3.1.14 The C272 main works will provide a new passenger access from the new taxi facility on the Red Star Deck and a new concourse area with Network Rail facilities, plant rooms and retail storage immediately north of Platform 12 in the existing back of house area.

3.1.15 The works will comprise the demolition of the existing milk ramp and the construction of new drainage, new fixed stairs, two escalators and lifts constructed within new openings in the Red Star Deck. A new concrete floor slab will also be required across the back of house area. To facilitate construction of the VCC the existing left luggage facility and retail storage space will have to be removed and relocated.

3.1.16 The C272 platform 12 and VCC works are anticipated to be undertaken in 12 stages as set out in the Construction Programme (C272) – Construction Sequences (Document No. C131-MMD-C-PPT-B071-00003 Rev. 1.0). Intrusive construction impacts requiring archaeological mitigation are anticipated during the following stages which relate to excavation required in the vicinity of Platform 12:

<u>Stage 3</u>

- Saw cut floor slab, breakout, blind waterproof and concrete GL13-11 and install drainage.

<u>Stage 4</u>

- Saw cut floor slab, breakout, blind waterproof and concrete GL11-5 and install drainage.

<u>Stage 5</u>

- Saw cut floor slab, breakout, blind waterproof and concrete GL5-3 and install drainage;
- Install drainage pipes, interceptor manholes; and
- Form escalator pit base and drainage.

Stage 6

- Saw cut floor slab, breakout, blind waterproof and concrete in area of Milk Ramp; and
- Form lift pit base and install drainage.

4 Aims and Objectives

4.1 Research Aims

4.1.1 Selected research themes derived from A Research Framework for London Archaeology 2002 (Nixon et al, 2003) are included in the Assessment of Archaeology Impacts Technical Report (Crossrail 2005). Archaeological investigation and mitigation in the Crossrail worksites at Paddington Station have the potential to contribute to the research themes set out below:

- Understanding the evolving character of development in central London between Westminster and the City, and Southwark.
- Examining the concept of core/periphery for different periods in London's past, as a means of understanding a settlement and its environs, a city and its hinterland.
- Contributing to our understanding of the creation of the London suburbs.
- Understanding the reasons for evolution of the road systems, street layouts, river crossings and ferries, and their importance as engines of development and change.
- Understanding how water supply and drainage provision were installed and managed.

4.2 Objectives of the Investigation

4.2.1 The fieldwork priorities for the works will be to recover data that addresses the following research objectives of importance to this landscape. These are:

- To record the landscape development (i.e. land construction) through assessment of the soil stratigraphy, including the definition of any surviving Brickearth deposits;
- To define levels of landscape change due either to environment and climate or human interaction;
- To define and record the development of Brunel's railway and associated works;
- To define and record surviving elements of Victorian vernacular architecture both above and below ground; and
- To determine the significance of the non-listed built heritage.

5 Scope of the Investigation

5.1.1 The historic development of the PIP site is summarised in Section 2.6 of this SS-WSI and in Appendix 4 of this document. The potential for the survival of archaeological remains is described in Section 2.7.6 above.

General Requirements for Main Contractors

Site Accommodation and Facilities

5.1.2 For each works package the Main Contractor shall provide the following site accommodation facilities for the use of archaeological operatives, inclusive of any hardstanding and services required:

- Welfare and mess facilities (including power, water and lighting);
- Toilets, with drying and washing facilities;
- First Aid;
- Storage for small plant and tools; and
- Temporary office including 1 No. desk space for the use of the C254 lead archaeologist complete with furniture.

5.2 Archaeology – C271

C271 Upper Triangle Site Targeted Watching Brief

5.2.1 Targeted watching brief is a design change from proposed trial trench evaluation (PSC04 Activity ID AAPIP10150) described in Revision 1.0 of this SS-WSI. Since issue of the previous version of the SS-WSI Critical Path programme constraints have necessitated a change to the archaeological design. The design change was agreed at a meeting held between the Crossrail Site Manager, PDP Archaeologist and FDC Archaeologist for PIP on the 4th August 2010.

5.2.2 The details of the design change and scope of the Targeted Watching Brief and the requirements of both C271 Main Contractor and C254 Archaeological Contractor are presented in an addendum to this SS-WSI (Document No. C131-MMD-T1-RGN-B071-00003 – Rev. 2.0).

5.2.3 English Heritage Greater London Archaeological Advisory Service officer for the London Borough of Westminster has been consulted and has accepted the design change and targeted watching brief methodology.

5.2.4 Any further requirement for archaeological mitigation will be informed by the results of the Targeted Watching Brief and the any archaeological mitigation design prepared and issued in a subsequent revision to this SS-WSI or in the form of an addendum document.

5.3 Archaeology – C272

Specific Requirements for Main Contractor

Platform 12 and Vertical Circulation Core

5.3.1 As noted above the granite sett surface identified in package 16A trial pits in the back of house area to the north of Platform 12 falls within the curtilage of the Grade I listed Paddington Station structure. The granite sett surface is therefore itself considered to be listed (David Keeley, CRL Historic Building Specialist, personal communication, October 2010).

5.3.2 Elements of the C272 Platform 12 and VCC works have the potential to disturb or remove parts of the granite sett surface. These include:

- Excavation of the escalator base (as shown on construction drawings C131-MMD-A-DDA-B071_2-43102, C131-MMD-S-DDA-B071_3-32103 and sections C131-MMD-A-DDB-B071_Z-44304 and C131-MMD-A-DDB-B071_Z-44318);
- Excavation of the lift shaft bases (as shown on construction drawings, C131-MMD-A-DDA-B071_2-43102 and C131-MMD-S-DDA-B071_3-32103);
- Construction of thickened slabs along new wall lines (as shown on construction drawing C131-MMD-S-DDA-B071_3-32102 to 4 and sections C131-MMD-A-DDB-B071_Z-44301 to 4, C131-MMD-A-DDB-B071_Z-44309, C131-MMD-A-DDB-B071_Z-44312, and C131-MMD-A-DDB-B071_Z-44318); and
- Laying of new drainage and the construction of new manholes/inspection chambers (as shown on construction drawings C131-MMD-P-DDA-B071_2-43116 and C131-MMD-P-DDA-B071_2-43117).

5.3.3 To adequately preserve-by-record those parts of the granite sett surface that will be disturbed or removed, an archaeological watching brief is required during the above C272 construction activities within the area of the Platform 12 and VCC works site defined on drawing C131-MMD-S-DDL-B071_Z-41007 in Annex 3 of this SS-WSI.

5.3.4 The watching brief will comprise two elements:

- A general watching brief on the above intrusive construction activities; and
- A targeted watching brief to specifically expose and record the granite sett surface under controlled archaeological supervision.

5.3.5 Archaeological investigation by General Watching Brief is defined in the Generic SS-WSI (CR-PN-LWS-EN-SY-00001).

5.3.6 The general watching brief will comprise a programme of observation, investigation and the recording of archaeological remains during the excavation of the escalator and lift shaft bases, thickened slabs along new wall lines, new drainage runs and new manholes/inspection chambers.

5.3.7 The C272 Main Contractor will work with the C254 Archaeologist to ensure that the necessary controls are implemented in order to allow archaeological recording to take place to the required standard.

5.3.8 Modern overburden will be removed in stages by the C272 Main Contractor using a mechanical excavator fitted with a toothless grading bucket. Excavation will proceed where possible in level spits of a maximum thickness of 500mm at the discretion of the C254 archaeologist. Excavation will proceed until the first archaeological horizon or to a depth of 800mm below the existing ground surface (e.g. at a depth of *c.*122.7m ATD) which ever is encountered first.

5.3.9 If construction activities require excavation below a depth of 800mm below the existing ground surface (i.e. at a depth of *c.*122.7m ATD), the general watching brief will be upgraded to targeted watching brief in order to enable the exposure and recording of the granite sett surface under controlled archaeological supervision.

5.3.10 Any archaeological horizons encountered will be hand cleaned as necessary to achieve clear definition of any archaeological features which will then be rapidly investigated, sampled and recorded by the C254 archaeologists. Sections through the stratigraphic sequence will also be cleaned, sampled and recorded.

5.3.11 Archaeological monitoring of the intrusive construction activities in this manner will allow the full sequence of deposits to be examined and recorded.

Archaeological General Watching Brief Procedure

5.3.12 The method of working for the C272 Main Contractor during the Platform 12 and VCC works shall allow for:

- Identifying the location all known services and utilities prior to excavation and brief the C254 archaeologist as to their location;
- The removal of modern material and made ground will be carried out under archaeological observation, to 800mm below ground level (i.e. to c. 122,7m ATD);
- Allow suitable access from ground level to bottom of the excavated trench for C254 archaeologists to rapidly clean and record the stratigraphic sequence of deposits visible in trench sections and any significant archaeological deposits which may be encountered.
- In the event that archaeological remains are identified the C272 *Main Contractor* should allow adequate time for the C254 archaeologist to investigate and record any surviving archaeological remains. The duration of any archaeological investigation and recording required may vary dependant on the density and complexity of archaeological remains present. This will be agreed by the C131 Designer's Archaeologist following discussion with the *C272 Main Contractor*, and C254 Archaeologist;

- Allow suitable secure access, shoring and edge protection where required from ground level to bottom of excavated area for archaeologists to work;
- Remove, as directed by the C254 archaeologist, materials once they have been recorded by the C254 archaeologists until the required level is reached.
- Use of excavators or other plant within the area shall only be undertaken with the agreement of the Project Manager and under the observation of C254 Archaeologist.
- Allow for up to 4 archaeologists to be on site during groundworks.
- Provide further technical advice to C254 as maybe required to safely complete the works.

Targeted Watching Brief

5.3.13 Targeted Watching Brief will be required during intrusive construction activities below a depth of 800mm below the existing ground level (below c. 122.7m ATD) to identify record and remove any granite setts present. The granite setts have been found at a depth of between 1050 - 1080mm (*c.*122.5m ATD) below the existing ground surface. Below this depth where it has been proved that the granite sett surface is not present Targeted Watching Brief may be downgraded to General Watching Brief. The decision to down grade the Targeted Watching Brief will be made by the C131 Designer's Archaeologist following discussion with the Crossrail Central Designer's Archaeologist, C254 Archaeologist and *C272 Main Contractor.*

5.3.14 Archaeological monitoring in this manner will allow the full sequence of deposits and elements of the listed station structure to be examined and recorded.

5.3.15 The *C272 Main Contractor's* methodology should allow provision for the following procedure:

Archaeological Targeted Watching Brief Procedure

- Identify the location all known services and utilities prior to excavation and brief the C254 archaeologist as to their location;
- Machine or hand excavate in stages (as directed by the C254 Archaeologist), under supervision of C254 Archaeologist modern overburden and post-medieval made ground to the surface of the granite sett surface, at approximately 1050 - 1080mm below the existing ground surface (*c.*122.5m ATD);
- Provide as clean an excavated surface at the top of the granite sett surface as is possible and allow the C254 archaeologist up to 1 day per 10m section of pipe trench or 1-2 days for each lift shaft or escalator base excavated, to clean, record and log the granite setts prior to removal;
- In the event that archaeological remains are identified the *C272 Main Contractor* should allow adequate time for the C254 archaeologist to investigate and record any surviving archaeological remains. The duration of any archaeological investigation and recording required may vary dependant on the density and complexity of archaeological remains present. This will be agreed by the C131 Designer's Archaeologist following discussion with the *C272 Main Contractor*, and C254 Archaeologist;
- Allow suitable secure access, shoring and edge protection where required from ground level to bottom of excavated area for archaeologists to work;

- Remove, as directed by the C254 archaeologist, materials once they have been recorded by the C254 archaeologists until the required base of each pipe trench, lift shaft or escalator base is reached;
- Allow for up to 4 archaeologists to be on site during groundworks;
- Provide further technical advice to C254 as maybe required to safely complete the works.

5.4 Non-Listed Built Heritage Assessment and Recording

5.4.1 Non-listed built heritage assessment and recording forms part of the archaeological mitigation strategy for CRL. The definition of non-listed built heritage adopted follows Information Paper D22 Archaeology and encompasses above ground historic features and structural elements of historical interest.

5.4.2 Two main groups are:

- Non-listed buildings proposed for demolition in conservation areas; and
- Historic street furniture and materials falling within a worksite and being temporarily or permanently impacted upon by the works.

5.4.3 The Crossrail Archaeology Generic SS-WSI expands upon the definition for non-listed buildings. The scope for this element of works includes:

- Important non-listed buildings of historic interest proposed for demolition in conservation areas (as set out in Information paper D18, Listed Buildings and Conservation Areas);
- Important non-listed historic street furniture and materials; and
- Other important non-listed buildings and structures of historic interest outside conservation areas (e.g. the standing walls at Stepney Green), locally listed station buildings and railway structures and any industrial and defence archaeology of significance.

5.4.4 An assessment of surviving Non Listed Build Heritage assets within the PIP Triangle Site identified several significant structures due for demolition that required mitigation in the form of a programme of built heritage recording. The structures identified comprised:

- late 19th century vaulted stable block, heavily altered, truncated and refaced in red brick in the 1930s;
- the truncated goods ramp (and rooms below) with stone setts still extant; and
- the 1930s shunt tunnel used as an engine spur in conjunction with the construction of the new Paddington station that replaced Bishops Bridge Station.

5.4.5 Following consultation with Crossrail's Heritage Specialist it was decided to undertake an English Heritage Level 2 survey standard to the structures within the PIP Triangle site and a Method Statement was prepared (Document No. C131-MMD-T1-GMS-B071-50001). The surveys were completed in early September 2010 and the final report is currently in preparation.

5.4.6 No further Non-Listed Built Heritage mitigation is required.

6 Programme

PIP Triangle Site

6.1.1 The targeted watching brief on ground reduction of the PIP Upper Triangle commenced at the end of September 2010 and is at the time of writing ongoing. The final ground reduction activity is currently programmed to commence during the week commencing 22nd November 2010 with duration of 10 days.

C272 Platform 12 and Vertical Circulation Core

6.1.2 The programme information provided in Table 4 below has been summarised from the C272 Main Contractor's Construction Programme C272-CAR-Z9-TPG-BG071-00001 dated 17 November 2010.

Table 4 C272 Provisional Construction Programme

Activity ID.	C272 Programme Activity	Archaeological Mitigation	Start Date	Finish Date	Duration (Days)
Stage 3					
A6570	Install shallow drainage / gullies girds 9-13	GWB/TWB	07-03-2011	09-03-2011	3 days
A6580	Excavate / Blind grids 9-13	GWB/TWB	10-03-2011	14-03-2011	4 days
Stage 4					
A7020	Install deep drainage / gullies grids 6 -9.	GWB/TWB	02-03-2011	08-03-2011	5 days
A7040	Install shallow drainage / gullies grids 6 -9.	GWB/TWB	11-03-2011	11-03-2011	1 day
A7050	Install shallow drainage / gullies grids 6 -9.	GWB/TWB	11-03-2011	11-03-2011	1 day
A7060	Excavate / blind lift pit	GWB/TWB	11-03-2011	11-03-2011	1 day
A7070	Excavate / blind grids 6 - 9.	GWB/TWB	14-03-2011	15-03-2011	2 days
A7120	Excavate / blind grids 6 - 9.	GWB/TWB	18-03-2011	21-03-2011	2 days
Stage 5					
A7280	Install deep drainage / gullies grids 2.5-6	GWB/TWB	24-02-2011	02-03-2011	5 days
A7290	Install deep drainage / gullies grids 2.5-6 (NIGHT)	GWB/TWB	24-02-2011	02-03-2011	5 days
A7310	Excavate for column foundations and sheets	GWB/TWB	23-03-2011	23-03-2011	1 day
A7320	Excavate for column foundations and sheets (NIGHT)	GWB/TWB	23-03-2011	23-03-2011	1 day
A7350	Excavate / blind grids	GWB/TWB	30-03-2011	31-03-2011	2 days

Activity ID.	C272 Programme Activity	Archaeological Mitigation	Start Date	Finish Date	Duration (Days)
	2.5-6				
A7370	Excavate / blind grids 2.5-6	GWB/TWB	11-04-2011	12-04-2011	2 days
A8090	Excavate / blind old left luggage area	GWB/TWB	26-08-2011	02-09-11	5 days
Stage 6					
A6740	Excavate and expose existing column foundation	GWB/TWB	03-03-2011	03-03-2011	1 day
A6750	Excavate / stitch / concrete foundation widening	GWB/TWB	04-03-2011	04-03-2011	1 day
A6760	Excavate escalator pit	GWB/TWB	07-03-2011	08-03-2011	2 days
A6850	Prop foundation and excavate to formation	GWB/TWB	21-03-2011	21-03-2011	1 day

Non-Listed Built Heritage

6.1.3 The Non-listed Built Heritage mitigation in the form of an English Heritage Level 2 survey of the 19th century stable block vaults, the truncated goods ramp and the 1930s shunt tunnel has been completed. No further Non-listed Built Heritage mitigation is proposed.

7 Specification for Evaluation & Mitigation (including Watching Brief)

7.1 Generic Standards

7.1.1 The archaeological evaluation and mitigation works and scope of any archaeological scientific methods shall be designed and undertaken in accordance with the Generic WSI and relevant best practise guidance (and any subsequent revisions) i.e.:

- Crossrail standards and specifications;
- Institute for Archaeologists – Standard and Guidance for archaeological field evaluation, 2008 (revised);
- 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;
- Museum of London Archaeology Service site recording manual (MOLAS 1994); and
- English Heritage – Understanding Historic Buildings – A guide to good recording practice, 2006.

Potentially nationally important remains

7.1.2 Where unexpected, potentially nationally important archaeological remains (as defined in the Crossrail Environmental Minimum Requirements and Generic WSI) are identified during the works, the C254 Archaeology Contractor shall undertake works in accordance with the Environmental Requirements (archaeology) section of the relevant package Works Information and shall adhere to procedures as set out in the SS-WSI.

7.1.3 The C254 Archaeology Contractor shall submit details of their procedure for excavating and recording potentially nationally important remains in the C254 Archaeology Contractor's Method Statement.

7.1.4 In the event that archaeological remains of potentially national importance are encountered the C254 Archaeology Contractor will immediately inform the Project manager and C131 Designer's Archaeologist for Paddington and not recommence work at the location until further instruction has been received from the Crossrail Central Designer's Archaeologist. The discovery of archaeological remains of potentially national importance will be confirmed in writing within 24hours of discovery.

7.1.5 The C131 Designer's Archaeologist will be responsible for informing the Crossrail Central Designer's Archaeologist and relevant statutory consultees (EH GLAAS) and co-ordinate any meetings required between Crossrail Central, the Principal Contractor, the C254 Archaeology Contractor and the relevant statutory consultees.

7.1.6 The Principal Contractor will be responsible for supplying any material required to protect archaeological remains of potentially national importance from possible damage by ongoing construction activities in the vicinity. This may include the provision of barrier fencing, terram and sand.

7.1.7 As a result of the discovery of unexpected, potentially nationally important archaeological remains, the SS-WSI will be updated by the C131 Designer's Archaeologist Designer's to incorporate any additional specific primary fieldwork event aims.

Human Remains

7.1.8 Certain aspects of the normal legal procedure for the removal of human remains (and associated monuments) from burial grounds has been modified by Schedule 15 to the Crossrail Act 2008. However for other aspects, normal legislation applies.

7.1.9 Where human remains are identified, all subsequent works must be undertaken in accordance with relevant legislative and environmental health requirements as set out in the Environmental Requirements (archaeology) section of the relevant package Works Information.

7.1.10 In the event that human remains are encountered the C254 Archaeology Contractor will immediately inform the Project manager and C131 Designer's Archaeologist for Paddington and not recommence work at the location until further instruction has been received from the Crossrail Central Designer's Archaeologist. The discovery of human remains will be confirmed in writing within 24hours of discovery during which time C254 will apply for the relevant Licences.

7.1.11 The C131 Designer's Archaeologist will be responsible for informing the Crossrail Central Archaeologist and relevant statutory consultees (EH GLAAS) and co-ordinate any meetings required between Crossrail Central, the Principal Contractor, the C254 Archaeology Contractor and the relevant statutory consultees.

7.1.12 The C254 Archaeology Contractor shall confirm how the requirements set out in the SS-WSI will be implemented as part of their procedure for excavating and recording human remains in the C254 Archaeology Contractor's Method Statement. This should incorporate best practice guidance e.g. Council for the Care of Churches (1999) and English Heritage (2002 and 2002a).

7.1.13 At sites known in advance to have a high risk of encountering human remains, provision shall be made by the C254 Archaeology Contractor for site inspection by a recognised specialist.

7.1.14 Should human remains be discovered, the C254 Archaeology Contractor shall notify the C131 Designer's Archaeologist immediately so that these procedures can be implemented. This notification may be initially made personally or by telephone but shall be confirmed in writing within 24 hours of discovery.

7.1.15 The Principal Contractor will be required to cease all works at that location until further instruction is provided by the C131 Designer's Archaeologist. The C254 Archaeology Contractor shall undertake an initial in situ observation and assessment of the remains and shall advise the C131 Designer's Archaeologist of the course of action required.

7.1.16 Lifting of human skeletal remains shall be kept to the minimum which is compatible with an adequate evaluation or excavation. Notwithstanding this, the C254 Archaeological Contractor shall ensure that all burials are planned/photographed in-situ and that appropriate samples have been recovered prior to any lifting.

7.1.17 Visible grave goods and other obvious artefacts, shall be recorded and lifted before the end of the working day to avoid the risk of vandalism and theft. Where this is not feasible or appropriate, the C254 Archaeology Contractor shall ensure, on liaison with the C131 Designer's Archaeologist that adequate site security is provided by the Principal Contractor. As a minimum, this will require a 24 hour comprehensive security regime until sensitive remains have been recorded and lifted.

7.1.18 As a result of the discovery of human remains, the SS-WSI will be updated by the C131 Designer's Archaeologist to incorporate any additional specific primary fieldwork event aims.

Treasure Act

7.1.19 The Treasure Act 1996 defines 'Treasure' as:

- Any object at least 300 years old when found which is: not a coin, but has metallic content of which at least 10% is precious metal; or
- One of at least two coins with at least 10% precious metal content;
- One of at least 10 coins;

- Any object at least 200 years old designated as treasure by the Secretary of State;
- Any object which would have been 'Treasure Trove';
- Any object found with any of the above.

7.1.20 The Treasure (Designation) Order 2002 extends the definition of treasure to include:

- Finds of at least two base metal objects (other than coins) of prehistoric date; and
- Any object (other than a coin) of prehistoric date with any precious metal content.

7.1.21 All finds falling within the definitions of treasure shall be reported immediately to the C131 Designer's Archaeologist and all subsequent works must be undertaken in accordance with the relevant legislative requirements as set out in the Environmental Requirements (archaeology) section of the relevant package Works Information.

7.1.22 C131 Designer's Archaeologist to insert the procedure (or reference to the procedure) to be followed in the SS-WSI, identifying any specific individual roles or circumstances that are relevant to the works. Details shall include how relevant parties are to be informed of such discoveries, the criteria to be utilised in the assessment of the significance of such discoveries and the timescales to be adhered to.

7.1.23 To protect the finds from theft, the C254 Archaeology Contractor shall record the finds and remove them to a safe place. Where recording and removal is not feasible or appropriate on the day of discovery, the C254 Archaeology Contractor shall ensure, on liaison with the C131 Designer's Archaeologist that adequate site security is provided by the Principal Contractor.

7.1.24 Subject to the Provisions of the Treasure Act 1996, all material that is defined as Treasure is vested in the franchisee or, if none, the Crown.

7.1.25 With respect to Treasure finds, a reward may be payable to the finder, the landowner and/or the occupier. The Crown usually offers finds to a museum.

7.2 Health and safety

7.2.1 The C254 Archaeology Contractor shall undertake the works in accordance with the Employer's Health and Safety requirements and the C271 and C272 Principal Contractor's Health and Safety Plans. The C254 Archaeology Contractor will prepare an Archaeological Method Statement and Site Specific Risk Assessment for submission to Crossrail Central prior to the start of the targeted watching brief works.

7.2.2 No archaeological ground intervention or other survey shall be made without approval of the C254 Archaeology Contractor's Health and Safety Plan, Method Statement and Risk Assessment by the CDM co-ordinator.

7.2.3 Hand excavation or other remote sensing method may be required prior to any mechanical excavation in the first instance to locate any known or suspected below ground hazards. The C254 Archaeology Contractor's Method Statement and Risk

Assessment shall take account of any design information (including the Designer's and Principal Contractor's Risk Assessment) pertaining to above ground hazards such as buildings and other structures or public rights of way and below ground hazards such as services, utilities and infrastructure and shall contain a site specific Risk Assessment for unknown below ground hazards such as contaminants including unexploded ordnance. All appropriate mitigation measures shall be in place prior to commencement of any ground intervention or other survey.

7.2.4 Trial trench excavation method and earthworks support design, shall conform to Health and Safety legislation and safety standards as well as incorporating current engineering best practice, where appropriate.

7.3 Location and ground elevation of interventions and survey grids

7.3.1 The spatial extent of the investigation(s) shall be set out in accordance with the setting out co-ordinates supplied by the C131 Designer's Archaeologist. All spatial setting out and recording shall be in accordance with The London Survey Grid Standard (formerly Crossrail Survey Grid). See Crossrail standard CR-STD-010.

7.3.2 Interventions shall be located to a horizontal accuracy of +/-500mm in relation to the detail illustrated in the contract drawing(s). The corner points of each excavation or the centre point of each soil core location shall be set out with a Total Station Theodolite or other suitable automated equipment referenced from approved Permanent Ground Marker (PGM) data supplied to the C254 Archaeology Contractor by the Principal Contractor. The positions of the trenches and survey points shall be verified by the C254 Archaeology Contractor taking additional check measurements to additional known-location points of detail.

7.3.3 Surface heights shall be recorded and related to PGMs or approved Ordnance Survey Bench Marks (OSBM) .The full descriptions and locations of PGMs and OSBMs known to the Employer will be supplied to the C254 Archaeology Contractor by the Principal Contractor. Levelling accuracy between OSBMs/PGMs and site TBMs shall be within 10 mm$\sqrt{k}$: where 'k' is the total distance levelled in kilometres. Each TBM shall be levelled as part of a closed loop starting and finishing on approved OSBMs or Crossrail PGMs. Where more than one TBM is required per site the Archaeology Contractor shall establish the TBMs as part of the same closed loop.

7.3.4 The C254 Archaeology Contractor shall include details of their surveying methodology within their Method Statement (see Section 8), including the setting out of the grid and how they intend to provide the project grid co-ordinates to the C131 Designer's Archaeologist with the Survey Report.

7.3.5 The C254 Archaeology Contractor shall ensure that all trench or excavation limits, and significant archaeology detail are surveyed 'as dug' in relation to the project grid before leaving the site. Ground level height data shall be recorded for each intervention. Survey methodology and a detailed survey record shall be provided to the C131 Designer's Archaeologist within the Survey Report.

7.4 Specification for watching brief

Scope of Watching Brief

7.4.1 Watching brief, as defined in the Generic WSI, is a programme of archaeological monitoring (i.e. observation, investigation and recording) which is carried out by a suitably qualified archaeologist during site investigations (e.g. geotechnical test pits, boreholes and utilities trial trenches) and construction works. The purpose of a watching brief is to identify the potential of any archaeological remains that are uncovered in the course of the works and record them appropriately (as far as is reasonably practicable). The watching brief shall result in the preparation of an ordered archive which will be incorporated into the post-excavation works and into publication of the project results.

7.4.2 The C254 Archaeology Contractor shall undertake the watching brief for all areas of ground disturbance which may potentially contain archaeological remains as set out in the SS-WSI. This shall include any activities (including those associated with site set-up and demolition) undertaken by the Principal Contractor that involve the removal of modern material, made ground and topsoil, subsoils, and superficial geological deposits such as alluvium and colluvium.

7.4.3 Areas that have been previously subject to archaeological excavation and which are known not to contain significant deposits (for example tunnels, cuttings, and areas of known large-scale modern disturbance) shall be excluded from the scope of the watching brief, unless stated otherwise in the SS-WSI. Areas that have been subject to previous assessment and evaluation (e.g. geophysical survey, surface artefact collection, geotechnical survey, trial trenching etc.) shall be included within the watching brief, as appropriate.

7.4.4 Two classes of watching brief are set out in the Generic WSI:

- A general watching brief shall comprise observation and recording of the Principal Contractor's works without constraint on their working methods.

- A targeted watching brief shall comprise observation and recording of the Principal Contractor's works with specific operations carried out under the supervision of the Archaeology Contractor. Under targeted watching brief, the Archaeology Contractor may impose constraints on, or require changes to, the Principal Contractors' or his sub-contractor's method of working to enable the archaeological investigation to take place alongside construction works.

7.4.5 Targeted watching brief shall be used for areas of known occasional, dispersed features which are either not considered to be of sufficient significance to warrant archaeological investigation in advance of construction, or where access prior to construction has not been possible and where, as a result, there is a possibility of unexpected discoveries

7.4.6 Except in cases where unexpected, potentially nationally important, archaeological remains are discovered, the targeted watching brief shall be designed and implemented so as to avoid adverse impact on the construction programme, wherever practicable

7.4.7 The Principal Contractor shall make allowance in their activity programme for the completion of any targeted or general watching briefs as set out in the SS-WSIs

7.4.8 The specification for watching briefs (general and targeted) are set out below:

Scope of Targeted Watching Brief - Constraints on Principal Contractor's Methodology

7.4.9 In archaeologically sensitive areas, where the need for a targeted watching brief has been identified in the SS-WSI, the Principal Contractor will strip soils (which may include modern made ground, topsoil, subsoil, alluvium and colluvium) using a 360 degree excavator and toothless ditching bucket under the supervision of the C254 Archaeology Contractor. The Principal Contractor will limit their tracking of vehicles and plant within areas specified in the SS-WSI and/or as instructed by the C131 Designer's Archaeologist. The Principal Contractor will facilitate mapping and sampling of deposits by the C254 Archaeology Contractor through use of agreed plant, a site share agreement and careful liaison between the C254 Archaeology Contractor's supervising archaeologist and the Principal Contractor's site supervisor.

Specification for watching brief

7.4.10 The C254 Archaeology Contractor shall undertake a targeted watching brief during ground reduction of the Upper Triangle site during C271 works and a combined targeted/general watching brief during the C272 excavation and drainage works in the vicinity of Platform 12 and the VCC.

7.4.11 The Works to be carried out by the C254 Archaeology Contractor shall consist of two parts:

a) Watching brief ('observation') following, and without interruption to, the progress of the Principal Contractor by a core team of archaeologists.

b) Investigation of archaeology and remains of quaternary geological importance undertaken either:

- by the core team, following the progress of the Principal Contractor; or
- by additional archaeologists (the 'support team'), to be deployed to investigate unanticipated archaeological remains, where appropriate.

7.4.12 The C254 Archaeology Contractor's core team shall consist of the C254 Archaeology Contractor's key person (the field director) and other appropriately experienced archaeologists commensurate with the scale and nature of the Principal Contractor's works.

7.4.13 The core team shall undertake the observation and any required investigation such as they may reasonably be able to undertake.

7.4.14 The C254 Archaeology Contractor's support team shall consist of additional experienced archaeologist. The size of the support team shall be commensurate with the scale and programme of the Principal Contractor's works. The C254 Archaeology Contractor shall be required to supply teams of 5 and 10 persons within 24 and 48 hours notice respectively.

7.4.15 The C254 Archaeology Contractor's core and support teams shall be advised where necessary by specialists, as appropriate and as agreed with the C131 Designer's Archaeologist.

7.4.16 The C254 Archaeology Contractor shall record the following observations on a daily basis. The record shall consist of, as a minimum:

- The Event Code and chainage/location of the area observed;
- The date(s) of the observation;
- Personnel employed on site;
- A description of the construction works observed;
- The works (sub) contractor and personnel undertaking and supervising the construction activity;
- Depths and extents of excavation works observed;
- 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.

Investigation undertaken during watching brief

7.4.17 An appropriate sample shall be excavated from cut features and other archaeological remains of importance. Sampling of cut features shall include feature inter-sections to establish relative chronologies. The extent of sampling shall be determined by the C254 Archaeology Contractor in liaison with the C131 Designer's Archaeologist (and as discussed with the relevant local authority and English Heritage, and a quaternary specialist, if necessary) but may, for instance, include the sample excavation of a selected number of deposits (both layers and negative, cut features), recording of structural remains, drawn sections and profiles, and/or be aimed at recovering sufficient information to determine function, form, and date. Any specific variations from this specification shall be indicated in The C254Archaeology Contractor's Method Statement.

7.4.18 Heights for all deposits shall be related to approved Permanent Ground Markers (PGMs) or approved Ordnance Survey Bench Marks (OSBM), where reasonably accessible. Levelling accuracy between OSBMs/PGMs and site Temporary Bench Marks (TBMs) shall be within 10 mm k: where 'k' is the total distance levelled in kilometres. Each TBM shall be levelled as part of a closed loop starting and finishing on approved OSBMs or CRL PGMs. Where more than one TBM is required per site, the C254 Archaeology Contractor shall establish the TBMs as part of the same closed loop. The C254 Archaeology Contractor shall prepare a record of their surveying methodology for inclusion in the archive.

7.4.19 It may not be possible to clean and record the archaeological profile of geotechnical test pits, due to health and safety or access constraints. Every effort shall be made to establish the presence or absence of archaeological deposits by establishing the absolute ordnance datum (AOD) for the height of significant deposits, including the depth of modern intrusions, key stratigraphic components and natural deposits.

Recording standards

7.4.20 The archaeological remains shall be recorded to best practice standards, recognising the special circumstances of a watching brief which demand flexibility in order to achieve archaeological objectives and requirements within the construction environment.

7.4.21 The recording is to include as a minimum:

- The written record of individual context descriptions on appropriate pro-forma.
- The drawn record shall normally include, plans and section drawings of appropriate features, structures and individual contexts (1:50 1:20 or 1:10). Isolated archaeological remains (artefacts) may be spot located in plan and a height provided where possible. Deposits which are regular in plan (pits and ditches) may be located though co-ordinates, annotated with dimensions, and may be recorded digitally.
- Other appropriate drawn and written records shall also be produced (for environmental sampling etc.).
- The photographic record shall consist of monochrome prints/negatives and colour transparencies. A 35mm format (film or digital) SLR camera is acceptable for all site photography. The Archaeology Contractor shall maintain a minimum of two 35mm SLR cameras on site at all times during working hours. The photographic record shall include photographs and transparencies of archaeological features, appropriate groups of features, structures, and quaternary deposits. Each photograph and transparency shall clearly show details of the above. Each photograph and transparency shall include an appropriate graduated scale, a north arrow, and a header board detailing (as a minimum) the event code and context/feature number. In addition, the Archaeology Contractor shall take appropriate record photographs to illustrate work in progress.

7.5 Specification for archaeological investigation

7.5.1 A sufficient sample of the archaeological features and deposits revealed must be sampled/or fully excavated to allow the resolution of the aims and objectives of the work. Structures, features, or finds which might reasonably be considered to merit preservation in-situ shall not be unduly damaged.

7.5.2 Where modern foundations are likely to be present, the SS-WSI shall identify whether they should be left in-situ for the purposes of the evaluation or removed. Where it is clear that modern foundations have truncated certain archaeological levels they should be removed to assess lower archaeological levels. The C254 Archaeology Contractor shall take all reasonable care to ensure that any damage is limited as for as practicable. If significant damage is likely to occur the work shall be suspended and the C131 Designer's

Archaeologist informed so that a technical solution can be agreed with the Project Manager.

7.5.3 The location and objectives of the targeted and general watching briefs set out in Section 5 of the SS-WSIs have been established in consultation with the projects' statutory consultees.

7.5.4 Each archaeological intervention has been assigned a unique ID number by the Crossrail Central Project Archaeologist. The Archaeology Contractor shall not vary this number unless agreed by the Crossrail Central Project Archaeologist in writing.

7.5.5 Temporary works and any required hand investigation to address below ground hazards shall be carried out by the Principal Contractor under supervision by the Archaeology Contractor in accordance with their approved Method Statement and Risk Assessment. All subsequent trial excavations shall be excavated by the Principal Contractor under supervision by the Archaeology Contractor using a mechanical excavator with toothless ditching bucket, except where the nature of the made ground or surface of the pits is such that an alternative bucket or means of breaking out prior to excavation is required (and the C131 Designer's Archaeologist has agreed an alternative method).

7.5.6 All machine work and demolition of below-ground obstructions (e.g. removal of basement slabs) shall be carried out by the Principal Contractor under supervision by the C254 Archaeology Contractor. The Principal Contractor shall cease work when archaeological evidence is revealed and allow the C254 Archaeology Contractor to undertake investigation, as appropriate. An excavator shall not be used to cut arbitrary trial trenches down to natural deposits without regard to the archaeological stratification.

7.5.7 All undifferentiated topsoil, or overburden of recent origin, shall be removed down to the first archaeological layer. An exception to this would be where a focused soil-sampling strategy is proposed to record and collect data from reworked soil contexts above recognisable stratified archaeological contexts. If a mechanical excavator is to be used to remove modern overburden, such as floor slabs or recent levelling layers, this shall be undertaken in spits of 0.20m-0.5m depth (dependant on specific site conditions), moving along the length of the trench or area. The C254 Archaeology Contractor's supervising archaeologist shall use their professional judgement to determine the appropriate depth of each spit and will advise the Principal Contractor accordingly. Any variations to the excavation methodology shall be at the discretion of the supervising archaeologist and recorded in writing for inclusion in the final report to the C131 Designer's Archaeologist.

7.5.8 Each spit shall be examined carefully to assist the recovery of any archaeologically significant artefacts and thus to determine when to cease machining.

7.5.9 The archaeological level shall be cleaned in plan by the Principal Contractor using a wide blade, ditching bucket or similar, with no teeth. If the machine has to re-enter the trench care will need to be taken to ensure that it does not damage underlying remains.

7.5.10 The C254 Archaeology Contractor shall undertake hand excavation and cleaning of any archaeologically significant horizons, to fulfil the aims of the work. Within alluvial sequences the C254 Archaeology Contractor shall pay particular attention to establishing the vertical extent of layers of archaeological potential and shall be aware that horizons of cultural activity may be interdigitated with horizons of sterile alluvium. The C254 Archaeology Contractor shall supervise the excavation of each test pit in such a manner so as to allow a cumulative or continuous section to be recorded.

7.5.11 The C254 Archaeology Contractor's excavation, sampling and recording policy shall be included in the C254 Archaeology Contractor's Method Statement. This is to include, as a minimum:

- The recording of individual contexts on appropriate pro-formas;
- Excavation plans at 1:50 scale; planning and section drawing of appropriate single contexts and features (usually at 1:20 scale for plans and 1:10 scale for inhumations and sections);
- Photographs; and other appropriate drawn and written records; and
- Permanent Ground Markers (PGM's), any temporary benchmarks and approved OS benchmarks shall be indicated on the relevant plans.

7.5.12 The C254 Archaeology Contractor's survey and recording policy shall meet the following requirements:

- All levels shall be recorded to London Grid standards and reduced to OS datum;
- All trial pit locations shall be electronically surveyed with reference to the London Grid and Crossrail PGM's upon the completion of fieldwork by the C254 Archaeology Contractor;
- The locations of trial pits shall be plotted on appropriate scale plans related to the London Grid and labelled with six figure eastings and northings; and
- The electronic survey record shall be retained with the project archive.

7.5.13 In alluvial sequences, each trial excavation shall be excavated to the base of the alluvial sequence, and shall be appropriately shored and kept free of water by the Principal Contractor to allow 'person entry' to the excavations i.e. to allow the C254 Archaeology Contractor to undertake investigation and recording to fulfil the aims of the work.

7.5.14 The C254 Archaeology Contractor shall identify any temporary works and dewatering requirements associated with the archaeological investigation in the C254 Archaeology Contractor's Method Statement and shall agree the detailed arrangements for such with the Principal Contractor. The C254 Archaeology Contractor will be required to undertake works in accordance with the Principal Contractor's arrangements for matters such as off site-spoil disposal or storage, on-site facilities and services. Relevant requirements shall be incorporated in the C254 Archaeology Contractor's Method Statement.

7.5.15 Where areas of extensive archaeological stratification are encountered, trial trenches shall not be fully excavated. However, the horizontal and vertical extent of archaeological stratification shall be assessed by the C254 Archaeology Contractor through implementation of an appropriate strategy including, either the excavation of features cut into horizontal stratification, limited test pitting or auguring. The aim shall be to recover suitable stratigraphic, finds and environmental samples from the full, intended depth of the trench, as far as is practicable. The exact methodology may need to be determined by the C254 Archaeology Contractor during the excavation of individual trenches and agreed with the C131 Designer's Archaeologist.

7.5.16 A sufficient sample shall be excavated from cut features and other archaeological deposits to fulfil the aims of the work. Sampling of cut features shall include feature intersections to establish relative chronologies.

Recording systems

7.5.17 The trial excavations shall be recorded by the C254 Archaeological Contractor to the standards of current best practice. The recording systems adopted during the investigations must be fully compatible with those published by the Museum of London Archaeology Service (MoLAS 1994 3rd ED) and Museum of London (MoL 1998).

7.5.18 The recording is to include, as a minimum:

- At least one representative section at (1:10 or 1:20 scale) of each trial excavation from ground level to the base of the excavation;
- The written record of individual context descriptions on appropriate pro-forma;
- Plans at appropriate scales (1:10 or 1:20);
- Single context planning if appropriate; and
- Photographs and other appropriate drawn and written records.
- Other sections, including the half-sections of individual layers or features shall be drawn as appropriate to 1:10 or 1:20.

7.5.19 Site plans shall identify both London Grid and OS co-ordinates. A 'site location plan', indicating site north shall be prepared at 1:1250. Individual 'trench plans' or 'excavation

area plans' at 1:200 (or 1:100) shall be prepared which show the location of archaeology investigated in relation to the investigation area.

7.5.20 Section drawings shall be located on the relevant plan and both London Grid and OS co-ordinates recorded. The locations of the OSBM or PGM bench markers used and any site TBM shall also be indicated.

7.5.21 A record of the full extent in plan of all archaeological deposits as revealed in the investigation shall be made; these plans shall be on polyester based drawing film, and be at a scale of 1:10 or 1:20 unless otherwise agreed with the C131 Designer's Archaeologist. 'Single context planning' shall be used on deeply stratified sites. Drawing information shall be digitised for eventual CAD applications. The GLSMR will accept Autocad DXF or .DWG format of extent of site and location of major features with the completed Sites and Monuments Report Form.

7.5.22 A 'Harris matrix' stratification diagram shall be employed to record stratigraphic relationships (Harris 1993). This record shall be compiled and fully checked by the Archaeological Contractor during the course of the excavations. Spot dating shall be incorporated onto this diagram during the course of excavations.

7.5.23 Recording of structural evidence revealed below ground level will vary according to the level of special interest of the structure and its relationship to below-ground archaeology. Structures of little or no significance shall be noted on a site plan. Detailed element detail drawings of important features revealed in investigations may be required in accordance with the aims and objectives of the investigation.

7.5.24 The Archaeology Contractor shall agree the appropriate level of recording and analysis for discovered standing structures with the C131 Designer's Archaeologist, in accordance with the Crossrail procedure for non-listed built heritage recording (Document CR-PN-PRW-EN-PD-00010). The Archaeology Contractor shall revise the Archaeological Contractor's Method Statement to reflect any additional requirements for built heritage recording.

7.5.25 The photographic record shall consist of monochrome prints/negatives and colour transparencies. A 35mm format SLR camera (film or digital) is acceptable for all site photography. The Archaeology Contractor shall maintain a minimum of two 35mm SLR cameras on site at all times during working hours. The photographic record shall include photographs and transparencies of archaeological features, appropriate groups of features, and structures. Each photograph and transparency shall clearly show details of the above, and may require the use of artificial lighting to achieve suitable definition. Each photograph and transparency shall include an appropriate graduated scale, a north arrow, and a header board detailing (as a minimum) the project event code and context/feature number. In addition, the Archaeology Contractor shall take appropriate record photographs to illustrate work in progress.

7.5.26 The transparencies shall be mounted in suitable frames for long-term curation in preparation for deposition with the archive. Digital photography and video recording may be appropriate in some circumstances and the Archaeology Contractor shall set out proposals for such recording in the Archaeology Contractor's Method Statement for approval by the Crossrail Central Project Archaeologist.

7.5.27 Where appropriate a photogrammetric record or laser scan record shall be made of complex structures, features and horizons, liable to be damaged in the course of the

investigation, such as buildings or parts of buildings. Appropriate technical specification and scales shall be specified in the SS-WSI and addressed in the Archaeology Contractor's Method Statement.

7.6 Archaeological science

7.6.1 The strategy for sampling archaeological and palaeo-environmental deposits and structures (which can include soils, timbers, pollen, diatoms, animal bone, human bone etc.) will be developed by the C131 Designer's Archaeologist in consultation with English Heritage Regional Science Advisor and the Archaeology Consultant. On-site work and off-site analysis of the processed samples and remains will be undertaken by the Archaeology Contractor's environmental archaeologist as specified in the Archaeology Contractor's Method Statement.

7.6.2 The finds retrieval policies of the appropriate recipient museum will be adopted. In accordance with the collection and retention strategy set out in SS-WSI, all finds (artefacts and ecofacts) visible during excavation shall be collected and processed by the Archaeology Contractor. In some cases, sampling may be the most appropriate strategy. Finds shall be appropriately packaged and stored under optimum conditions, as detailed in the RESCUE/UKIC publication First Aid for Finds (Watkinson and Neal 1998).

7.6.3 Where there is evidence for industrial activity, macroscopic technological residues (or a sample of them) shall be collected by hand. Separate samples (c. 10ml) shall be collected for micro-slags (hammer-scale and spherical droplets). Reference should be made to the Centre for Archaeology Guideline on Archaeometallurgy (English Heritage 2001). Assessment of any technological residues shall be undertaken.

7.6.4 Where appropriate, samples shall be taken for scientific dating (for example radiocarbon dating, OSL, thermoluminescance at the evaluation stage). This may apply where dating by artefacts is insecure or absent, and where dating is necessary for development of the SS-WSI for subsequent mitigation strategies. Procedures and specifications shall follow English Heritage guidance (English Heritage 2008b).

7.6.5 Buried soils and sediment sequences shall be inspected and recorded on site by the Archaeology Contractor's geoarchaeologist, since field inspection may provide sufficient data for understanding site formation processes. Procedures and techniques presented in the English Heritage documents Environmental Archaeology (English Heritage 2002) and Geoarchaeology (English Heritage 2007) shall be followed. Samples for laboratory assessment shall be collected where appropriate, following agreement with the C131 Designer's Archaeologist.

7.6.6 Deposits shall be sampled for retrieval and assessment of the preservation conditions and potential for analysis of biological remains following English Heritage guidance (English Heritage 2002). The sampling strategy shall include a reasoned justification for selection of deposits for sampling, and shall be developed by the Archaeology Contractor's environmental archaeologist or recognised bioarchaeologist in liaison with the C131 Designer's Archaeologist. Flotation samples and samples taken for coarse-mesh sieving from dry deposits shall be processed at the time of the fieldwork wherever possible, to permit variation of sampling strategies if necessary. Sampling strategies for wooden structures shall follow the methodologies presented in Brunning (1996).

7.6.7 Artefacts, biological samples and soils shall be assessed for evidence of site and deposit formation processes and taphonomy and especially for evidence of recent changes that may have been caused by alterations in the site environment.

7.6.8 Assessment of finds assemblages shall include x-radiography of all iron objects (after initial screening to exclude obviously recent debris) and, where appropriate, non-ferrous artefacts (including all coins). Where necessary, active stabilisation /consolidation shall be carried out to ensure long-term survival of the material, but with due consideration to possible future investigations.

7.6.9 Once assessed, all material shall be packed and stored in optimum conditions, as described in First Aid for Finds (Watkinson and Neal 1998). Waterlogged organic materials shall be processed in accordance with: Guidelines for the care of waterlogged archaeological leather (English Heritage/Archaeology Leather Group 1995) and Waterlogged wood: the recording, sampling, conservation and curation of structural wood (Brunning 1996).

7.6.10 Samples for absolute dating shall be submitted promptly to the supply laboratory proposed by the C254 Archaeology Contractor or other supplier as instructed by the C131 Designer's Archaeologist. Delivery times shall be agreed to ensure that the results are available to aid development of specifications for subsequent mitigation strategies in the SS-WSI. Where it is proposed to date human remains, the time limits for reburial imposed by Schedule 15 of the Crossrail Act (for remains removed from burial grounds) or set out in the relevant burial licence under the Burial Act 1857 (in all other cases) shall be adhered to.

7.6.11 Processing of all soil samples collected for biological assessment, or sub-samples of them, shall be completed as soon as reasonably practicable. The preservation state, density and significance of material retrieved shall be assessed by the Archaeology Contractor's recognised specialist. Special consideration shall be given to any evidence for recent changes in preservation conditions that may have been caused by alterations in the site environment. Unprocessed sub-samples shall be stored in appropriate conditions in accordance with the Archaeology Contractor's Method Statement.

7.6.12 Samples collected for geo-archaeological assessment shall be processed promptly by the Archaeology Contractor's specialist, particularly where storage of unprocessed samples is thought likely to result in deterioration. Appropriate assessment shall be undertaken as agreed with the C131 Designer's Archaeologist. Where preservation in situ is a viable option, consideration shall be given to minimising the possible effects of compression and loading on the physical integrity of the site and any hydrological or chemical impacts of the proposed construction works (English Heritage 2002).

7.6.13 Animal bone assemblages, or sub-samples of them, shall be assessed by the Archaeology Contractor's specialist with reference to English Heritage guidance (English Heritage 2002).

7.6.14 The results from any specific investigations in Archaeological Science shall be included in the Site Archive and presented in the evaluation report or final fieldwork report. Reports shall include sufficient detail to permit assessment of potential for analysis. They shall include tabulations of data in relation to site phasing and contexts, and include non-technical summaries. The objective presentation of data shall be clearly separated from interpretation i.e. recommendations for further investigations, (both on samples already

collected, and at future excavations), shall be clearly separated from the results and interpretation.

Generic specification for Environmental Sampling

7.6.15 Appropriate features and deposits shall be sampled to retrieve palaeo-environmental and economic indicators. The Archaeology Contractor shall make provision for the sampling of a wide range of contexts for potential assessment and analysis for plant and animal micro/macro fossils and soils/sediments in order to fulfil the aims set out in the SS-WSI.

7.6.16 The Archaeology Contractor shall use ten litre plastic buckets (with lids and handles), or strong polythene bags (double bagged) secured at the neck, for the recovery of bulk 'disturbed' environmental samples. An adhesive label recording the project event code, context number and sample information shall be securely fixed to a vertical face of the bucket only or attached to the neck of the bag. Labels shall be completed with an indelible ink pen. A duplicate non-adhesive label shall be inserted within the bucket or between the polythene bags.

7.6.17 The selection, preparation for and methods of taking samples together with their size, presentation and processing shall be in accordance with current best practice (e.g. IFA Standard and Guidance for Artefact and Environmental Study, Collection, Research and Conservation 2008e; English Heritage –Geoarchaeology, 2007; English Heritage - Archaeological Science at PPG16 interventions: Best Practice Guidance for Curators and Commissioning Archaeologists, 2003).

7.6.18 The Archaeology Contractor shall be responsible for the protection of all samples and finds and for their transport (including loading and unloading) to the Archaeology Contractor's facilities or other location as agreed with the C131 Designer's Archaeologist. Samples shall be protected at all times from temperatures below 5 and above 25 degrees Celsius and from wetting and drying out due to weather exposure.

7.6.19 Bulk samples shall normally be in the range of 10-60 litres. The size selected will depend on the likely density of macrofossils in the soil. The lower end of the range (10-20 litres) will be suitable for the recovery of macrofossils from waterlogged deposits. For non-waterlogged deposits the sample volume is likely to be in the middle to higher range (20-40 or 40-60 litres) dependant upon site activity, conditions and preservation. The residue of soil left in the bottom of any inhumations after the removal of human remains shall be retrieved for bulk processing. Vessel or pit fills containing human remains shall be processed as bulk samples to ensure the maximum retrieval of cremated bone. Cremation vessels and deposits of placed human bone within cut features may require excavation in spits. The fill residues from the excavation of these features shall be bulk sampled to ensure maximum retrieval of cremated bone, associated small finds and floral and faunal remains. All work shall be undertaken in compliance with the generic Crossrail standards for Human Remains (see Section 7A) which may require the reburial of human remains within a specific timeframe.

7.6.20 For 'bulk disturbed' samples the limits of the sample zone shall be recorded and identified on plan.

7.6.21 The Archaeology Contractor shall use appropriately sized monolith or kubiena boxes for the recovery of 'undisturbed' monolith samples for geo-archaeological study (pollen, other microfossil and micromorphological studies etc). Care shall be taken to ensure that

wherever possible only newly exposed sections are sampled to avoid contamination, desiccation and decalcification. This sampling shall be undertaken under supervision of the Archaeology Contractor's environmental specialist. Boxes shall be wrapped neatly and tightly in bin-liners or plastic sacks and secured with rubber bands. A label shall be attached to the outside (in duplicate) with site name and code, feature/context number and depths of sample.

7.6.22 The Archaeology Contractor shall record the depth of the 'undisturbed' monolith at the top and the bottom of the sample. There shall be a 50mm overlap between each monolith. This information shall be plotted onto a section drawing at an appropriate scale, with all levels reduced to heights relative to Ordnance Datum. Where the sample crosses archaeological context boundaries these shall be noted on the sample recording pro-forma.

7.6.23 Where it is not possible to insert monolith boxes, the Archaeology Contractor shall take a vertical series of small 'spot' samples. Samples shall be at 20mm vertical intervals with no more than 10mm depth being sampled. In the case of deposits with a low organic content it may be necessary to take as much as 5g or even 20g per sample. If so, sampling shall be extended laterally at a given depth in 10mm deep spits.

7.6.24 Where appropriate, the Archaeology Contractor shall take contiguous column samples for the retrieval of macrofossils. The individual sub-samples will be of 1-10kg, depending on the nature of the deposit and the category of material to be retrieved. Where several specialists are involved it may be necessary to take separate sub-samples for a range of palaeo-environmental evidence, for example, insects, molluscs and seeds, to ensure that adequate sub-samples are available for specialist assessment.

8 Deliverables

8.1 C254 Archaeological Contractors Deliverables

8.1.1 The C254 Archaeology Contractor shall provide a detailed Archaeological Method Statement for the archaeological fieldwork events (targeted and general watching brief and trial trench excavation) for each works package.

8.1.2 During the execution of each fieldwork event the C254 Archaeology Contractor shall submit a weekly progress report to the Crossrail Central Project Archaeologist and C131 Designer's Archaeologist.

8.1.3 On completion of each archaeological fieldwork event the C254 Archaeology Contractor shall provide the post-excavation deliverables summarised in Table 11 below:

	Deliverable		
Fieldwork Event	**Weekly Progress Report**	**Interim Report**	**Fieldwork Report**
C271Targeted Watching Brief	✓	✓	✓
C272 General & Targeted Watching Brief	✓	✓	✓

Table 5 C254 Archaeological Contractor fieldwork event deliverables

8.1.4 The requirement for production of a formal Post-excavation Assessment will be dependant on the significance of the results of the archaeological mitigation undertaken during the C131 Package works.

8.1.5 Details of each deliverable are provided below.

8.2 Archaeological Contractors Method Statement

8.2.1 The C254 Archaeology Contractor shall provide a detailed Method Statement for the works for the Crossrail Central Archaeologist's approval. The Method Statement shall be prepared in association with the Principal Contractor, taking account of their Environmental Management Plan and other relevant site information provided by them and requirements for the works set out in the Works Information (e.g. relating to health and safety, security, engineering design requirements and attendances). The Method Statement shall include, as appropriate:

a) A resource plan and programme and CV's;

b) The C254 Archaeology Contractor's IT capability and proposed IT plan (including specific survey methods for on-site recording of stratigraphic profiles and sub-surface topographic modelling;

c) The C254 Archaeology Contractor's approach to Archaeological Science;

d) The methods for survey and setting out works;

e) The methods to address the specific event types required (trial trench, area excavation etc);

f) The safe method of working whilst excavating trenches or pits including any temporary works required;

g) The method for disposing of water from trenches and test pits in waterlogged ground;

h) Site management plan to include details of the method for preparing safe access route to the working areas, the proposed site accommodation, services and welfare;

i) The retention and disposal policies for samples and artefacts recovered during the work;

j) The method for excavating and recording inhumations and cremations in compliance with the generic Crossrail standards for Human Remains (see Section 7.1);

k) The method for preparation of the required reports, archive and all associated deliverables;

l) The procedures for assessment of potential for analysis (post excavation assessment);analysis and publication proposals;

m) The method for preparation of the digital dataset, digital drawings, and digital report deliverables;

n) The C254 Archaeology Contractor's methods and approach for undertaking the site based works and off site processes to completion.

o) The Health and Safety Plan and Site-Specific Risk Assessment (including unexploded ordnance);

p) The Quality Assurance Plan;

q) The procedures for on- and off- site security and emergency response plan (including environmental incidents);

r) The method for complying with project generic and site specific environmental and consent requirements; and

s) The C254 Archaeology Contractor's requirements and specification for services and facilities and attendances required to be supplied by the Principal Contractor or the Employer.

8.3 Site Archives

8.3.1 The site archive shall be organised to be compatible with other archaeological archives in London, or where outside the greater London area, any specific requirements of the receiving museum. This requirement for archival compatibility includes computerised databases.

8.3.2 For London archives, individual descriptions of all archaeological strata and features excavated or exposed shall be entered onto prepared pro-forma recording sheets which include the same fields of entry on the recording sheets of Museum of London Archaeology. Sample recording sheets, sample registers, finds recording sheets,

registered finds catalogues and photographic record cards shall also follow the Museum of London Archaeology equivalents.

8.3.3 Archives shall be prepared to conform with current best practise (e.g. Brown and Duncan 2007; Institute for Archaeologists 2008g) The archive shall cover all finds, samples and records (drawn, written, photographic and electronic) collected and produced during the works. The archive shall be indexed and internally consistent. The C254 Archaeology Contractor shall complete the site archive and submit to the C131 Designer's Archaeologist within 8 weeks of completion of a fieldwork event.

8.3.4 The site archive shall be deposited by at a museum to be confirmed by the Crossrail Central Project Archaeologist.

8.4 Digital Data

8.4.1 The C254 Archaeology Contractor shall produce a digital data archive of all primary field data produced during the works in accordance with ADS guidelines (Richards and Robinson 2001).

8.4.2 The C254 Archaeology Contractor shall prepare and provide field and laboratory data, evaluation or excavation trench and phasing plans showing archaeological features recorded, and report text in digital form, as well as in paper form. Consideration should be given to recording electronic plans during fieldwork.

8.4.3 The digital archive for each fieldwork event shall be copied to CD-R or DVD (recordable laser disc) and submitted to the C131 Designer's Archaeologist for archiving in the Employer's document management system.

8.4.4 Final reports, site plans and other illustrations shall be prepared in accordance with the Employer's Information Management standards and procedures.

8.4.5 All data files submitted shall be scanned by a virus detection programme updated to the most current version. The disk label shall clearly indicate:

- Confirmation that this check has been carried out (including details of the virus checking programme name and version used) and that the submission is virus free.
- Fieldwork event name and code.
- Supplier company name, date and QA details (as a minimum, the name, position and signature of the approver).

8.4.6 Prior to commencing the works, the C254 Archaeology Contractor shall submit an example hard copy and data output of each of the data formats required (i.e. data, graphic, CAD and text) produced by their current software, for approval by the Crossrail Central Project Archaeologist. The C254 Archaeology Contractor shall inform the Crossrail Central Project Archaeologist of any changes or upgrades made to approved software prior to processing any works data. The sample disk shall include data from a previous real job or jobs.

8.4.7 A sequential numbering of data issues shall be rigorously adhered to so that no data versions are submitted out of sequence. The organisation of the data prior to submission

shall be the responsibility of the C254 Archaeology Contractor. The C254 Archaeology Contractor shall ensure that data originating from different sources within the C254 Archaeology Contractor's organisation is compatible with the project requirements. The C254 Archaeology Contractor shall nominate one person to the Crossrail Central Project Archaeologist who is the main point of contact for matters relating to the digital data submissions.

8.4.8 Where errors or inconsistencies are noted in the data, by either the C131 Designer's Archaeologist or C254 Archaeological Contractor they shall be corrected by the C254 Archaeology Contractor and a corrected data file issued to the C131 Designer's Archaeologist . When a change or addition is made to the data within an issue, a complete data group shall be re-issued, not just the changed fields. This may not require complete replacement of the whole data set which includes other previous issues.

8.4.9 Where any changes are made to a data record between digital data submissions, the C254 Archaeology Contractor shall record the date of the change and the name of the person carrying out the change. The C254 Archaeology Contractor shall ensure that each data amendment is carried out correctly.

8.4.10 The C254 Archaeology Contractor shall make two identical copies of the digital archive. The first copy shall be retained by the C254 Archaeology Contractor until the expiry of the Contract maintenance period. The second copy shall be issued to the Crossrail Central Project Archaeologist.

8.4.11 A digital archive for each Crossrail site (incorporating individual event archives) shall be submitted to a regional or national data archive as agreed with the service provider by the Employer.

8.5 Interim Statement

8.5.1 Within 7 days of completion of a fieldwork event the C254 Archaeology Contractor shall submit an Interim Statement to the C131 Designer's Archaeologist .

8.5.2 The Interim Statement shall be brief, and the information contained commensurate with the timescale for production. The report shall not duplicate effort to be utilised at a later date and shall draw on the data gathered during the initial assessment undertaken during fieldwork.

8.5.3 A site plan indicating all as-dug investigations shall be provided. Key stratigraphic profiles and topographic templates of the major stratigraphic units shall be provided.

8.5.4 The Interim Statement including illustrations shall be submitted as a single PDF file to the C131 Designer's Archaeologist. CAD drawing files shall also be submitted.

8.5.5 The Interim Statement text shall be submitted in hard copy and as an MS Word *.document in accordance with the Employer's information management standards and procedures.

8.5.6 The Interim Statement shall include an approved report title sheet and QA page (to be supplied by the Employer).

8.5.7 The following shall appear in the footer or header of each Interim Statement:

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8.5.8 Copies of the Interim Statement shall be provided by the C131 Designer's Archaeologist to the LB Westminster and GLAAS for comment.

8.6 Survey Report

8.6.1 The C254 Archaeology Contractor shall provide a written and graphic survey report for the works upon completion of fieldwork. Evidence shall be provided for check measurements and results of levelling for establishment of TBM's. The survey report shall be submitted by the C254 Archaeology Contractor to the C131 Designer's Archaeologist within 2 weeks of the completion of fieldwork.

8.6.2 The C254 Archaeology Contractor shall prepare and submit 'as excavated' site area outlines and levels in accordance with Crossrail standard CRS-SDT-05. Each drawing shall identify the relevant event code and sub-site division, if applicable.

8.7 Fieldwork Report

8.7.1 The evaluation report and watching brief reports shall be prepared by the C254 Archaeology Contractor within 6 weeks of the completion of the fieldwork (unless this is varied by the C131 Designer's Archaeologist). The Fieldwork Report shall follow the standard structure set out in City of London Planning Advice Note 3 and IFA standards i.e.:

Contents list

Non technical summary

1. Introduction
2. Planning background
3. Previous work(s) relevant to archaeology of site (DBA, DDBA, surveys etc)
4. Geology and topography of site
5. Research objectives and aims
6. Methodology of site-based and off-site work
7. Results and observations including quantitative report, stratigraphic report(including any constraints on site).
8. Assessment of results against original expectations (using criteria for assessing national importance i.e. period, relative completeness, condition, rarity, and group value) and review of evaluation strategy
9. Statement of potential of archaeology
10. Conclusions and recommendations for appropriate mitigation strategy
11. Publication and dissemination proposals (in addition to fieldwork report)
12. Archive deposition
13. Bibliography
14. Acknowledgements
15. Sites & Monuments Record form
16. A3 plans

8.7.2 The Fieldwork Report shall provide an illustrated factual statement and statement of importance with associated assessment of potential for further fieldwork and/or analysis of the archive. The Fieldwork Report shall utilise information collected during archaeological fieldwork and from any other appropriate sources agreed with the C131 Designer's Archaeologist.

8.7.3 The Fieldwork Report shall include sections detailing the background to the project, any previous relevant research and investigation, location and topography/geology, a description of the methodology employed and the techniques adopted. Where relevant, these sections shall include location plans with scale and grid co-ordinates.

8.7.4 Each component of the works (e.g. stratigraphic/structural, artefactual and environmental/economic) shall be supported by a statement setting out:

- A quantification of the resource (tabulated and cross referenced as appropriate);
- Provisional dating and evidence for residuality and intrusiveness;
- The range of material, including sampling and/or taphonomic biases; and
- The condition of the material, including preservation bias.

8.7.5 The stratigraphic statement shall include: a description of the geomorphology and sedimentation record of the survey area; a description of the fieldwork results (brief context descriptions supported by plans and sections as necessary, with levels related to Ordnance Datum); a trench summary table indicating depths of all major stratigraphic units, and their boundaries. Photographs shall be included where appropriate.

8.7.6 The C254 Archaeology Contractor shall produce a subsurface model(s) and profiles to illustrate the extent, character and depth of the major stratigraphic topology identified. The model shall be correlated with previous works within the survey area in order to inform the mitigation design. The processing software and presentation format of the data shall be included in the Archaeology Contractor's Method Statement for approval by the Crossrail Central Project Archaeologist.

8.7.7 The assessment of results and statement of potential shall include the C254 Archaeology Contractor's conclusions based on the recorded data, e.g. the monument/site class represented, site/feature function and relevant parallels. The statement shall also comment on the potential of the data to address the projects' research themes. As appropriate, comment shall be made on the site as a whole and the individual components (e.g. artefactual, palaeo-environmental, economic). The statement shall utilise the criteria laid down by the Secretary of State for Culture, Media and Sport Criteria for Scheduling, to establish importance.

8.7.8 In reporting the results of the works, the accuracy of the original expectations and the appropriateness of the methods adopted shall be assessed by the C254 Archaeology Contractor in order to illustrate what level of confidence can be placed on the information. The C131 Designer's Archaeologist will use that information as the basis for developing any further mitigation strategy and/or further analysis and publication.

8.7.9 The report shall be illustrated with a site location plan, survey location plans as appropriate (to include archaeological interpretation of results), and individual trench and area plans identifying archaeological features exposed and investigated.

8.7.10 When submitted at evaluation stage, the report shall set out an outline recommendation for mitigation. This may include preservation in situ and/or further investigation and recording of the remains and/or watching brief. The development of a detailed mitigation strategy shall be progressed by the C131 Designer's Archaeologist in liaison with the Project Manager's engineering design team, the Archaeology Contractor, and the English Heritage Regional Science Advisor (and other statutory authority), as appropriate.

8.7.11 Copies of the Fieldwork Report shall be provided by the C131 Designer's Archaeologist to the LB Westminster and GLAAS for comment.

8.7.12 The following shall appear in the footer or header of each Fieldwork Report:

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8.8 SMR/HER Summary Sheet

8.8.1 The C254 Archaeology Contractor shall complete a GLSMR Summary Sheet for the works (i.e. one per fieldwork event). The Summary Sheet shall be included in the Fieldwork Report.

8.9 Summary Report

8.9.1 A short summary report of no more than 500 words (the Summary Report) for the works shall be prepared by the C254 Archaeology Contractor for submission to the C131 Designer's Archaeologist for subsequent publication within London Archaeologist or another local (county) journal or publication outlet specified by the Crossrail Central Project Archaeologist.

8.9.2 The C254 Archaeology Contractor shall submit the draft Summary Report to the C131 Designer's Archaeologist for approval within 8 weeks of the completion date of the fieldwork event. The C254 Archaeology Contractor shall allow two weeks in the programme of works for the C131 Designer's Archaeologist to provide comments. The C254 Archaeology Contractor shall include any amendments required by the C131 Designer's Archaeologist in the final Summary Report which shall be submitted within one week of receiving the C131 Designer's Archaeologist's comments on the draft report.

8.9.3 The Summary Report shall be submitted as an MS Word *.document in accordance with the Employer's information management standards and procedures.

8.10 Post excavation assessment

8.10.1 If instructed by the Crossrail Central Project Archaeologist, the C254 Archaeology Contractor shall undertake a post-excavation assessment of the site archive and submit a report of their findings to the C131 Designer's Archaeologist for approval. Assessment of potential for analysis shall be undertaken in accordance with English Heritage guidelines.

8.10.2 The C254 Archaeology Contractor shall provide details of its current post excavation assessment procedures with their Method Statement.

9 Site Monitoring & Progress Reports

9.1.1 Prior to commencing the works the C254 Archaeology Contractor shall agree a programme of weekly written progress reports and periodic progress meetings with the Crossrail Central Project Archaeologist an/or Project Manager and shall be represented at such meetings to the satisfaction of the Crossrail Central Project Archaeologist. The C254 Archaeology Contractor shall provide information describing progress on-site to date, the processing of samples and artefacts and feedback from any initial assessment.

9.1.2 The LB Westminster and GLAAS shall be informed in writing at least one week in advance of commencement of fieldwork by the C131 Designer's Archaeologist.

9.1.3 Periodic updates on the progress of the Crossrail archaeology programme shall be submitted to the LB Westminster and GLAAS by the C131 Designer's Archaeologist. The C254 Archaeology Contractor shall provide information to the C131 Designer's Archaeologist as requested to inform this reporting.

9.1.4 The C131 Designer's Archaeologist shall arrange and convene monitoring site visits by the LB Westminster and GLAAS, as appropriate. There shall be no unauthorised access to the works in any other circumstances. Any visits to the works shall be in accordance with the Principal Contractor's health and safety, site access and security requirements.

9.1.5 The C254 Archaeology Contractor may propose that archaeological excavation be carried out as an extension to evaluation works, if the scope of such work is readily incorporated into the SS-WSI. The detailed method for this work shall be agreed between the C254 Archaeology Contractor, the C131 Designer's Archaeologist at a site meeting and subsequently in writing between the C131 Designer's Archaeologist and the relevant external consultees.

10 Personnel requirements

10.1.1 The C254 Archaeology Contractor shall provide project personnel of experience as described below. The personnel shall be approved by the C131 Designer's Archaeologist. Approval may be withdrawn by the Employer at their discretion and in accordance with the contract conditions.

10.1.2 The C254 Archaeology Contractor shall submit CVs of all proposed personnel including any specialists, but excluding site technician grades, to the C131 Designer's Archaeologist for approval if this has not already been done as part of the pre-qualification process.

10.1.3 The works shall be managed, directed and staffed by appropriately qualified and experienced personnel. The C254 Archaeology Contractor's Key Person shall possess at least ten years relevant experience.

10.1.4 The excavation, sampling and recording of the works shall be directed in the field by a Fieldwork Director who is a Member of the Institute of Field Archaeologists (MIFA) The Fieldwork Director shall be on site throughout the fieldwork stages.

10.1.5 The C254 Archaeology Contractor's project team shall include an environmental archaeologist suitably qualified in archaeological science and geo-archaeological sediment description methods, and on site sample processing and assessment techniques.

10.1.6 The C254 Archaeology Contractor's project team shall be staffed by technician grades with minimum six months experience in appropriate aspects of excavation and recording.

10.1.7 Specialist staff employed on any aspect of the works, including post-excavation assessment or analysis of any kind including the writing of reports, shall be suitably qualified and shall be supervised by personnel with a minimum of ten years of relevant experience in their field (this may be inclusive of post-graduate studies).

10.1.8 Specialist staff shall be available, normally at 24 hours notice, for the duration of the works to provide advice on any specialist tasks to be undertaken.

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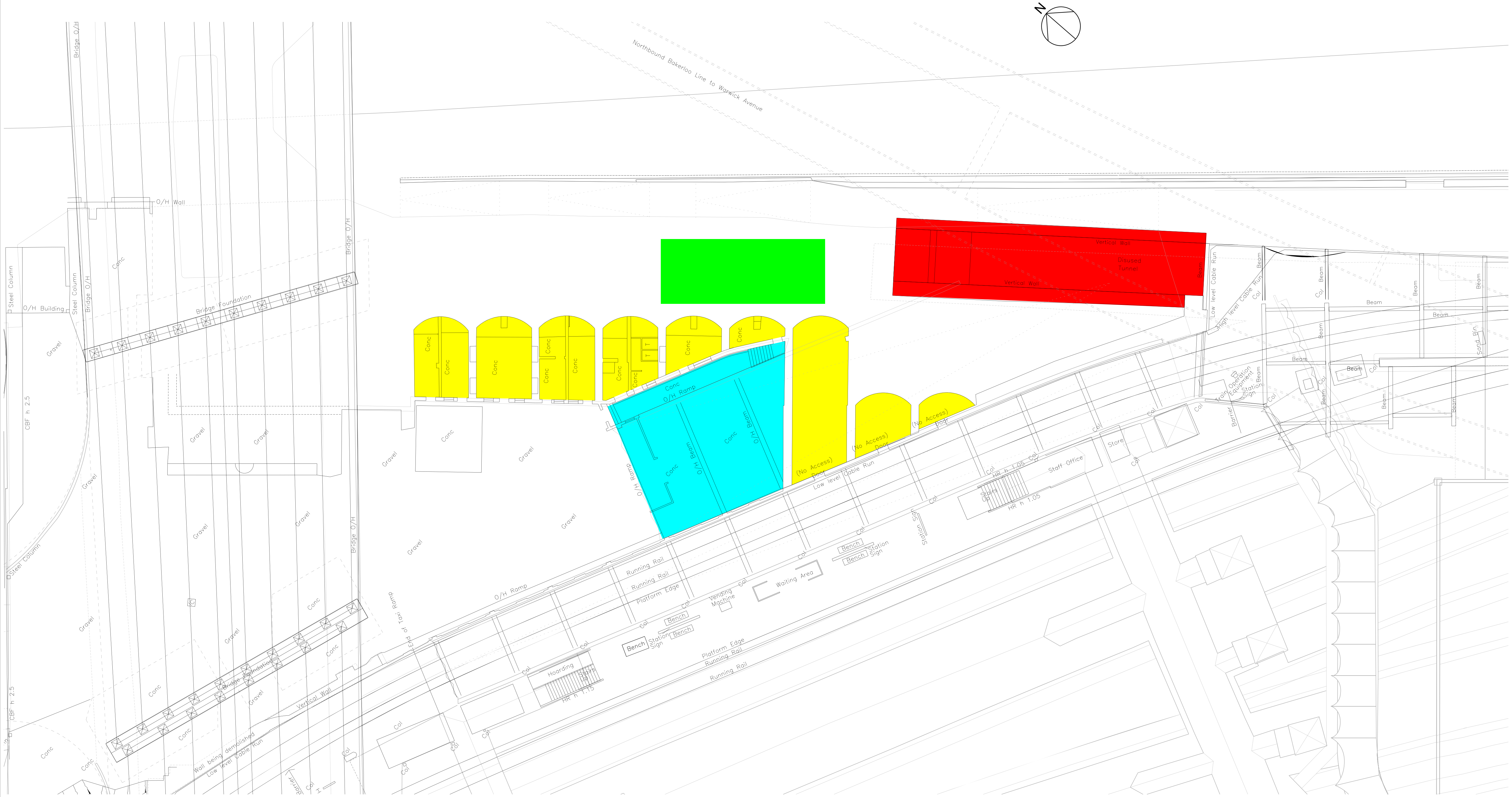
Annex 1 – Plans and Other Illustrations

The following drawings are attached:

- C131-MMD-S-DDL-B071_Z-41000
- C131-MMD-S-DDL-B071_Z-41001
- C131-MMD-S-DDL-B071_Z-41007
- C131-MMD-S-DDL-B071_Z-41012

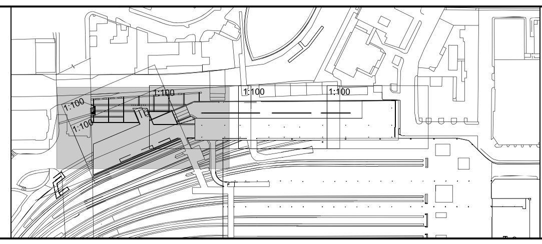
Legend

- Shunt Tunnel
- Former Stable Block
- Goods Ramp
- Historic Street Surface



P01	27/01/2010	First Issue	AB	SE	CL	
P02	22/12/2010	Issued for inclusion in document C131-MMD-T1-RGN-B071-00002	AB	TA	CG	
Rev.	Date	Description	By	Chkd	App	Auth

Notes



Crossrail

Crossrail Limited
25 Canada Square
Canary Wharf
London
E14 5LQ

www.crossrail.co.uk

Contract : Paddington Integrated Project (PIP)

Originator : Mott MacDonald Limited

Location : Paddington Stn Bakerloo Praed Street

Title : Non Listed Built Heritage Location Plan

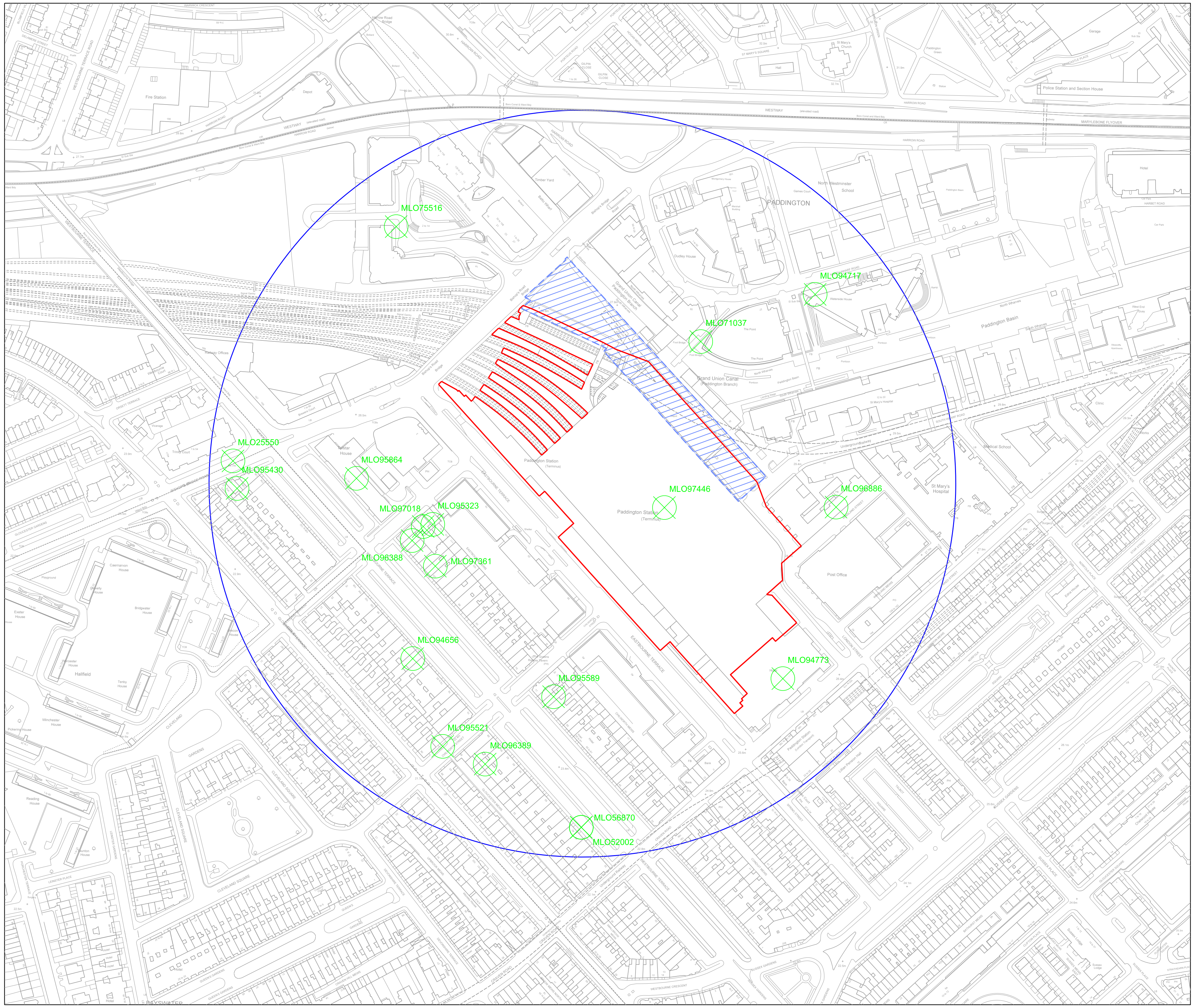
By : A.BARKER
Chk : T.ABBOTT
App : C.GARNETT
Auth :

Scale : NTS@ A1 | Drawing and CAD file No : C131-MMD-S-DDL-B071_Z-41000 | Rev : P02 | Suitability : S4

Fit for authorisation

RESTRICTED

Copy Approved for Design - Created: 22-DEC-2010



Key

MLO97446 — Greater London Site and monuments Record

PIP Worksite

Curtilage of Grade I Listed Paddington Station

Search Area

N

Scale 1:2000

40m 0 40m 80m 120m 160m 200m

Fit for authorisation

Rev.	Date	Description	By	Chkd	App	Auth
P01	27/01/2010	First Issue	AB	SE	CL	
P02	28/01/2010	---	AB	SE	CL	
P03	01/02/2010	---	AB	JR	CG	
P04	22/12/2010	Issued for inclusion in document C131-MMD-T1-RGN-B071-00002	AB	TA	CG	

Notes

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25 Canada Square
Canary Wharf
London
E14 5LQ

www.crossrail.co.uk

Contract : Paddington Integrated Project (PIP)

Originator : Mott MacDonald Limited

Location : Paddington Stn Bakerloo Praed Street

Title : Archaeological Baseline - PIP

By : A.BARKER
Chk : T.ABBOTT
App : C.GARNETT
Auth :

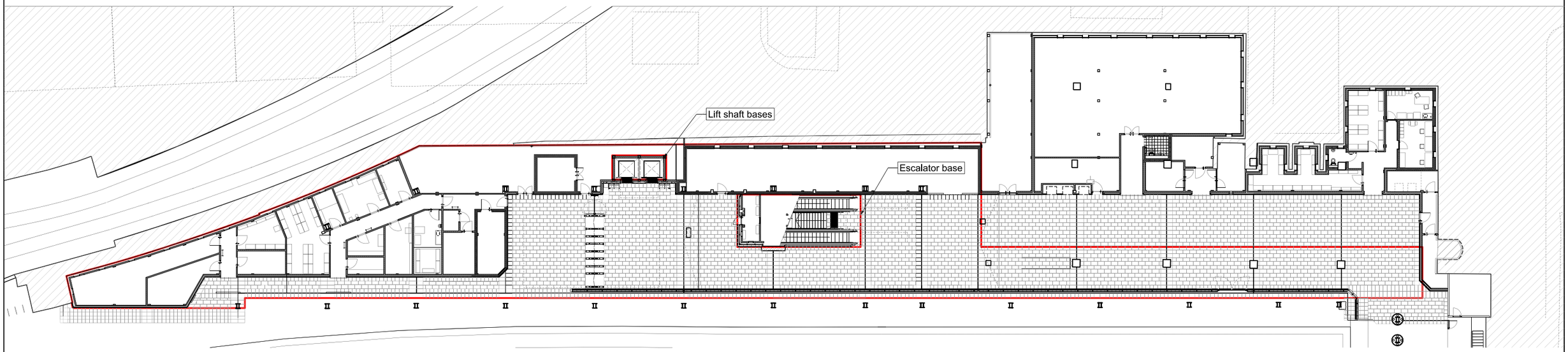
Scale : NTS@ A1

Drawing and CAD file No : C131-MMD-S-DDL-B071_Z-41001

Rev : P04

Suitability : S4

RESTRICTED

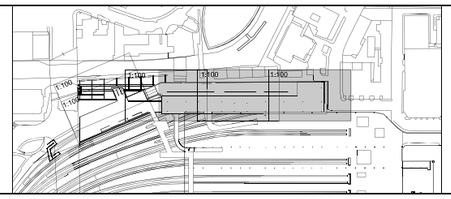


Key

General and Targeted Watching Brief Area

Rev.	Date	Description	By	Chkd	App	Auth
P01	19/11/2010	First Issue	AB	TA	JD	---
P02	22/12/2010	Issued for Inclusion In document C131-MMD-T1-RGN-B071-00002	AB	TA	CG	---

Notes



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London
E14 5LQ

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Contract : Paddington Integrated Project (PIP)
Originator : Mott MacDonald Limited
Location : Paddington Stn Bakerloo Praed Street
Title : Non Listed Built Heritage - Platform 12 Site General & Targeted Watching Brief Area
By : A.BARKER
Chk : T.ABBOTT
App : C.GARNETT
Auth : ---
Scale : NTS@ A1
Drawing and CAD file No : C131-MMD-S-DDL-B071_Z-41007
Rev : P02
Suitability : S4

Fit for authorisation

RESTRICTED

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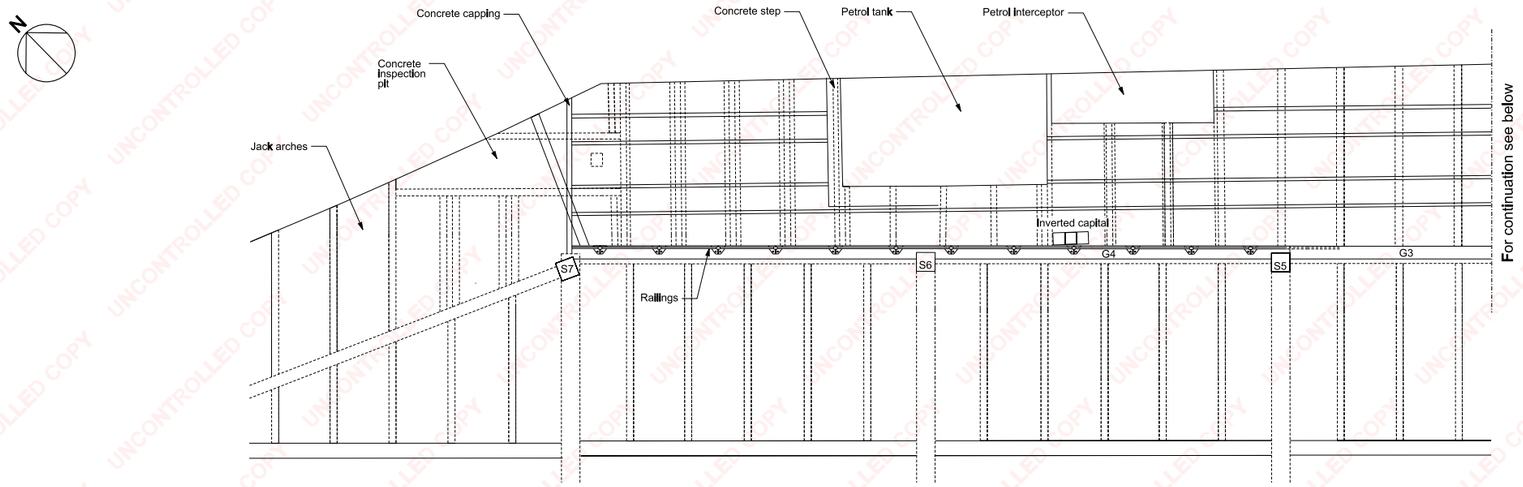

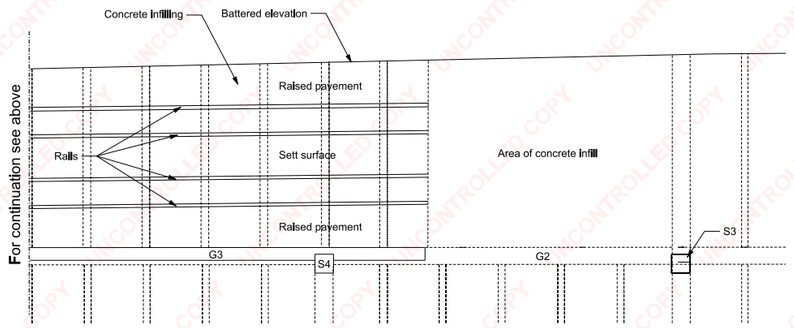

2m 0 2m 4m 6m 8m 10m

Rev.	Date	Description	By	Chkd	App	Auth
P01.1	23/11/2010	Issued for Inclusion in doc C131-MMD-T1-RAN-B071-0001		—	—	—

Notes

Legend

Elements at ramp level

Elements above ramp

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Canary Wharf
London
E14 5LQ

www.crossrail.co.uk

Contract: Paddington Integrated Project (PIP)

Originator: Mott MacDonald Limited

Location: Paddington Stn Bakerloo Praed Street

Title: Historic Building Recording
London Street Deck - Milk Ramp
Plan
Figure 1

By: A.BARKER

Chk: —

App: —

Auth: —

Scale: 1:100@ A1

Drawing and CAD file No.: C131-MMD-S-DDL-B071_Z-41012

Rev: P01.1

Suitability: S0

RESTRICTED

Work in progress

Annex 2 – Programme and Order of Work for Implementation of Works and Integration with Other Activities

Actual Work | Remaining Work | Critical Remaining Work | Remaining Level of Effort | Actual Level of Effort | Milestone

Activity ID	Activity Name	Start	Finish	TF	RD
A6350	Erect Hoarding for new cycle store	04/02/11	07/02/11	1d	2d
A6360	Construct new Cycle store - canopy / cycle racks etc....	08/02/11	21/02/11	1d	10d
Hoardings & Crashdeck		08/02/11	14/02/11	2d	5d
A6410	Erect Hoarding GL 13-3 along platform 12 - line of existing columns	08/02/11	10/02/11	1d	3d
A6430	Install Temporary and Permanent ties to soffit of deck beams	11/02/11	14/02/11	1d	2d
A6435	Install Temporary Crash Deck	11/02/11	14/02/11	2d	2d
Main Works		11/02/11	13/01/12	1d	226d
Phase 1 Works (Grids 2.5-13)		11/02/11	02/09/11	33d	141d
Preliminary Works		11/02/11	15/02/11	5d	3d
A6420	Takedown existing glass block wall	11/02/11	15/02/11	5d	3d
A6440	Strip out NR Drip tray & existing services. Protect / identify live services and protect. Establish	11/02/11	15/02/11	5d	3d
RSD Opening Up Works		15/02/11	24/02/11	1d	8d
A6460	Sawcut RSD slab escalator opening, takeup and dispose	15/02/11	16/02/11	1d	2d
A6480	Remove jack arches escalator opening	16/02/11	18/02/11	1d	3d
A6470	Sawcut RSD slab milkramp opening, takeup and dispose	17/02/11	18/02/11	3d	2d
A6520	Crane in plant and equipment	21/02/11	21/02/11	1d	1d
A6510	Establish materials handling through escalator opening	21/02/11	21/02/11	1d	1d
A6500	Remove Joists escalator opening	21/02/11	22/02/11	1d	2d
A6530	Remove Joists milkramp opening	23/02/11	24/02/11	1d	2d
A6535	Remove Temporary Crash Deck	23/02/11	24/02/11	1d	2d
Platform Level Works Grids 9-13		22/02/11	14/04/11	11d	38d
A6550	Sawcut and breakout floor slab (200thk) grids 9-13 (NIGHT) 317m2	22/02/11	25/02/11	1d	4d
A6560	Sawcut and breakout floor slab (200thk) grids 9-13 (NIGHT) 317m2	04/03/11	04/03/11	1d	1d
A6570	install shallow drainage / gullies grids 9-13	07/03/11	09/03/11	1d	3d
A6580	Excavate / Blind grids 9-13	10/03/11	14/03/11	1d	3d
A6600	Remedial work to columns/beams/walls/soffits gids 9-3	21/03/11	22/03/11	3d	2d

carillion

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Bracknell, Berkshire,RG12 2UP.
Tel 01344828500
Fax 01344828691

Client: **Crossrail**

Project: **Paddington Intergrated Project C272**

Title: **Construction Programme**

Programme No: C272-CAR-Z9-TPG-B071-00001 Rev 0
Comment: First Issue For Acceptance
Prepared By: DH
Date Issued: 17/11/10 Printed: 17/11/10

Actual Work | Remaining Work | Critical Remaining Work | Remaining Level of Effort | Actual Level of Effort | Milestone

Activity ID	Activity Name	Start	Finish	TF	RD
A6610	Remedial work to columns/beams/walls/soffits gids 9-3 (NIGHT)	21/03/11	22/03/11	3d	2d
A6590	DPM/Insulation/Concrete Slabs grids 9-13	15/03/11	24/03/11	1d	8d
A6620	Remedial work to columns/beams/walls/soffits gids 9-3	25/03/11	28/03/11	1d	2d
A6630	Remedial work to columns/beams/walls/soffits gids 9-3 (NIGHT)	25/03/11	28/03/11	1d	2d
A6650	Erect steelwork grids 9-13 (NIGHT)	29/03/11	30/03/11	1d	2d
A6640	Erect steelwork grids 9-13	29/03/11	30/03/11	1d	2d
A6660	Deck/Rebar/Concrete roof slab 9-13	31/03/11	04/04/11	11d	3d
A6670	Deck/Rebar/Concrete roof slab 9-13 (NIGHT)	31/03/11	04/04/11	11d	3d
A6680	Brickwork/Blockwork (NIGHT)	05/04/11	13/04/11	11d	7d
A6690	Brickwork	05/04/11	13/04/11	11d	7d
A6700	Floor Screeds Rooms / Concourse	07/04/11	14/04/11	11d	6d
A6710	Ready for M&E Installation		14/04/11	11d	0d
Platform Level Works to Escalator Pit		02/03/11	24/03/11	1d	17d
A6730	Sawcut and breakout floor slab (200thk) for Escalator and other pits	02/03/11	02/03/11	1d	1d
A6740	Excavate and expose existing column foundation	03/03/11	03/03/11	1d	1d
A6750	Excavate/stitch/concrete foundation widening	04/03/11	04/03/11	1d	1d
A6760	Excavate for escalator pit	07/03/11	08/03/11	1d	2d
A6770	Backblind escalator pit walls and column foundations	09/03/11	10/03/11	1d	2d
A6780	Backblind escalator pit walls and column foundations	09/03/11	10/03/11	1d	2d
A6790	FRC Escalator Pit Base	11/03/11	14/03/11	1d	2d
A6800	FR Escalator Pit Base (NIGHT)	11/03/11	14/03/11	1d	2d
A6810	FRC Escalator Pit Walls	15/03/11	17/03/11	1d	3d
A6820	FRC Escalator Pit Walls (NIGHT)	15/03/11	17/03/11	1d	3d
A6830	Saw Cut and breakout corner of existing column base	18/03/11	18/03/11	1d	1d
A6840	Saw Cut and breakout corner of existing column base (NIGHT)	18/03/11	18/03/11	1d	1d
A6850	Prop foundation and excavate to formation	21/03/11	21/03/11	1d	1d

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Activity ID	Activity Name	Start	Finish	TF	RD
A6870	FR Escalator Pit Base corner	22/03/11	22/03/11	1d	1d
A6860	FRC Escalator Pit Base corner	22/03/11	22/03/11	1d	1d
A6880	FR Escalator Pit Corner Walls	23/03/11	23/03/11	1d	1d
A6890	FR Escalator Pit Corner Walls (NIGHT)	23/03/11	23/03/11	1d	1d
A6900	Remove sheets and backfill Escalator Pit Corner Walls	24/03/11	24/03/11	1d	1d
Milk Ramp Works		25/02/11	11/03/11	17d	11d
A6920	Breakout Milk Ramp Slab, Tank and dispose	25/02/11	03/03/11	1d	5d
A6930	Breakout Milk Ramp Slab Tank, and dispose (NIGHT)	25/02/11	03/03/11	1d	5d
A6940	Cut up and crane out Milk Ramp Steelwork	04/03/11	11/03/11	17d	6d
RSD Level Works to Milk Ramp Opening		05/04/11	15/04/11	1d	9d
A6960	Install new joists grids 6-9	05/04/11	08/04/11	1d	4d
A6970	FRC new deck grids 6-9	06/04/11	12/04/11	1d	5d
A6980	Install new joists grids 5-6	13/04/11	13/04/11	1d	1d
A6990	FRC new deck grids 5-6	14/04/11	15/04/11	1d	2d
Platform Level Works Grids 6-9		25/02/11	19/04/11	9d	37d
A7010	Sawcut and breakout floor slab (200thk) grids 6-9 (NIGHT) 416m2	25/02/11	04/03/11	1d	6d
A7020	install deep drainage / gullies grids 6-9	02/03/11	08/03/11	1d	5d
A7030	Sawcut and breakout floor slab (200thk) grids 6-9 (NIGHT) 416m2	09/03/11	10/03/11	1d	2d
A7060	Excavate / Blind Lift Pit	11/03/11	11/03/11	1d	1d
A7040	install shallow drainage / gullies grids 6-9	11/03/11	11/03/11	1d	1d
A7050	install shallow drainage / gullies grids 6-9	11/03/11	11/03/11	1d	1d
A7080	FRC Lift Pit Base	14/03/11	15/03/11	1d	2d
A7090	FRC Lift Pit Base (NIGHT)	14/03/11	15/03/11	1d	2d
A7070	Excavate / Blind grids 6-9	14/03/11	15/03/11	3d	2d
A7100	FRC Lift Pit Walls	16/03/11	17/03/11	1d	2d
A7110	FRC Lift Pit Walls (NIGHT)	16/03/11	17/03/11	1d	2d

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Activity ID	Activity Name	Start	Finish	TF	RD
A7120	Excavate / Blind grids 6-9	18/03/11	21/03/11	1d	2d
A7140	Remedial work to columns/beams/walls/soffits gids 6-9	28/03/11	30/03/11	2d	3d
A7150	Remedial work to columns/beams/walls/soffits gids 6-9 (NIGHT)	28/03/11	30/03/11	2d	3d
A7130	DPM/Insulation/Concrete Slabs grids 6-9	22/03/11	31/03/11	1d	8d
A7210	Remedial work to columns/beams/walls/soffits gids 6-9 (NIGHT)	01/04/11	01/04/11	1d	1d
A7200	Remedial work to columns/beams/walls/soffits gids 6-9	01/04/11	01/04/11	1d	1d
A7160	Erect steelwork grids 6-9	31/03/11	04/04/11	1d	3d
A7170	Erect steelwork grids 6-9 (NIGHT)	31/03/11	04/04/11	9d	3d
A7180	Deck/Rebar/Concrete roof slab 6-9	04/04/11	06/04/11	9d	3d
A7190	Deck/Rebar/Concrete roof slab 6-9	04/04/11	06/04/11	9d	3d
A7230	Brickwork/Blockwork (NIGHT)	07/04/11	18/04/11	9d	8d
A7220	Brickwork/Blockwork	07/04/11	18/04/11	9d	8d
A7240	Floor Screeds Rooms / Concourse	11/04/11	18/04/11	9d	6d
A7250	Ready for M&E Installation	19/04/11		9d	0d
Platform Level Works Grids 2.5-6		22/02/11	04/05/11	1d	48d
A7270	Sawcut and breakout floor slab (200thk) grids 2.5-6 (NIGHT)	22/02/11	24/02/11	1d	3d
A7280	install deep drainage / gullies grids 2.5-6	24/02/11	02/03/11	1d	5d
A7290	install deep drainage / gullies grids 2.5-6 (NIGHT)	24/02/11	02/03/11	1d	5d
A7300	Sawcut and breakout floor slab (200thk) grids 2.5-6 (NIGHT)	22/03/11	22/03/11	4d	1d
A7310	Excavate for column foundations and sheets	23/03/11	23/03/11	4d	1d
A7320	Excavate for column foundations and sheets (NIGHT)	23/03/11	23/03/11	4d	1d
A7330	FRC Column Foundations	24/03/11	25/03/11	4d	2d
A7340	FRC Column Stubs	25/03/11	25/03/11	4d	1d
A7350	Excavate / Blind grids 2.5-6	30/03/11	31/03/11	2d	2d
A7360	DPM/Insulation/Concrete Slabs grids 2.5-6	04/04/11	07/04/11	1d	4d
A7370	Excavate / Blind grids 2.5-6	11/04/11	12/04/11	1d	2d

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Activity ID	Activity Name	Start	Finish	TF	RD
A7380	DPM/Insulation/Concrete Slabs grids 2.5-6	12/04/11	15/04/11	1d	4d
A7390	Erect steelwork grids 2.5-6	18/04/11	19/04/11	1d	2d
A7400	Erect steelwork grids 2.5-6 (NIGHT)	18/04/11	19/04/11	1d	2d
A7410	Deck/Rebar/Concrete roof slab 2.5-6	20/04/11	21/04/11	1d	2d
A7420	Deck/Rebar/Concrete roof slab 2.5-6 (NIGHT)	20/04/11	21/04/11	1d	2d
A7440	Brickwork/Blockwork (NIGHT)	26/04/11	03/05/11	1d	5d
A7430	Brickwork	26/04/11	03/05/11	1d	5d
A7450	Floor Screeds Rooms / Concourse	28/04/11	03/05/11	1d	3d
A7460	Ready for M&E Installation	04/05/11		1d	0d
RSD Level Works to Escalator Opening		07/04/11	11/05/11	16d	22d
A7480	Install megashores to support RSD above	07/04/11	07/04/11	1d	1d
A7490	Cut and remove sections of RSD main beams (NIGHT)	07/04/11	07/04/11	1d	1d
A7500	Install new columns/beams	08/04/11	08/04/11	1d	1d
A7510	Install escalator opening frame and connect to existing (NIGHT)	08/04/11	11/04/11	5d	2d
A7520	FRC to Column Encasement (NIGHT)	11/04/11	11/04/11	5d	1d
A7530	FRC to Column Encasement	11/04/11	12/04/11	5d	2d
A7550	Install Falsework for concrete works (NIGHT)	13/04/11	13/04/11	5d	1d
A7540	Install Falsework for concrete works	13/04/11	13/04/11	5d	1d
A7560	FRC to Beam Encasement	14/04/11	18/04/11	5d	3d
A7570	FR to Beam Encasement (NIGHT)	14/04/11	18/04/11	5d	3d
A7580	Remove Falsework for concrete works (NIGHT)	26/04/11	26/04/11	5d	1d
A7600	FRC apron slab around escalator opening	27/04/11	04/05/11	16d	5d
A7590	Install Escalator Stairs	27/04/11	04/05/11	16d	5d
A7610	FRC walls around escalator opening	05/05/11	11/05/11	16d	5d
Mechanical and Electrical Works		12/05/11	18/08/11	28d	70d
A7690	M&E - Fitout Lift Motor Room (1 split system AC, 1 DB, Electrical, FAVA)	12/05/11	09/06/11	33d	20d

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Activity ID	Activity Name	Start	Finish	TF	RD
A7700	M&E - Fitout 9 Retail Stores (Ductwork, Electrical, FAVA)	02/06/11	06/07/11	1d	25d
A7650	M&E - Fitout Vent P/Rm 1 (P408) (1 AHU, 2 PEF, 2 EEF, 1EF, 1 MCC, Ductwork, Electrical, FAVA)	03/06/11	07/07/11	0d	25d
A7660	M&E - Fitout Switchroom (P406) (2 Sw/Bds, 4 DBs, Electrical, FAVA)	03/06/11	07/07/11	0d	25d
A7710	M&E - Commission New Retail Stores (1 AHU, 1EF, 1 MCC, Lighting & Sm Pwr, FAVA)	07/07/11	20/07/11	1d	10d
A7670	M&E - Fitout Gate Line Switchroom (P407) (1 Ticket Barrier DB)	08/07/11	04/08/11	38d	20d
A7680	M&E - Fitout CER (P405) (2 split system ACs, 1 UPS, 2 DBs, 7 cabinets?, Raised Floor?, Ductwork,	24/06/11	04/08/11	0d	30d
A7720	M&E - Fitout Left Luggage (Temporary Vent, 1 DB, Electrical, FAPA)	08/07/11	11/08/11	0d	25d
A7730	M&E - Commission Left Luggage (1 AHU, 1 EF, 1 MCC, Lighting & Sm Pwr, FAPA, Comms?)	05/08/11	18/08/11	0d	10d
Install Lifts and Escalators		12/05/11	02/09/11	33d	80d
A7750	Install escalators structural elements	12/05/11	25/05/11	16d	10d
A7760	Fit out and commission escalators	26/05/11	07/07/11	73d	30d
A7770	Lift installation	10/06/11	02/09/11	33d	60d
Floor Finishes, Furniture and Ceilings grids 2.5-13		04/05/11	02/09/11	33d	86d
A7790	All concourse floor screeds complete grids 2.5-13		04/05/11	69d	0d
A7800	Const floor finishes from grid 13 to 2.5	04/05/11	08/06/11	69d	25d
A7810	complete wall finishes and ceiling	02/06/11	15/06/11	69d	10d
A7820	Install New Gate line	29/07/11	11/08/11	38d	10d
A7830	commission gate line	12/08/11		38d	0d
A7840	M&E - Install Concourse Lighting, FAPA, CCTV	12/08/11	02/09/11	33d	15d
Phase 2 Works (Remaining Areas)		21/07/11	13/01/12	1d	116d
Preliminary Works		21/07/11	08/08/11	1d	13d
A7870	Adjust hoarding & relocate existing retail storage units (NIGHT)	21/07/11	25/07/11	1d	3d
A7880	Incorporate old retail storage units within site and demolish walls	26/07/11	08/08/11	1d	10d
Platform Level Works (old retail storage areas)		09/08/11	29/09/11	1d	37d
A7900	Breakout remaining floor slab old retail storage areas(200thk)(NIGHT)	09/08/11	11/08/11	1d	3d
A7910	install drainage / gullies new future use rooms	12/08/11	18/08/11	1d	5d

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Activity ID	Activity Name	Start	Finish	TF	RD
A7920	Excavate / Blind new future use rooms	19/08/11	25/08/11	1d	5d
A7930	DPM/Insulation/Concrete Slabs new future use rooms	23/08/11	31/08/11	1d	6d
A7940	Remedial work to columns/beams/walls/soffits new future use rooms	01/09/11	05/09/11	1d	3d
A7950	Remedial work to columns/beams/walls/soffits new future use rooms (NIGHT)	01/09/11	05/09/11	1d	3d
A7960	Erect steelwork new future use rooms	06/09/11	08/09/11	1d	3d
A7970	Erect steelwork grids new future use rooms (NIGHT)	06/09/11	08/09/11	1d	3d
A7980	Deck/Rebar/Concrete roof slab new future use rooms	09/09/11	20/09/11	1d	8d
A7990	Brickwork/Blockwork new future use rooms	15/09/11	26/09/11	2d	8d
A8000	Brickwork / Blockwork new future use rooms (NIGHT)	15/09/11	26/09/11	1d	8d
A8010	Floor Screeds Rooms / Concourse	22/09/11	29/09/11	1d	6d
Relocate Left Luggage Facilities		19/08/11	31/08/11	1d	8d
A8040	Relocate left luggage office / facilities to new location (link route to left luggage)	19/08/11	22/08/11	0d	2d
A8050	Modify hoardings & demolish existing left luggage facility & form public route to new left luggage	19/08/11	22/08/11	0d	2d
A8060	Demolish section of existing block glass wall	23/08/11	31/08/11	1d	6d
Platform Level Works (old left luggage area)		23/08/11	14/09/11	0d	16d
A8080	Breakout remaining floor slab old left luggage area (200thk)(NIGHT)	23/08/11	25/08/11	0d	3d
A8090	Excavate / Blind old left luggage area	26/08/11	02/09/11	0d	5d
A8100	DPM/Insulation/Concrete Slabs old left luggage area	31/08/11	07/09/11	0d	6d
A8110	Remedial work to columns/beams/walls/soffits old left luggage area	08/09/11	12/09/11	0d	3d
A8120	Remedial work to columns/beams/walls/soffits old left luggage area (NIGHT)	08/09/11	12/09/11	0d	3d
A8130	Floor Screeds Rooms / Concourse	07/09/11	14/09/11	0d	6d
Floor Finishes, Furniture and Ceilings (concourse area)		12/08/11	19/10/11	0d	48d
A8200	Remove part of old gate line, relocate buggy access & install glass partition	12/08/11	18/08/11	38d	5d
A8150	All concourse floor screeds complete		14/09/11	0d	0d
A8160	Const floor finishes concourse area	15/09/11	12/10/11	0d	20d
A8170	complete wall finishes and ceilings concourse area	06/10/11	19/10/11	0d	10d

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Annex 3 – Gazetteer of Archaeological Sites for PIP

Archaeology

Record ID	Name	Description	Subject(a)	Period(a)	OS Grid Ref
MLO71037	12-20 Praed St, W2	A borehole survey of the site indicates river terrace gravel at depths of between 4.5-4.8m below ground level. This is capped by good survival of brickearth in turn overlain by made ground, which may include archaeological strata. **PRA98.** Natural gravels were overlaid in the W of the site by a cultivated soil that was cut, probably from a higher level, by some minor undated gullies. Fragmentary evidence was recorded in the NW of the site for the construction and subsequent repair or rebuilding of the canal basin which was opened in 1801, forming the terminus of the Paddington branch of the Grand Union Canal. A construction trench for the canal sidewall was recorded (and found to be nearly a metre higher than the present water level in the canal). A relatively deep cut had been made in the centre of the site, and later backfilled with imported gravel: this may have represented a dock on the S side of the canal basin, similar to two docks running a short distance eastwards from the E end of the basin that were infilled by the 1960s. The southern dock could have been associated with a warehouse - a Grade II listed building - still standing at the SW corner of the basin. This was built c1840, and includes a timber-framed barge canopy (a roof partly extending over the canal basin). Features that presumably belonged to other 19th-c and later buildings associated with the use of the canal basin, such as brick-lined drains, a cesspit and wall foundations, were found in all parts of the site. These were truncated and overlaid by extensive dumps of building debris and imported gravels levelling up the site. The southernmost corner of the site was cut by a railway tunnel in 1860, the first stretch of urban underground railway ever built.	Borehole	Unknown	TQ 2659 8151
MLO52002	Paddington	An additional supply for the City conduit came from springs in Ox Lese/Ox Close. Water was brought to Stratford Place, and it would have required a deep ditch to carry it across the high ground at Marble Arch.	Conduit	Medieval Post-medieval	TQ 2763 8105
MLO56870	Westbourne Terrace (Junction with)	Conduit head	Conduit	Unspecified	TQ 2650 8110
MLO25550	Paddington Goods Yard	Post medieval (19th century) pottery dump encountered during evaluation PGY90 and find spot	Feature	Post-medieval	TQ 2620 8140
MLO75516	Paddington Goods Yard, City of Westminster	No archaeological deposits encountered during a watching brief in 2000. **PYD00.** Above a layer of gravel some masonry and brick walls were recorded, probably part of the mid-20th-c goods yard infrastructure. Otherwise, the site was truncated above the natural clay.	Negative evidence	-	TQ 2633 8160

Record ID	Name	Description	Subject(a)	Period(a)	OS Grid Ref
	Praed Street, South Wharf Road, Paddington, W2	PED01. The architectural and historic interest of 17 buildings between Praed Street, and paddington Canal Basin, was assessed before possible redevelopment. The buildings include converted early 19th-c brick canal-side warehouses, system-built NHS buildings of 1948-70, and a ten-storey general hospital, built 1983-87. Two buildings are listed Grade II. The Clarence Memorial Wing (where Fleming discovered penicillin in 1928), built in 1893-1904, has a flamboyantly galleried and turreted front on Praed Street but is severely utilitarian behind. The Mint Wing to the W, a large brick building around a courtyard, built 1875-77 by the Great Western Railway Company as a parcels depot and ramped multi-storey stables for 600 horses serving Paddington Station, was converted to hospital use in the 1960s. The original charity hospital for the poor was built in 1845-51, later in the 19th c it was extended to the W, and with modifications forms the present Cambridge and Mary Stanford Wings. A dispensary of 1883 survives to the N, as may parts of a medical school anatomy museum of 1854; cast-iron galleries to the W are possibly unfinished. Redevelopment in a 'neo-Georgian imperial' style began with the Lindo Wing, for paying patients, built in 1933-37, the present Imperial College Medical School, 1931-33, and the nurses' quarters, 1936-37. The school was completed partly in this style in 1954-58 and partly in concrete and glass in 1968. On South Wharf Road early 20th-c offices and warehouses became the headquarters of an engineering company in c. 1951, and the street front was rebuilt in a modernist style, including a show-window of blue glass in vertical prisms, stainless steel doors and brazed and stainless steel door and window frames. The world's first stretch of urban underground railway, opened 1863 bisects the site.	Historic buildings assessment	19th to 20th century	TQ 2680 8140; TQ 2656 8148; TQ 2667 8134; TQ 2696 8149

Listed Buildings

Record ID	Description	Reference	Period(a)	Grade
MLO94656	**Railings, Terrace.** TQ 2681 SW CITY OF WESTMINSTER WESTBOURNE TERRACE, W2 51/17 (south-west side) 5.2.70 Nos 70 to 106 (even) (including 1 to 3 (consec.) Chilworth St). GV II Grand terrace of houses. Circa 1840 (probably by William King and William Kingdom). Stucco. Some slate mansards. 4 storeys, full attic storey to centre houses and later attic with C20 windows to Nos 70-72. Each house 2 windows wide. Centre 7 houses and end pairs break forward slightly with rusticated quoins. Channelling to ground floor. Projecting Greek Doric porches, colonnade to ground floor of centre pair. Panelled studded doors. Continuous first floor bombé balcony. First floor windows pedimented and flanked by fluted Corinthian columns. Second floor windows corniced. All windows architraved above ground floor. Mainly sashes, plate glass; French casements to first floor. Guilloche band above second floor. Rich dentil cornice above third floor (removed to Nos 70,72,86, 88 and simplified to Nos 74,76 and 78). Subsidiary cornice to attic of centre houses. Cast iron area railings. Returns to left and right with 3 storey semicircular bow windows. Integral part of grand scheme with other houses in Westbourne Terrace. The London Encyclopedia, B Weinreb and Hibbert (Eds), 1983, p.942. Listing NGR: TQ2635581238	207568	1820 to 1860	II

MLO95323	**1 Cleveland Terrace.** TQ 2681 SW CITY OF WESTMINSTER CLEVELAND TERRACE, W2 51/11 (south side) 9.1.70 No 1 (formerly listed as No 15) GV II Terraced house. Mid C19. Stucco. Roof not visible. 4 storeys. 5 bays wide above ground floor. Rusticated quoins. Ground floor rusticated with 3 arches, semi-circular except for left hand arch which is a segmental-headed carriageway, leading to Eastbourne Mews. Small round headed window between centre and right hand ground floor windows. All windows architraved above ground floor. Centre 3 windows to first floor united beneath cornice, with flanking continuous columns. Square-headed windows to centre and outer bays. Round-headed windows between second floor windows corniced. Square-headed; central triparite window with triangular pediment, outer windows with segmental pediments. Decorative band above third floor. Fourth floor windows in the form of "Caernarvon arches". Cornice above fourth floor. Listing NGR: TQ2636981351	209226	1833 to 1866	II
MLO97361	**109, 111, 113, 115, 117, 119 Westbourne Terrace.** TQ 2681 SW CITY OF WESTMINSTER WESTBOURNE TERRACE, W2 51/8 (south-west side) 5.2.70 Nos 108 to 136 GV II Grand terrace of houses. Circa 1840. Probably by William King and William Kingdom. Stucco. Some slate mansards. 4 storeys, some attic mansards but full attic storeys to centre 5 houses and end pairs. Each house 2 windows wide. Centre 5 houses and end pairs break forward slightly with rusticated quoins. Channelling to ground floor. Projecting Greek Doric porches. Panelled studded doors. Continuous first floor bombé balcony to first floor windows, originally pedimented (mostly removed) and flanked by fluted Corinthian columns. Second floor windows corniced. All windows architraved above ground floor. Mostly sashes, plate glass. Guilloche band above second floor. Rich dentil cornice above third floor (simplified) and subsidiary cornice to attic. Cast iron area railings. Returns to left and right, with 2 storey semicircular bow windows. Integral part of grand scheme with other houses in Westbourne Terrace. The London Encyclopedia, B Weinreb and C Hibbert (Eds), 1983, p.942. Listing NGR: TQ2637281316	207569	1820 to 1860	II
MLO95430	**21 and 23 Bishops Bridge Road.** TO 2681 SW CITY OF WESTMINSTER BISHOP'S BRIDGE ROAD W2 51/43 (south side) Nos 21 and 23 GV II Pair of terraced house, mid C19. Stucco. Roof not visible. 4 storeys and attic. Each house 2 windows wide (plus extra splayed bay to No 23). Channelling to ground floor. Doric porches. Panelled doors to 1st floor. Continuous cast iron bombé balcony. Square headed windows; architraves above ground floor; cornices to first and second floor. Guilloche band above second floor. Dentil cornice above third floor. Subsidiary cornice to attic. Cast iron area railings. Included for group value only. Listing NGR: TQ2620481377	208706	1833 to 1866	II
MLO94717	**35 North Wharf Road.** TQ 2681 NE CITY OF WESTMINSTER NORTH WHARF ROAD, W2 41/7 (south side) 5.2.70 No 35 - II House. Early-mid C19. Yellow stock brick. Welsh slate roof. 2 storeys, 3 bays. Central round-arched doorway contains panelled door with fanlight, reeded jambs and heads with stops decorated with roundels. Projecting eaves. - Hipped roof. Listing NGR: TQ2668581552	421611	1800 to 1866	II
MLO96389	**34, 36, 38, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 58, 60, 61, 62, 63, 64, 65, 66, 67 Westbourne Terrace.** TQ 2681 SE CITY OF WESTMINSTER WESTBOURNE TERRACE, W2 52/26 (south-west side) TQ 2681 SW 51/26 No 32 (Royal Eagle Hotel) and Nos 34 to 5-2-70 68 (even) GV II Terrace. 1840s. Probably by William King and William Kingdom. Brick, stuccoed and channelled to ground floor. Roof concealed. 4 storeys and basement with attic to central 12 bays and 4-bay ends. Symmetrical composition with emphasised centre and ends: 12-bay breakforward with further breakforward of 10 bays. 16-bay ranges to each side of which the last 4 breakforward. Rusticated quoins to each breakforward. Projecting Tuscan porches, some with flanked columns and dentilled cornices, flanked by tripartite windows, mainly sashed. Iron balcony to 1st floor. Casement windows flanked by attached Composite columns with pediments, some with dentils and modillions. 2nd floor band. Iron railings to casement windows in architraves with flat hoods on consoles. 3rd floor guilloche band. Casement windows in architraves. Attic is articulated by pilasters and has casement windows in architraves. Iron railings to basement with arrow heads. No 32, return to Craven Street has 3 storey, 3-window bow. The London Encyclopedia, C Hibbert and B Weinreb, 1983, p.942. Listing NGR: TQ2641881151	207567	1840 to 1849	II

MLO95589	**33, 41, 43, 45, 47, 49, 51, 53, 55, 61, 63, 65, 67, 69, 71, 73, 75, 77 Westbourne Terrace**. TQ 2681 SW TQ 2681 SE CITY OF WESTMINSTER WESTBOURNE TERRACE, W2 51/18 52/18 (north-east side) 5.2.70 Nos 33 to 77 (odd) GV II Grand terrace of houses. Circa 1840 (probably William King and William Kingdom). Stucco. 4 storeys, with attic storey to centre houses and others with later added storey. Each house 2 windows wide. Centre 5 houses and end pairs break forward slightly with rusticated quoins. Chanelling to ground floor. Projecting Greek Doric porches. Panelled studded doors. Continuous first floor bombé balcony. First floor windows pedimented and flanked by fluted Corinthian columns. Second floor windows corniced. Architraves above ground floor. Some wide C20 metal frames windows to 3rd floor and added storey. Mainly plate glass. Casements. Guilloche band above second floor. Rich dentil cornice above third floor (lost to Nos 67 to 77). Subsidiary cornice to attic of centre houses. Cast iron area railings. Returns to left and right with 3 storey semicircular bow windows. Integral part of grand scheme with other houses in Westbourne Terrace, and matching pair with Nos 36 to 68. The London Encyclopedia, B Weinreb and C Hibbert (vds), 1983, p.942. Listing NGR: TQ2647481209	207563	1820 to 1860	II
MLO96388	**101, 103, 109, 111, 113, 115, 117, 119, 79, 83, 87, 89, 93, 95, 97, 99 Westbourne Terrace.** TQ 2681 SW CITY OF WESTMINSTER WESTBOURNE TERRACE, W2 51/19 (north-east side) Nos 79 to 119 (odd) GV II Grand terrace of houses. Circa 1840. Probably by William King and William Kingdom. Stucco. Some slate mansards. 4 storeys, full attic storey to centre houses and later attic with C20 windows to Nos 79-81,91,107,117 and 119. Each house 2 windows wide (centre house of 3 windows wide). Centre 7 houses and end pairs break forward slightly with rusticated quoins. Channelling to ground floor. Projecting Greek Doric porches, colonnade to ground floor of centre pair. Panelled studded doors. Continuous first floor bombé balcony. First floor windows pedimented and flanked by fluted Corinthian columns. Second floor windows corniced. All windows architraved above ground floor. Mainly sashes, plate glass. French casements to first floor. Guilloche band above second floor. Rich dentil cornice above third floor (removed to Nos 79 to 81, simplified to Nos 85,103 and 105). Subsidiary cornice to attic of central houses. Cast iron railings. Returns to left and right with 3-storey semicircular bow windows. Integral part of grand scheme with other houses in Westbourne Terrace. The London Encyclopedia, B Weinreb and C Hibbert (Eds), 1983, p.942. Listing NGR: TQ2635281337	207564	1820 to 1860	II
MLO97018	**1 Cleveland Terrace.** TQ 2681 SW CITY OF WESTMINSTER CLEVELAND TERRACE, W2 51/10 Nos 3 and 5 (Clifton Court) [Formerly listed as Nos 17 10.4.75 and 19 (including area railings)] GV II Pair of terraced houses. Mid C19. Stucco. Slate mansard. 4 storeys, attic mansard and basement. Each 2 windows wide. Channelling to ground floor. Pair of unfluted projecting Doric porches to centre (left hand one blocked). Square-headed windows, architraved above ground floor; corniced to first and second floor. Sashes, plate glass. First floor French casements altered. Cornice removed. Cast iron railings. Included for group value only. Listing NGR: TQ2636181349	209227	1833 to 1866	II
MLO95864	**140 Westbourne Terrace.** TQ 2681 SW CITY OF WESTMINSTER WESTBOURNE TERRACE, W2 51/9 (north-easts side) Dorland Hotel (formerly listed as Nos 121 to 141 (odd)) GV II Hotel, formerly terrace of grand houses. Circa 1840. Probably by William King and Wiliam Kingdom. Stucco. Some slate mansards. 4 storeys, some attic mansards but full attic storeys to centre 6 bays. Each house unit 2 windows wide. Centre 6 bays and end 4 bays of composition set forward slightly with rusticated quoins. Channelling to ground floor. Projecting Greek Doric porches only to ends, with widely spaced paired columns (probably an alteration). Continuous first floor bombé balcony. First floor windows pedimented and flanked by fluted Corinthian columns. Second floor windows corniced. All windows architraved above ground floor. Sashes, plate glass. Guilloche band above second floor. Rich dentil cornice above third floor and subsidiary cornice to attic of centre houses. Cast iron area railings. Returns to left and right with similar treatment. Rear elevation rebuilt. Integral part of grand scheme with other houses in Westbourne Terrace The London Encyclopedia, B Weinreb and C Hibbert (Eds), 1983, p.942. Listing NGR: TQ2630481388	207565	1820 to 1860	II

MLO94773	**K6 Teleohone Box outside flank wall of 90 Gloucester Terrace.** TQ 2681 SE CITY OF WESTMINSTER PRAED STREET, W2 52/2 (north-west side) 1.2.74 Great Western Hotel. GV II Hotel. 1851-3, opened 1854, altered 1933-6. By P C Hardwick for Great Western Railway. Brick, stuccoed except ground floor and 1st floor of centre bays which are refaced in stone. Welsh slate roof. French Second Empire style. Four storeys, attic to 7-bay centre with breaks forward, further breakforward of 5 bays under pediment. 7-bay ranges to either side with projecting 2-bay square angle towers of 6 storeys. Channelled angle pilasters. Ground and 1st floor of centre refenestrated, otherwise sashes in eared architraves. Pulvinated friezes and pediments to 1st floor windows. 3rd floor sill band. Modillion cornice with drops to central range. Pediment with sculpted figures of Peace, Plenty, Science and Industry by John Thomas. Steep pavilion roof, pedimented dormers above attic, otherwise C20 dormers. Ogee roofs to towers with pierced parapets. The first of the large purpose-built hotels in London. The Railway Heritage of Britain G Biddle and o S Nock, 1983, pp 213-5. Great Western Architecture, A Vaughan, 1977, pp 95-129 Listing NGR: TQ2666681229	424765	1851 to 1853 (19th Century hotel) 1933 to 1936 (modern hotel)	II
MLO96886	**Mint Wing of St Mary's Hospital.** TQ 2681 SE CITY OF WESTMINSTER WINSLAND STREET, W2 52/4 (north-west side off) 2.12.86 Mint wing of St Mary's Hospital GV II Multi-storey stable range, now converted to hospital use. 1878 for Great Western Railway with considerable rebuilding including resurfacing of brickwork in 1922 and conversion in 1960s. Yellow brick, ramps partly renewed in concrete. Welsh slate roof. 3 storeys ranged around an irregular courtyard. To outer walls, mainly segment-arched windows to ground and 2nd floors, C20 windows in enlarged openings to 1st floor. Interior of yard: 2 levels of originally open galleries (now glazed) connected by sloping ramps leading to stables of which the original openings mainly survive although converted to hospital use. The stables were constructed to hold approximately 600 horses to serve the main line terminal at Paddington. Included for historical interest and group value with station. London's Industrial Heritage, A Wilson,1970, p 90, illustrated on p 91. Listing NGR: TQ2670781374	207686	1878 (Courtyard); 1878 and 1922 Railway stables; 1960 to 1969 (Hospital); 1960 to 1969 (modern hospital)	II
MLO97446	**Lawn, War memorial, Railway Office, Railway Station, Train Shed.** TQ 2681 SE CITY OF WESTMINSTER EASTBOURNE TERRACE,W2 52/1 (north-east side) Paddington Station, including the lawn and 11.1.61 offices along Eastbourne Terrace GV I Station. 1852-4 with addition of 4th train shed 1914-16 and other alterations. By I K Brunel and Sir Matthew Digby Wyatt. For Great Western Railway. Wrought iron arches with decorative work in sections on cast iron bolted on to the ribs. Originally supported on cast iron columns which were replaced by hexagonal steel stanchions between 1916-24. Glazed roof. Offices in brick, stuccoed. Originally 3 parallel train sheds with 2 transepts, a further shed in the same style added to the north, flanked to the south-west by offices. Elliptical arches with diagonally-braced cross girders with a column under every third arch. The ground floor wall of the offices abutting the train sheds is arcaded and has scrollwork in cement in the spandrels on the arches. This and the Moorish ornament of the train sheds designed by Wyatt. At the end of each transept an oriel window flanked by 2-light windows with bar tracery overlooks the Station from the offices. To Eastbourne Terrace the offices are very plain, heightened and much altered, except for the arcaded ground floor which is below street level and concealed by the glazed awning of the carriage road. War memorial on Platform One with powerful figure in bronze by Charles Sargeant Jagger. The Railway Heritage of Britain, G Biddle and 0 S Nock, 1983, pp 213-215 Early Victorian Architecture, R Hitchcock, 1954, pp 558-561. Great Western Architecture, A Vaughan, 1977, pp 95-129. Listing NGR: TQ2656381370	209557	1852 to 1854 (Railway office, station, train shed) 1914 to 1916 (modern station, train shed) 1916 to 1924 (modern station)	I

Annex 4 – Historic Development of the PIP Triangle Site

The PIP site comprises the London Street Deck ('Red Star Deck'), built in 1908-12, the Hammersmith and City Line Station, opened in 1933, and the Triangle Site, bounded by Bishops Bridge Road, the Grand Union Canal towpath and the H&C Line Station.

Paddington Station was built in a cutting with the embanked Grand Union canal located immediately to the north. Prior to 1845, the PIP site was occupied by the canal embankment, the cutting, and an approach ramp from London Street to the passenger and goods shed. In 1845 the PIP site was located to the north east of the original entrance to Paddington station, partially on the embankment, which separated the goods shed from the canal to the north (Figure 6).

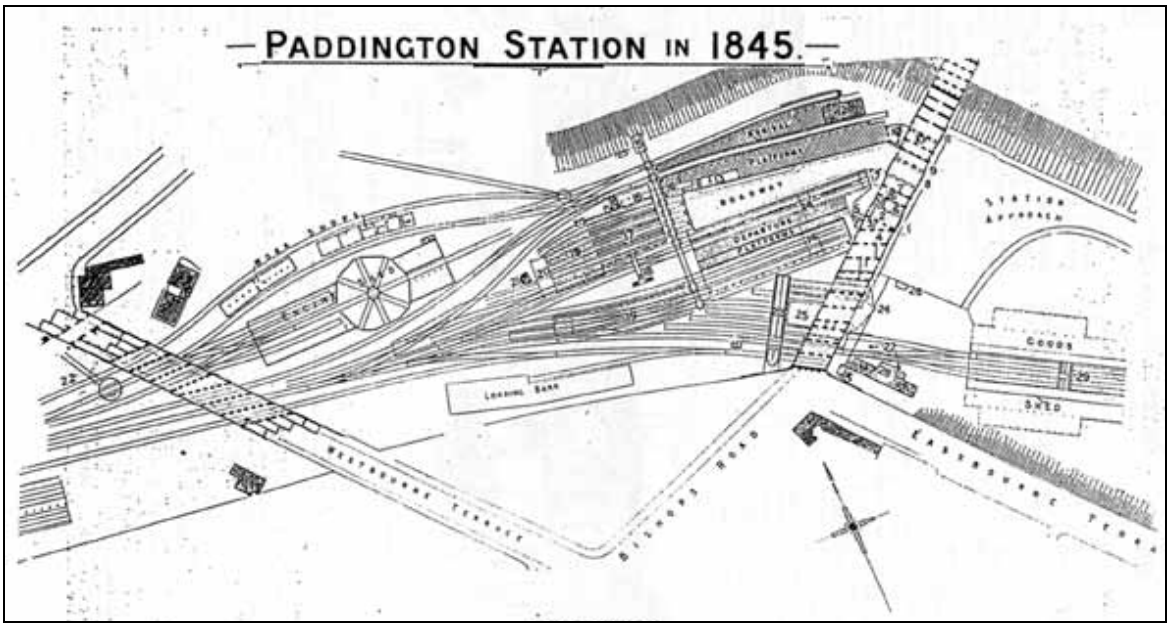

Figure 6 1845 plan of the PIP site

The goods depot was eventually relocated to the west of Bishop's Bridge road and accessed via a goods ramp that connected to London Street in the east and to Bishop's Bridge Road in the west via a side road to the north (Figure 7).

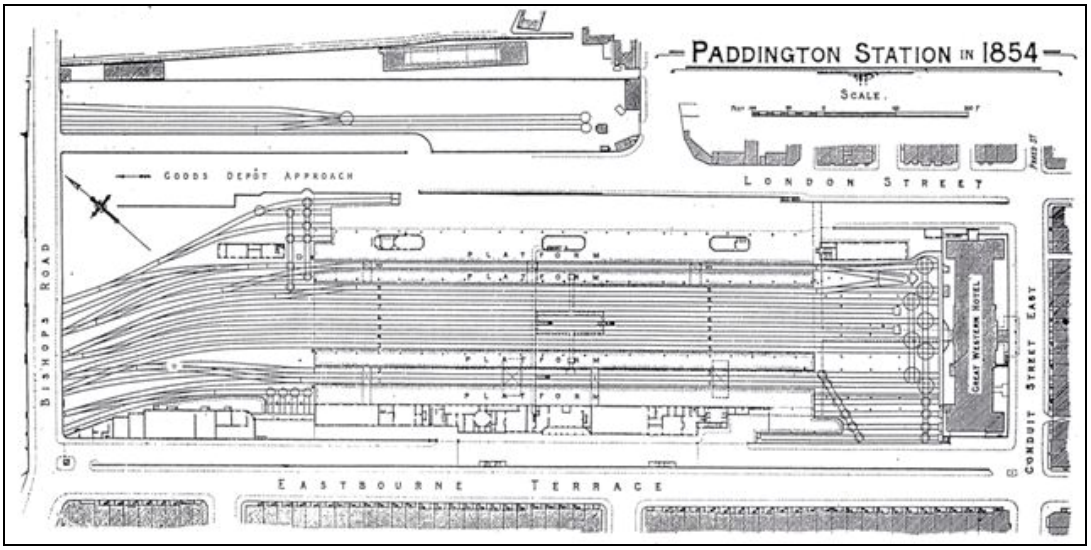

Figure 7 Paddington Station in 1854

By 1863 the layout had changed due to the construction of Bishops Bridge Station directly to the south west of the PIP Triangle Site. It was during this phase of development that the triangular

formation of the western section of the site began - a new side road connected to Bishops Bridge Road ran parallel to its east, projected perpendicularly southwest before sweeping back on itself in a triangular shape towards the goods ramp which sloped north-west beneath the bridge (Figure 8). The new ramps were supported by brick vaults, some of the remnants which are still extant. These vaults were originally stables for horses that worked on the goods yard to the west. The southern extent of the canal embankment was replaced with a retaining structure and a high level coal depot with associated tracks. This was then enclosed from the canal tow path to the north by a stock brick wall, sections of which are still extant.

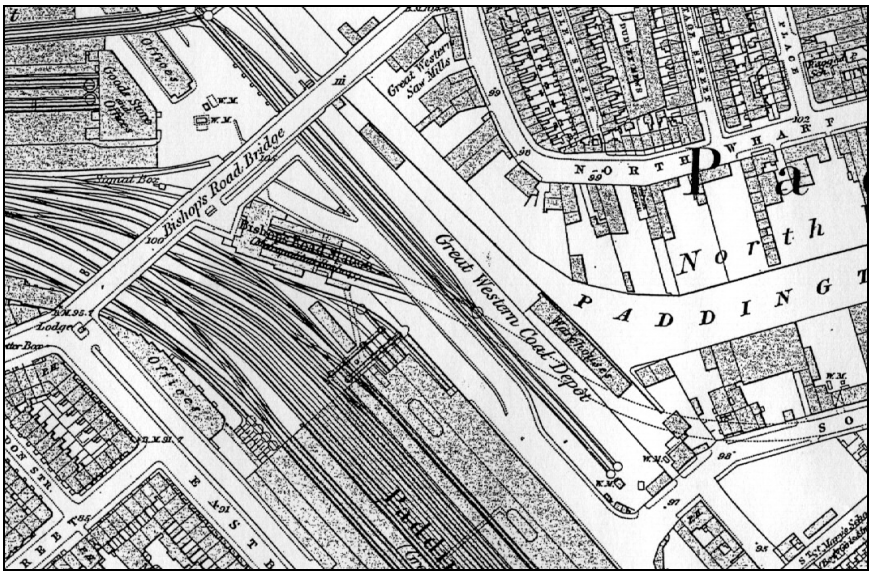

Figure 8 1872 OS map

In 1908 the high level coal depot between the Paddington Station and Paddington basin was closed together with London Street. The London Street Deck and arrival side above was demolished and near end of the mint stables and the London Street area was excavated down to platform level and a new concrete retaining wall built towards the canal.

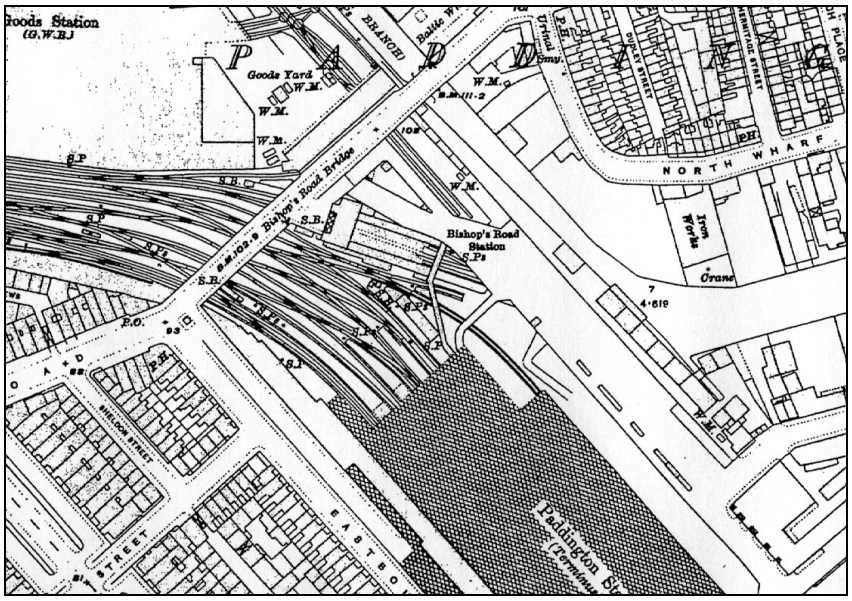

Figure 9 1914 OS map

Major alterations occurred in the 1930s when Bishops Bridge Road Station was completely rebuilt and reoriented in order to increase the number of platforms. It was at this period that the station lost its name and was incorporated into Paddington Station. These works resulted in the

demolition of the vaulted service road that ran parallel to Bishops Bridge Road and connected to the goods ramp in a triangular formation. In its place a new taxi ramp was built and orientated north-west to south-east and was constructed on concrete piers over the top of the northern platform and track of the Hammersmith and City Line. To the north of this a new goods ramp was built in the place of the existing one which necessitated the truncation and refronting of the stables to the north. These structures and numerous other structures located to the west and east were then used as coal stores, sculleries and mess rooms (Figure 10).

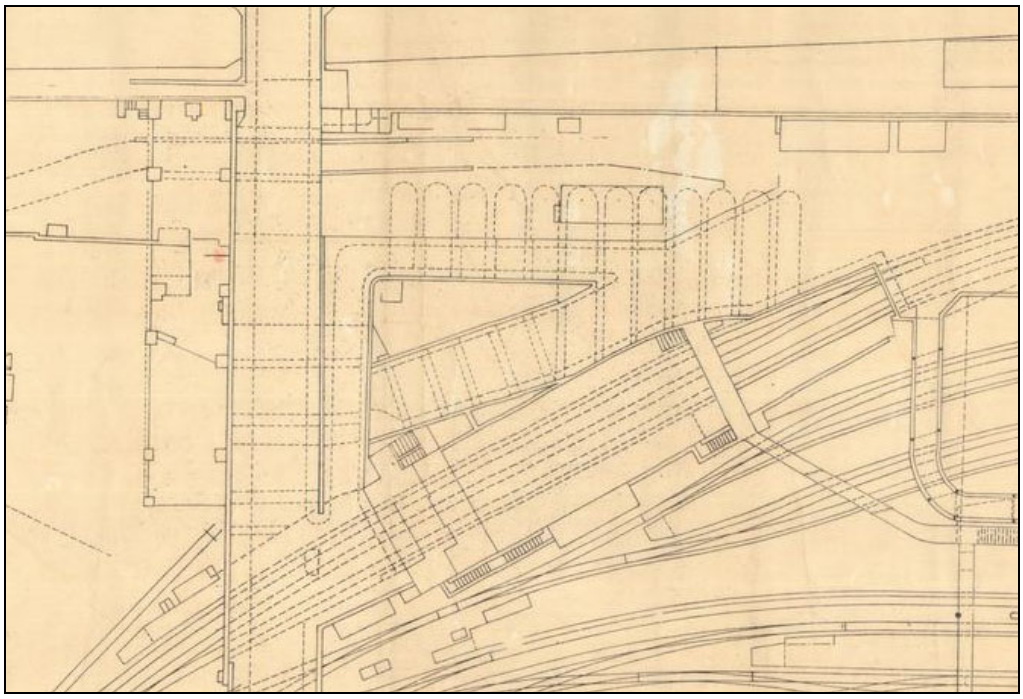

Figure 10 1930 plan just prior to the truncation of vaults and insertion of new ramp orientation

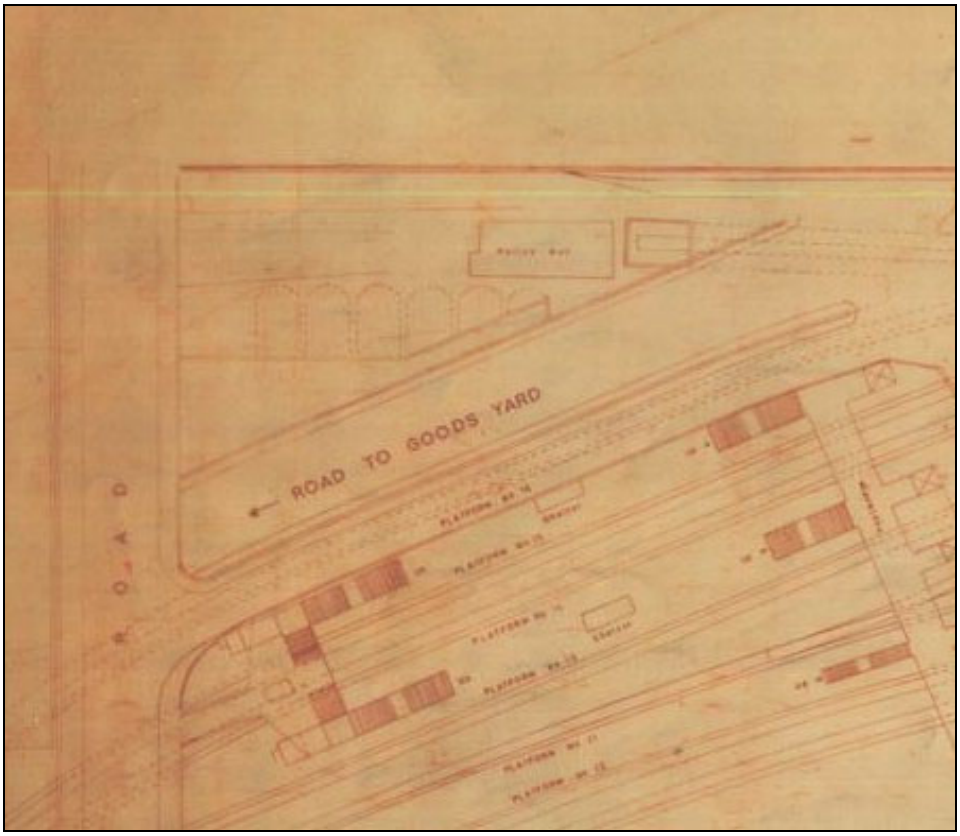

Figure 11 1969 plan identifying truncated vaults, new goods road, taxi rank and extant shunt tunnel.

During these works the London Street Deck was extended to the north and west to accommodate two new track beds. To span these additional tracks a bow string girder was constructed which is statutorily listed as part of Paddington Station.

There were numerous changes in and around the site in the 20th century. The goods station that the goods ramp once served was incrementally shut down between the 1970s and 80s. Bishop's Bridge was demolished in 2005 to incorporate a wider structure to ease traffic movement.