



# C123 – Intermediate Shafts

## Stepney Green Shaft Site-Specific Written Scheme of Investigation

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## Definitions, Abbreviations and Acronyms

The following is a list of the most commonly used definitions, abbreviations and acronyms within this report:

ADS	Archaeology Data Service
ATD	Above Tunnel Datum. Tunnel Datum = Ordnance Datum plus 100m
BP	Before Present
c.	Circa
CDI	Common Design Item
CDM	Construction (Design and Management) Regulations
CICP	Crossrail Integrated Construction Programme
CRL	Crossrail Ltd
CLRL	Cross London Rail Links Ltd (now Crossrail Ltd)
CPFR	Crossrail Project Functional Requirements
dB	Decibel
dB(A)	Decibel (ambient)
DDA	Disability Discrimination Act
DDBA	Detailed Desk Based Assessment
DfT	Department for Transport
DLR	Docklands Light Railway
Dom Doc	Lotus Domino Document Manager (software programme)
EMP	Environmental Management Plan
EMR	Environmental Minimum Requirements
ES	Environmental Statement
EWMA	Enabling Works Managing Agent
GLAAS	Greater London Archaeological Advisory Service
GLHER	Greater London Historic Environment Record
HER	Historic Environment Record
HF	Human Factors
HMRI	Her Majesty's Railway Inspectorate
IDC	Inter-Discipline Design Check
IDR	Inter-Discipline Design Review
IRD	Initial Reference Design
km	kilometre

km/h	kilometres per hour
LB	London Borough
LBTH	London Borough Tower Hamlets
LFEP	London Fire and Emergency Planning Authority
LLAU	Limit of Land to be Acquired or Used
LMP	Lorry Management Plans
LoD	Limit of Deviation
LU	London Underground Ltd
m	Metre
M&E	Mechanical and Electrical
MDC	Multi-Disciplinary Consultant
MDC4	Multi-Disciplinary Consultant 4, Halcrow
MOLA	Museum of London Archaeology
NLL	North London Line
NR	Network Rail
O&M	Operations and Maintenance
OHLE	Overhead Line Equipment
OSD	Over Site Development
RM	Requirements Management
RMP	Requirements Management Plan
RSPG	Railway Safety Principles and Guidance
SI	Systems Integration/Site Investigation
SRA	Strategic Rail Authority
SRC	Systems and Rolling Stock Consultants
SRS	Systems Requirements Specification
TBM	Tunnel Boring Machine
TfL	Transport for London
TOC	Train Operating Company
VE	Value Engineering
VM	Value Management
WSI	Written Scheme of Investigation



## 1 Executive summary

Jacobs, under Contract 123 Intermediate Shafts, has updated this Site-Specific archaeological Written Scheme of Investigation (SSWSI) covering archaeological trial trenching and watching brief at Stepney Green, London Borough of Tower Hamlets (LBTH), as part of the Crossrail development. This document has been compiled using the information on the Crossrail works available at the RIBA Stage E design stage (C123-JUL-N2-RGN-CR094\_SH005\_Z-00002). This version of the SSWSI is specific to the archaeological excavation to be undertaken by C305 either prior to de-walling or after the de-walling has been completed, and the archaeological watching brief to be undertaken on the Thames Sewer diversion and the EDF cable diversion.

The Crossrail worksite at Stepney Green is located within Stepney Green Park in the LBTH, and abuts the Stepney Village Archaeological Priority Zone. The site is currently occupied by Stepney City Farm and Stepney Green Park, and is cut north-south by Garden Street and King John Street. The ruins of a Baptist Chapel and a Congregational Church are present within the site and a close relationship between the buried archaeology and these upstanding remains is likely. Belowground remains of known buildings are also present to the east of Garden Street, including the remains of an early 19th century Sunday school; Stepney Meeting House (1672); the 16th century Worcester House and the remains of King John Court dating to the 18<sup>th</sup> century.

The Stepney Green Shafts Detailed Desk-Based Assessment (DDBA) has identified evidence indicating settlement within the area of Stepney Green from the medieval period to the present day. The watching brief and nine evaluation trenches, dug in December 2010, have identified evidence for prehistoric, late-medieval or Tudor buildings and post-medieval activity.

The evaluation trenches identified an average depth of 2.50m of Made Ground across the site. Cartographic evidence has shown that most of the site was occupied by back-to-back terraced housing for the majority of the 20th century. The results of the evaluation have identified that there are archaeological remains within the footprint of the shaft box. These comprise structural remains of King John's or St John's Court provisionally dated to the 16<sup>th</sup>-17<sup>th</sup> century. A section of the 19<sup>th</sup> century foundations of the Baptist Chapel were noted along with a row of small terrace dwellings. The results of the work have been summarised in C261 Archaeology Early East Interim Statement Archaeological Watching Brief and Evaluation Stepney Green Shaft – XRV10 (no document ref, but dated 27.01.11).

The proposed mitigation for the archaeological remains within the shaft footprint is preservation by record. The archaeological remains within the general working area would be preserved in situ. In most cases they are protected by 2.00 to 2.50m of Made Ground. The current design for the working area is to remove 0.50m of material and then lay a geotextile and a working surface of crush or similar material.

Further mitigation at Stepney Green will comprise the protection of standing remains (the Baptist Chapel and Congregational Church). Work for the site compound is programmed to begin in March 2011.

## 2 Project Background

### 2.1 Project Background and Site Location

C123 has been appointed to undertake a Site-Specific Written Scheme of Investigation (SSWSI) covering the proposed Stepney Green Shaft.

Crossrail is a new Cross London Rail Link project which will provide an additional transport route in the south east of England and across London. The line will provide a range of both new and improved rail journeys across London and its immediate surroundings. The proposed development will include the construction of seven stations within central London which will have interchange with other public transport modes including the London Underground, National Rail and the London Bus service; the development will also include the renewal and/or upgrade of existing stations outside central London. The route itself will link Maidenhead and Heathrow in the west with Shenfield in the north-east and Abbey Wood in the south-east.

The strategy for archaeological works has been set out in the Crossrail Generic Written Scheme of Investigation (WSI) (Doc. No. CR-PN-LWS-EN-SY-00001); 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 (July 09, version 2.0 section 3).

### 2.2 Summary of Previous Crossrail Studies

The principal studies are as follows:

- Crossrail, Environmental Statement, February 2005;
- Crossrail, Assessment of Archaeology Impacts, Technical Report. Part 2 of 6, Central Section: Westbourne Park to Stratford and Isle of Dogs, 1E0318-C1E00-00001 February 2005 [Specialist Technical Report (STR);
- Crossrail, Amendment of Provisions 1, January 2006;
- Crossrail, Amendment of Provisions 3, November 2006;
- Crossrail, Archaeology Programming Assessment, November 2006;
- Structures at King John Street, Stepney Green, London E1 Architectural and historical appraisal (1E0418-C1E00-00002) (no date)
- Crossrail 2007 MDC3 Archaeology, Updated Baseline Assessment. December 2007
- Crossrail 2007 Scheme Design Submission Planning Environmental and Consents Report Running Tunnels and Shafts CR-SD-ENV-RT-00005
- Crossrail, Archaeology Detailed Desk Based Assessment Stepney Green Shafts (Document number CR-SD-STG-EN-SR-00001) Version 1.0, April 2008

### 2.3 Summary of Previous Assessment Work and Archaeological Investigation

The Crossrail Generic WSI (Doc no. CR-PN-LWS-EN-SY-00001) outlines how the arrangements and controls for managing archaeology will be met in designing and constructing Crossrail. It also provides a framework for archaeology which will ensure that the works conform to a common project standard.

The Environmental Statement and supporting Specialist Technical Report (STR): 'Assessment of Archaeology Impacts' (Doc no. 1E0318-E200-00001) presents the outcomes of the archaeological studies undertaken as part of the Environmental Impact Assessment. The assessment included the likelihood of archaeological resources being present in land affected by the project, their importance and the extent to which they will be physically affected by the construction and operation of Crossrail.

An architectural and historical appraisal of the standing remains at Stepping Stones farm was undertaken in 2004. The appraisal included examination of documentary evidence and a basic photographic survey.

A Detailed Desk Based Assessments (DDBA) has subsequently been undertaken for the construction elements and associated worksites outlined in the Scheme Design for the Stepney Green Shafts, developed in 2007. The DDBA was produced in April 2008.

A programme of trial trenching and watching brief has been undertaken at the site. A General Watching Brief was undertaken on a water pipe trench in July 2010 and on works around the farm in August 2010. Neither identified significant archaeological remains.

Archaeological trial trenching was undertaken in November and December 2010 and comprised nine trenches (Plate 1). The earliest archaeological remains were identified in Trench 7 and comprised a small number of amorphous depressions containing undecorated prehistoric pottery. No evidence for Roman or early medieval activity was noted. Late medieval or Tudor activity was found in Trenches 1, 2 and 3 in the form of substantial brick foundations for St John's Tower, a fortified gatehouse, and its associated outbuildings. The remains of a possible octagonal wall was noted in Trench 5. Later 17<sup>th</sup> and 18<sup>th</sup> century remains were noted in Trenches 1, 2 and 8 and were associated with the transition of the site to a seminary. The 19<sup>th</sup> century was represented by back-to-back terrace slum housing.

The SSWSI is a live document and is updated at each activity stage that provides further information about the archaeological resource. This SSWSI includes additional archaeological information regarding Worcester House and re-examines earlier archaeological investigations.

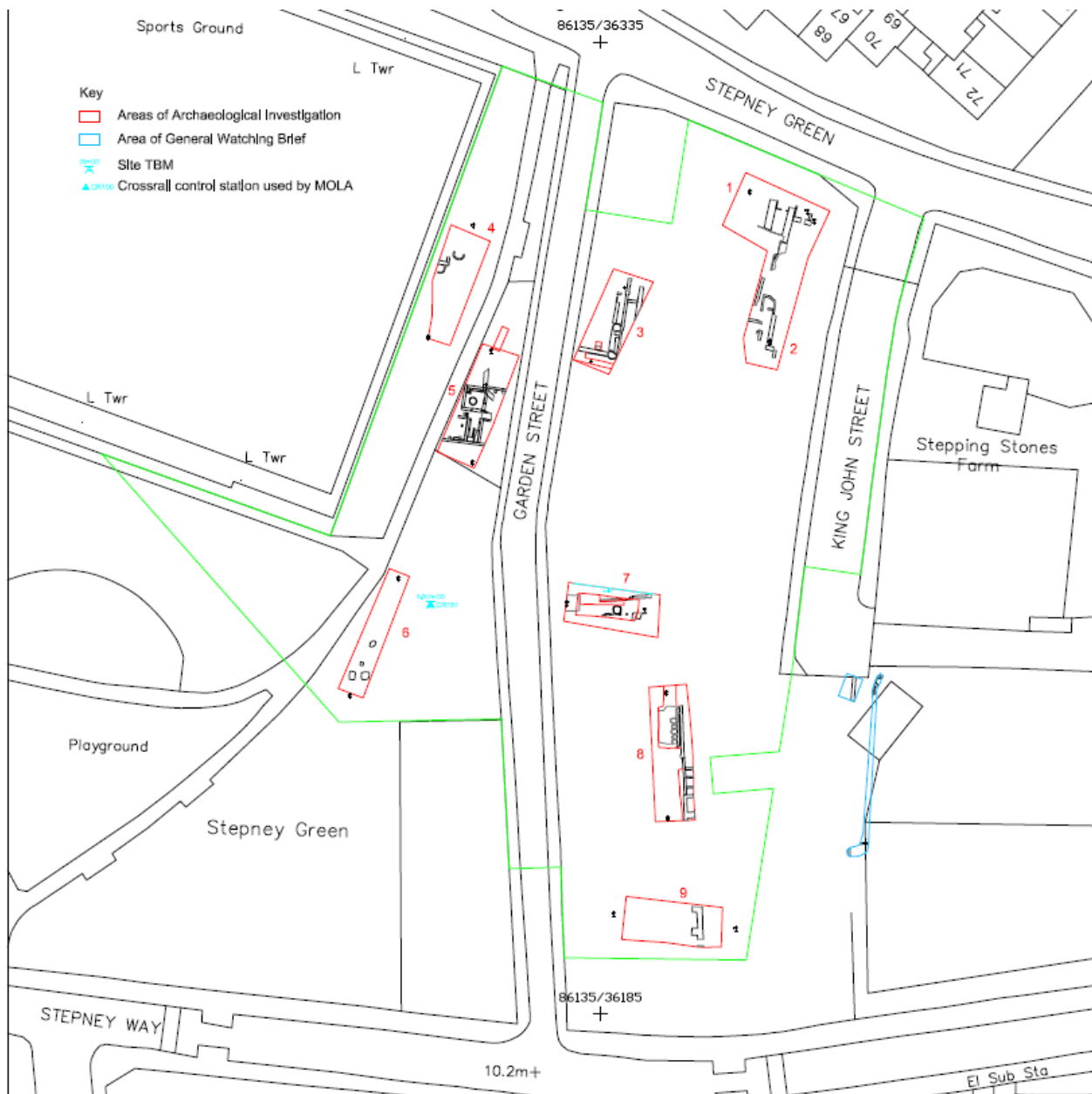


Plate 1 Location of 2010 trial trenches and watching brief

## 2.4 Geology and Topographic Setting

The Stepney Green Shaft is located in a narrow corridor of Stepney Green parkland between Stepney Way and Stepney Green. The site falls within the LBTH, between the all-weather sports ground to the west and Garden Street and Stepping Stones Farm to the east (Plate 1).

The following summary is based on the Geotechnical Sectional Interpretative Report 3: Liverpool Street to Pudding Mill Lane and Isle of Dogs (Crossrail 2007a) and section 10.2.4 of the Civil, Structural & Tunnel Engineering Report for MDC3 Running Tunnels & Shafts, Vol. 3 of 7, CR-SD-CT1-CE-RT-00008. Refer to drawing number P30103-C1M15-G00-D-50007 &

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50017 (see Annex 3) for a geological cross-section and the locations of the boreholes mentioned in the text.

The regional geology of the area around Stepney Green is typical of that for the London Basin, comprising Cretaceous Chalk, overlain successively by Palaeogene Deposits (Thanet Sand Formation, Lambeth Group and London Clay Formation). River Terrace Deposits (Taplow Thames terrace gravels) overlie the London Clay Formation across the site. In the north and west of the site these are overlain by alluvial deposits.

The ground level rises gradually from north to south (109.58 –110.27m ATD). There is a significant increase in the south-east corner, in the vicinity of the former Congregational Church, where the level rises to 111.34m ATD. This may be as a result of raising the ground level rather than removing the foundations. Information from geotechnical boreholes (SG9, 10, 15R, 12A, 12, 17, 13, 11A) within the site and in the immediate vicinity demonstrated that Made Ground was present across the whole site at an average depth of 2.00m. SG10 showed an increase of 0.5m in the depth of the Made Ground, which may result from the construction of Mowlem House, a former secondary school. The Made Ground was overlying occasional areas of alluvial deposition and a layer of River Terrace Deposits, suggesting that the natural geology of the area had not been significantly truncated by human activity.

The area is generally flat with the exception of the farm, parts of which are raised c.0.5 to 1m above the level of the surrounding streets. In particular, the ground where the Congregational Church originally stood is c.1m higher than that to the north and east. This indicates that the floor of the church was raised above its contemporary ground level and indeed a basement is documented, probably infilled with demolition debris after the church was damaged by bombing in WWII. Crossrail borehole SG11R encountered probable brick foundations from the church c.0.7m thick at c.1.2m BGL (Crossrail 2005).

## 2.5 Archaeological and Historical Development of the Site

The earliest evidence for archaeological activity around the site was the recovery of two sherds of Late Bronze Age/Early Iron storage jars, interpreted as possible urns for cremations, 50m to the east of the site (MOL 1982). The evaluation in 2010 identified a small number of depressions that may be small pits or features associated with animal activity/tree-throw holes. Undecorated pottery was recovered from the fills of some of the features.

Roman (43 – 450 AD) activity in the area is represented by the recovery of pottery and glass in the south-east corner of the site (MLO 23051/23318). The pottery comprised red ware pottery (likely to date to the Late Roman period). The glass consisted of *unguentaria*, blue-green glass flasks. The presence of oyster shells in Made Ground (Borehole SG17) has also been interpreted as evidence of Roman or later activity in the scheme footprint.

There is little evidence for medieval activity within the scheme footprint, however, there is in the greater area. St Dunstan's church is located 130m from the site and was constructed in 925 AD.

Stepney is referred to as *Stybbanhyp* in 1000 AD in the List of St Paul's Manors; the name is believed to mean Stybba's landing place (Ekwall 1947, 421). The Domesday survey refers to Stepney as being held by the Bishop of London and measuring 32 hides; the area was occupied by 60 villagers and 46 cottagers suggesting it covered a large area. To the south of the site is the site of a house constructed in 1299. The house was owned by the Mayor of London and at one point Parliament was held at the house.

Archaeological interventions in the site and in the vicinity (WOR85 and SHS79) have encountered much evidence for Post-medieval urbanisation around the site. There is a high potential for evidence of 16th to 19th century buildings, in particular relating to Worcester House and associated gardens, to yards and related structures including the non-conformist chapel, the Baptist Chapel; the Congregation Church; the early 19th century Sunday school; and other Post-medieval occupation features surviving, particularly if there are no modern cellars.

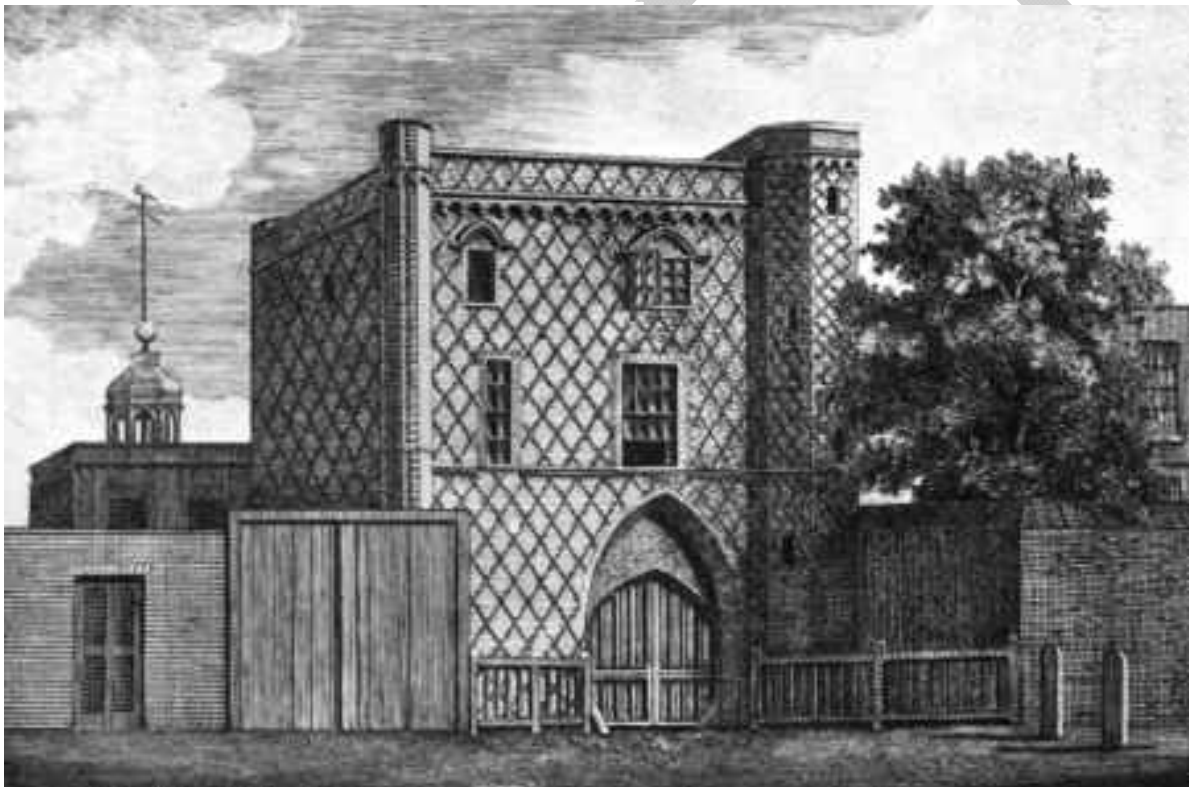


Plate 2 'A curious gate at Stepney' published in Lysons *Environs of London* 1791

Worcester House, the London home of the Marquess of Worcester, was constructed in the late 16<sup>th</sup> century. The house is noted to have had a semi-octagonal tower at the gatehouse. An engraving by John Thomas Smith of the gatehouse was published in 1791 (Plate 2). The engraving depicts the gate with a diaper patterned brick façade. This particular style is commonly associated with Tudor buildings; Tudor country houses also favoured a quadrangular ground plan with a gatehouse. Excavations by the Department of Greater London Archaeology in 1985 recorded a series of wall elements that they interpreted as the site of Worcester House, in particular the semi-octagonal tower was identified. Based on the mapping evidence (Drawing

C123-JUL-T1-DDL-CR094\_SH005-00061) (Appendix A) and Smith's engraving it appears that King John's Court, identified on Roques map of 1746 (Plate 3), was built over the site of Worcester House incorporating the gatehouse into its overall ground plan (Drawing C123-JUL-T1-DDL-CR094\_SH005-00061). Areas that were covered by the 1985 excavation were included in the 2010 evaluation. Substantial brick foundations were identified in Trench 1 (Plate 4).



Plate 3 Detail of Rocque's map of London (1746) showing King John's Court

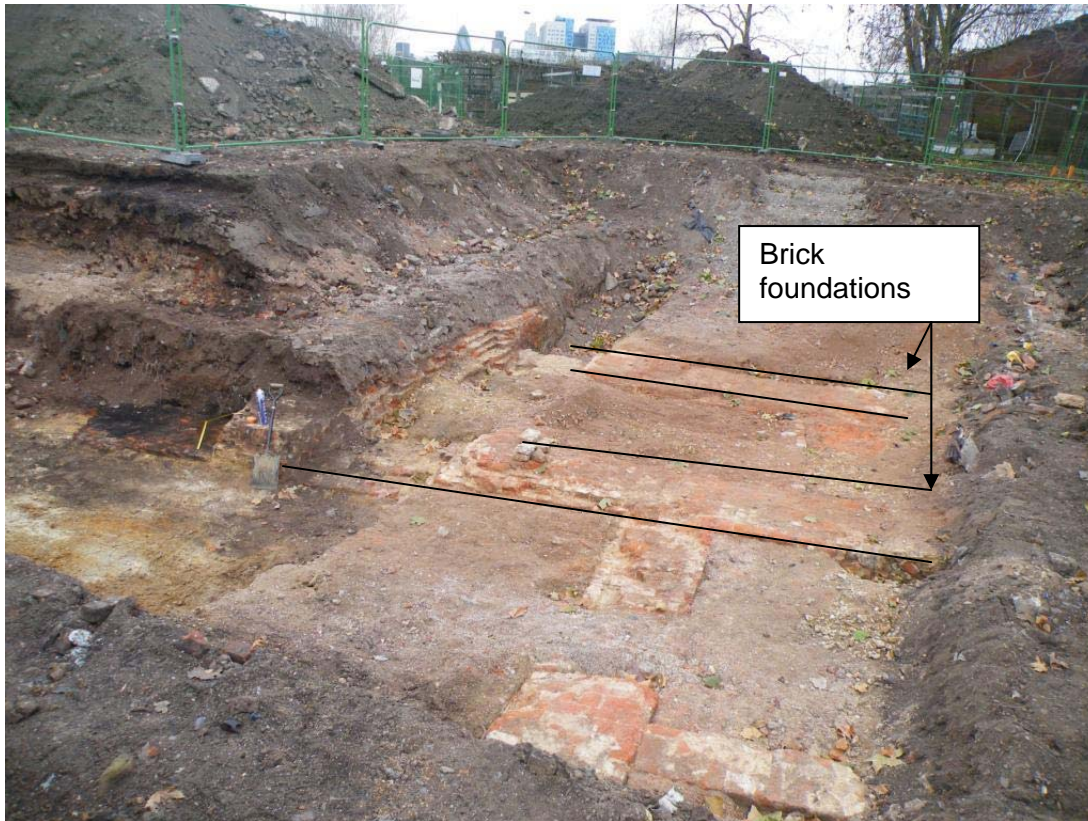


Plate 4 Trench 1 (facing west)

The remains of some earlier buildings on the site are still upstanding include the entrance to a c.1811 Baptist Chapel (or Academy), with associated gate piers, at the northeastern corner of Garden Street and the northern wall of the 1862-3 Congregational Church south of King John Street (Drawing C123-JUL-T1-DDL-CR094\_SH005-00062) (Appendix A). An arched doorway attached to the church wall and a gate pier formed parts of an open passageway adjacent to the church.

Historic maps show that the extent of development on the site until the early 20th century was in the form of individual buildings running along the northern boundary and along both sides of Garden Street. The site had also been used for small scale kitchen gardens. The 1914 map shows that back-to-back terraced housing occupied the majority of the site and continued to do so until at least the late 1960's. The extent and location of services running to these former houses or whether any of the buildings had cellars is unknown. Although the geotechnical data indicates that the depth of Made Ground is relatively uniform across the site it is not extensive enough to isolate individual instances of truncation that may be associated with basement structures. An early 19th century Sunday school was located immediately north-west of the Congregational Church.

There are no buildings currently occupying the site, although ruins of former buildings are still upstanding in the north and south-east of the site. The area to the west of Garden Street is



currently in use as an all-weather sports ground. The extent to which landscaping for the sports ground truncated archaeological remains is unknown.

## 2.6 Deposit modelling

The results of borehole surveys of the site have identified superficial deposits (Made Ground, Alluvium and River Terrace Deposits) measuring 4.40m to 7.80m in depth from current ground level. Four boreholes constructed across the site (SG11R, SG12, SG13, SG15R) identified the presence of Tudor/Stuart brick and Made Ground. Tudor brick was recovered from Borehole SG15R located over the conjectured site of Worcester House. The ground level in the area is recorded as 9.55m OD and a post-medieval dump, containing the Tudor brick, was identified at 8.95m – 7.75m OD. The site lies on a north to south slope. The northern most Trench 9 identified natural sand at 109.39m ATD; ground level is at 111.43m ATD. In Trench 1 ground level is at 109.78m ATD and Brickearth was noted at approximately 107.40m ATD.

## 2.7 Archaeological Potential

There are known remains of buildings within the shaft footprint. The preliminary results of the evaluation indicate that the shaft will impact upon elements of Worcester House and Kings John's Court. The area to the west of Garden Street, depicted as back-to-back terraced housing on the 1870 Ordnance Survey map, has also been identified within the shaft footprint.

There is a low potential for remains dating to the prehistoric period, however, they may survive beneath the foundations of some of the buildings.

## 2.8 Importance

Any well-preserved structures associated with Worcester House are of medium to high importance. Evidence for the remains of King John's Court is of medium importance as it informs the development of Stepney and offers evidence to aid the understanding of the incorporation of earlier buildings into later builds. English Heritage has professed an interest in potentially designating the remains as a Scheduled Monument (K Stabler pers comms).

No Prehistoric and Roman remains or artefacts were identified in the trial trenches. Activity dating to this period, based on remains in the adjacent area, would be of low to medium importance based on the extent and survival of the material.

## 3 Construction Impact Summary and Outline Mitigation Design

### 3.1 Construction Summary

The archaeological investigations at Stepney Green have identified that there are archaeological remains surviving across the site. The evaluation has identified the presence of archaeological remains within the proposed scheme footprint.

Construction work at Stepney Green that could disturb archaeological remains include:

- Levelling and other processes relating to the construction of the worksite (e.g. foundations for accommodation and batching plant) may impact upper levels of archaeological deposits relating to Worcester House, the Baptist Chapel, and the Congregational Church to the east of Garden Street.
- Utilities diversions – may partially or completely remove archaeological remains along their routes.
- The movement of heavy machinery within the worksite may affect buried and standing remains relating to Worcester House, the Baptist Chapel, and the Congregational Church.

The Stepney Green shaft site comprises a 31m deep basement with a single head house structure located above the basement. The following impacts will be caused by the Crossrail Main Works at the Stepney Green shaft:

- Excavation of the basement to 79.40m ATD (within the Lambeth group) will completely remove all archaeological deposits within its footprint.

Preliminary guidance as to the potential range of groundwater related settlement has been provided to the FDCs by C122 (C121-MMD-C2-RGN-CRG01-00013 Rev1.0), who acted as the Engineer for the pumping tests undertaken at Stepney Green as part of Package 13A ground investigations. Predicted settlements due to dewatering and depressurisation will be reviewed and reported in the next stage following further assessment of the final-issue pumping test data.

### 3.2 Mitigation Design

#### 3.2.1 Archaeological excavation

Two areas have been identified where excavation is to be undertaken as part of the preservation by record mitigation strategy. Trench Extension A measures approximately 260m<sup>2</sup> and Trench Extension B measures approximately 630m<sup>2</sup>. The areas are shown on Drawing C123-JUL-T1-DDL-CR094\_SH0005-00064 (Appendix A).

#### 3.2.2 Archaeological watching brief

The following mitigation measures are also required:

- Watching brief during the protection of the standing remains of the Baptist Chapel and Congregational Church with hoardings.
- General archaeological watching brief on utilities diversions at Stepney High Street; Stepney Way; Stepney Green and Ben Jonson Road.
- Targeted archaeological watching brief on utilities diversions at Garden Street, King John Street, through Stepping Stones Farm and through Stepney Green Park.

### 3.2.3 Preservation in situ

The recommendation is that the working area outside the shaft footprint will be preserved in situ. The current design allows for the removal of 500mm of Made Ground, the laying of a geotextile and the laying of a temporary compressed surface composed of suitable material.

## 4 Aims and Objectives

### 4.1 Research Aims

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) and are set out below.

Evidence relating to the religious buildings and history of the site may contribute to the following research themes:

- To examine the changing roles and diversity of religions in London society at different times; and
- To identify the extent to which religious minorities and non-conformists had a distinct material culture in London, and developing archaeological models for future analysis.

### 4.2 Objectives of the Investigations

The overall objectives of the investigation are to establish the nature, extent and state of preservation of any surviving archaeological remains that will be impacted upon by the development.

Specifically, archaeological investigations have the potential to:

- Recover archaeological remains of prehistoric date relating to occupation of the area;
- Recover archaeological remains of medieval date relating to the expansion of Stepney Green;
- Recover archaeological remains of Post-medieval, or earlier date relating to Worcester House or its predecessor;
- Establish the presence or absence of archaeological remains surviving below the foundations of building shown on the 19<sup>th</sup> century Ordnance Survey map; and
- Recover archaeological remains of modern and post-medieval date relating to the Baptist Chapel, Congregational Church, Sunday School and the former street layout at the site.

## 5 Scope of the Investigation

An archaeological excavation will be carried out across the shaft footprint in order to record the nature, extent and survival of any archaeological remains.

A Targeted Watching Brief will be undertaken on the Thames Water diversion along Garden Street; a decision will be made on site regarding the continuation of the work if the results are negative. A General Watching Brief will be undertaken on the EDF cable diversion along Stepney High Street; this would become a Targeted Watching Brief where the cable diversion runs across Stepney City Farm.

### 5.1 Site code

The site code has been allocated from the PDP Archaeological Requirements Master List. All of the work at Stepney Green will be under the code: **XRV 10**.

### 5.2 Details of EDF cable diversion

The construction of the shafts at Stepney Green requires the cutting back of local LV mains and the diversion of EHV M11 V2 (ex 22kv) Route into a new route clear of the site. The diversion comprises 310m of duct in the public footway and roads. The route is shown on the EDF plan (EDF Energy Ref: 40094744) Appendix A.

### 5.3 Details of Thames Water diversion

The Thames Water diversion is shown on drawing number A041-A1-20091. The diversion will take place within Garden Street connecting on to the B140 to the north and Stepney Way to the south. Manholes identified on the plan will be excavated to a depth of approximately 2.50m and the pipeline will be at approximately 1.50m in depth. The route of the pipeline is shown on the Thames Water Utilities plan (A041-A1-20091).

### 5.4 Details of the excavation

The trial trenching identified the presence of a sequence of buildings that ranged in date from the late-medieval to 19<sup>th</sup> century. The presence of late-medieval or Tudor buildings is of importance and there is a need to understand the floorplan and function of the building. There is also the potential to understand the chronological development of the building. The excavation area has been located over the footprint of the shaft with an allowance of an additional 1.50m around the shaft footprint to mitigate the impact on these remains. The area to be excavated is marked on Drawing C123-JUL-T1-DDL-CR094\_SH0005-00064 (Appendix A).

### 5.5 Watching briefs – general information



## 6 Specific Requirements for the Principal Contractor (C305)

### 6.1 Archaeological Excavation

Archaeological excavation is defined in the Generic WSI (CR-PN-LWS-EN-SY-00001) as *'the process of exposure, recording and recovery of archaeological remains. This may be targeted at specific locations or a sample range of locations (e.g. specific investigation trenches)'*.

The results of the archaeological trial trenching have informed the requirement for archaeological mitigation excavations. The archaeological excavation should be undertaken during March 2011, with completion before the C305 work begins.

The Principal Contractor (C305) will undertake mechanical excavation of the material within the excavation area as marked on Drawing C123-JUL-T1-DDL-CR094\_SH0005-00064.

The overburden (topsoil) will be removed by mechanical excavator by C305. The mechanical excavator will be fitted with a toothless ditching bucket. All excavation will be done under constant supervision by the Archaeological Contractor (C261). Following removal of this material any identified archaeological deposits will be recorded and sampled by C261. Archaeological excavation will be undertaken by C261 using hand tools.

#### Archaeological Excavation Procedure

The Principal Contractor (C305) will ensure the following:

- That there are no live underground services within the excavation footprint;
- That all excavated material is stored in spoil heaps at a safe distance from the excavation area;
- Provide earthworks support if the sides of the excavation areas are considered to be unstable and are therefore unsafe if access to the trenches is required;
- Provide Heras mesh fencing (or a similar product) around the excavation area, including suitable edge protection where necessary;
- Allow for localised machine excavation within the excavation area to remove material after having been recorded by C261;
- If required, provide suitable plant to remove masonry/brick walls after archaeological recording by C261 has taken place;
- All excavation using mechanical excavators or other types of plant will be undertaken in agreement with and under the supervision of a C261 Archaeologist;
- Provision of the following services:
  - Welfare
  - Plant
  - Equipment to dewater if required.
- Provision of safe access and egress for archaeological personnel into the working area;
- Allow for a team of up to 10 archaeologists at any one time within the excavation area;
- Allow for occasional visits by photographer; and

- Provision of further technical advice to C261 as may be required to safely complete the works.

Safety, Health and Environmental information is provided on Drawing C123-JUL-T1-DDL-CR094\_SH005-00060. The Principal Contractor (C305) will hold a DCDM Risk Register for the main works.

#### Site Accommodation and Facilities:

The Principal Contractor (C305) shall provide the following site accommodation facilities for the use of archaeological personnel, inclusive of hardstanding and services required:

- Site accommodation with suitable furniture and provision of drying areas for work clothing and secure storage;
- Toilets with washing and drying facilities;
- Temporary office facilities for use by C261 (one archaeologist) complete with suitable furniture and provision of drying areas for work clothing;
- First Aid facilities and fire stations.

#### Archaeological Watching Brief

As part of the overall scheme works are being undertaken on services within the scheme footprint. A Targeted Watching Brief will be undertaken on the Thames Water Sewer diversion and EDF cable diversion. A General Watching Brief will be undertaken on measures to protect the standing remains of the Baptist Chapel and Congregational Church; ground-reduction to create the working area and on dewatering trenches (if excavated).

Refer to generic WSI (CR-LWS-EN-SY-00001) for definitions of General and Targeted Watching Briefs.

#### Archaeological General/Targeted Watching Brief Procedure

During the removal of the Made Ground/overburden the following procedure is to be incorporated into the *Principal Contractor (C305)* methods of work:

- Remove Made Ground/overburden at approximately 104m ATD under archaeological supervision of the *Archaeological Contractor (C261)*;
- Allow for archaeological deposits to be excavated and recorded;
- Allow safe access to the working area;
- Make allowance for 2 to 3 archaeologists on site to monitor and record;
- Use of plant in the working area only to be undertaken with the agreement of, and under the constant supervision the *Archaeological Contractor (C261)*; and
- Provide technical advice to the *Archaeological Contractor (C261)* as may be required to safely complete the work.



### Site Accommodation and Facilities

The *Principal Contractor (C305)* will provide the following site accommodation facilities for the use of archaeological personnel, inclusive of hardstanding and services required:

- Secure storage for tools and equipment for a team of three archaeologists;
- Toilets with washing and drying facilities;
- Temporary office facilities for use by C261 (one Senior Archaeologist) complete with suitable furniture and provision of drying areas for work clothing; and
- First Aid facilities and fire stations.

DRAFT

## 7 Instructions to Archaeological Contractor (C261) and Specification

### Archaeological Excavation and Watching Brief

It is proposed that a programme of archaeological investigation comprising excavation be undertaken at the site of Stepney Green Shaft. The two excavation areas are identified on Drawing C123-JUL-T1-DDL-CR094\_SH0005-00064. Archaeological remains were identified in both Trench 3 and Trench 5 that date to the late-medieval/Tudor period onwards. The excavation will aim to further identify the archaeological sequence in the area. Currently it is recorded as 1m to 2.50m below ground level (BGL).

Where there are multiple phases of archaeological remains the full sequence of remains will be recorded. If post-medieval structures are present they will be hand cleaned, excavated and recorded before being removed to identify if earlier archaeological remains survive below them. If present these archaeological remains will be hand cleaned and recorded.

The Archaeological Contractor shall:

- Provide a team of suitably qualified and experienced archaeologists to cover the range of archaeological investigation to be undertaken;
- Provide a method statement, risk assessment and safe method of working for carrying out the works;
- During excavation all archaeological features will be hand cleaned and defined to allow determination of their plan form, type, function, phasing and relationship with any other archaeological features. Each feature will be recorded as defined in Section 9 of this document; and
- On completion of the recording of wall structures provide a suitably qualified and experienced archaeologist to supervise the removal of walls and other solid material within the excavation area. If earlier archaeological remains are identified beneath these they will be hand cleaned and recorded.

Safety, Health and Environmental information is provided on Drawing C123-JUL-T1-DDL-CR094\_SH005-00060. The Principal Contractor (C252) will hold a DCDM Risk Register for the main works.

## 8 Programme

### 8.1 Provisional timetable for excavation

The following provisional timetable has been developed to provide an indication of the timeframes required to undertake the work set out above:

Activity	Responsibility	Construction Phase
Excavation of Trench A extension	Principal Contractor (C305)	Enabling works - 5 to 10 working days
Excavation of Trench B extension	Principal Contractor (C305)	Enabling works - 10 to 15 working days
Interim Statement	Archaeological Contractor (C261)	Within 7 calendar days of completion of excavation

### 8.2 Provisional timetable for watching brief

The current programme for the utility diversions and site set-up at Stepney Green is based on programme PCS04 dated March 2009 and Stepney Green Utility Diversions Programme (no date or reference).

Task ID	Task	Start Date	Finish Date
AWSTGV7340	Watching briefs on utility diversions – EDF diversion	01-Mar-11	22-Apr-11
AWSTGV7340	Watching briefs on utility diversions – Thames Water diversion	tbc	tbc
M3STGV1710	Erect hoarding (including protection of standing archaeological remains)	C305 to confirm	C305 to confirm

This programme is based on provision of a Principal Contractor and access to the site.

## 9 Specification for Evaluation & Mitigation (including Watching Brief)

### 9.1 Generic Standards

9.1.1 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 practice guidance (and any subsequent revisions) i.e.:

9.1.2 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*

### 9.2 Potentially nationally important remains

9.2.1 Where unexpected, potentially nationally important, archaeological remains (as defined in the Crossrail Environmental Minimum Requirements and Generic WSI) are identified during the works, the 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 SSWSI.

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

9.2.3 Details shall be in accordance with Crossrail procedures and include how relevant parties are to be informed of such discoveries, the criteria to be utilised by the Archaeology Contractor in the assessment of the significance of such discoveries, and the timescales to be adhered to.

9.2.4 As a result of the discovery of unexpected, potentially nationally important archaeological remains, the SSWSI shall be updated by the Design Archaeologist and reissued by the Project Archaeologist to incorporate any additional specific primary fieldwork event aims.

### 9.3 Human Remains

- 9.3.1 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.
- 9.3.2 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.
- 9.3.3 Crossrail procedures for dealing with discoveries of human remains shall identify any specific individual roles or actions 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, the application process for licences and the timescales to be adhered to.
- 9.3.4 The Archaeology Contractor shall confirm how the requirements set out in the SSWSI will be implemented as part of their procedure for excavating and recording human remains in the 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).
- 9.3.5 At sites known in advance to have a high risk of encountering human remains, provision shall be made by the Archaeology Contractor for site inspection by a recognised specialist.
- 9.3.6 Should human remains be discovered, the Archaeology Contractor shall notify the Project 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.
- 9.3.7 The Principal Contractor will be required to cease all works at that location until further instruction is provided by the Project Archaeologist. The Archaeology Contractor shall undertake an initial in situ observation and assessment of the remains and shall advise the Project Archaeologist of the course of action required.
- 9.3.8 Lifting of human skeletal remains shall be kept to the minimum which is compatible with an adequate evaluation or excavation. Notwithstanding this, the Archaeological Contractor shall ensure that all burials are planned/photographed in situ and that appropriate samples have been recovered prior to any lifting.
- 9.3.9 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 Archaeology Contractor shall ensure, after liaison with the Project 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.

9.3.10 As a result of the discovery of unexpected, potentially nationally important archaeological remains, the SSWSI will be updated by the Project Archaeologist to incorporate any additional specific primary fieldwork event aims.

## 9.4 Treasure Act

9.4.1 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.

9.4.2 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.

9.4.3 All finds falling within the definitions of treasure shall be reported immediately to the Project 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.

9.4.4 Crossrail procedures for dealing with Treasure finds shall identify any specific individual roles or actions 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.

9.4.5 To protect the finds from theft, the 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 Archaeology Contractor shall ensure, on liaison with the Project Archaeologist that adequate site security is provided by the Principal Contractor.

9.4.6 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.

9.4.7 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.

## 9.5 Health and safety

9.5.1 The Archaeology Contractor shall undertake the works in accordance with the Employer's Health and Safety requirements and the Principal Contractor's Health and Safety Plan. Where specific health and safety constraints or requirements for the Archaeology Contractor's method of work are required, these are set out below and shall be addressed

in the Archaeology Contractor's Method Statement (in the Health and Safety Plan).

- 9.5.2 No ground intervention or other survey shall be made prior to approval of the Archaeology Contractor's Health and Safety Plan, Method Statement and Risk Assessment by the CDM co-ordinator and/or Principal Contractor responsible for the works.
- 9.5.3 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 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 and unexploded ordnance. All appropriate mitigation measures shall be in place prior to commencement of any ground intervention or other survey.

## 9.6 Location and ground elevation of interventions and survey grids

- 9.6.1 The spatial extent of the investigation(s) shall be set out by the Principal Contractor or Archaeological Contractor (as required by works information) in accordance with the setting out co-ordinates supplied by the Project 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.
- 9.6.2 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 Archaeology Contractor by the Project Archaeologist. The positions of the trenches and survey points shall be verified by the Archaeology Contractor taking additional check measurements to additional known-location points of detail.
- 9.6.3 Surface heights shall be recorded and related to Permanent Ground Markers (PGM) 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 Archaeology Contractor by the Project Archaeologist. Levelling accuracy between OSBMs/PGMs and site temporary bench marks shall be within 10 mm k: where 'k' is the total distance levelled in kilometres. Each temporary bench mark shall be levelled as part of a closed loop starting and finishing on approved OSBMs or Crossrail PGMs. Where more than one temporary bench mark is required per site the Archaeology Contractor shall establish the temporary bench marks as part of the same closed loop.
- 9.6.4 The 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 Project Archaeologist with the Survey

Report.

9.6.5 The 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 Project Archaeologist within the Survey Report.

## 9.7 Specification for Watching Brief

### Scope of Watching Brief

9.7.1 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.

9.7.2 The Archaeology Contractor shall undertake the watching brief for all areas of ground disturbance which may potentially contain archaeological remains as set out in the SSWSI. 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.

9.7.3 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 SSWSI. 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.

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

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

9.7.5 A 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.

9.7.6 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.

9.7.7 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 SSWSIs.

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

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

9.7.9 In archaeologically sensitive areas, where the need for a targeted watching brief has been identified in the SSWSI, the Principal Contractor shall 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 Archaeology Contractor. The Principal Contractor shall limit their tracking of vehicles and plant within areas specified in the SSWSI and/or as instructed by the Project Archaeologist. The Principal Contractor shall facilitate mapping and sampling of deposits by the Archaeology Contractor through use of agreed plant, a site share agreement and careful liaison between the Archaeology Contractor's supervising archaeologist and the Principal Contractor's site supervisor.

#### **Specification for watching brief**

9.7.10 The Works to be carried out by the 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.

- 9.7.11 The Archaeology Contractor's core team shall consist of the 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.
- 9.7.12 The core team shall undertake the observation and any required investigation such as they may reasonably be able to undertake.
- 9.7.13 The 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 Archaeology Contractor shall be required to supply teams of 5 to 10 persons within 24 and 48 hours notice respectively.
- 9.7.14 The Archaeology Contractor's core and support teams shall be advised where necessary by specialists, as appropriate and as agreed with the Project Archaeologist.
- 9.7.15 The Archaeology Contractor shall record the following observations on a daily basis. As a minimum the record shall consist of,:
- 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;
  - Location and description of any modern remains; and
  - Investigation undertaken during the watching brief.
- 9.7.16 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 Archaeology Contractor in liaison with the Project Archaeologist (and as discussed with the Greater London Archaeological Advisory Service/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 Archaeology Contractor's Method Statement.

9.7.17 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 Archaeology Contractor shall establish the TBMs as part of the same closed loop. The Archaeology Contractor shall prepare a record of their surveying methodology for inclusion in the archive.

9.7.18 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.

## 9.8 Recording standards

9.8.1 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.

9.8.2 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 an elevation 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.); and
- 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 and 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.

## 9.9 Specification for archaeological investigation

- 9.9.1 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.
- 9.9.2 Where modern foundations are likely to be present, the SSWSI 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 Archaeology Contractor shall take all reasonable care to ensure that any damage is limited as far as practicable. If significant damage is likely to occur the work shall be suspended and the Project Archaeologist informed so that a technical solution can be agreed with the Project Manager.
- 9.9.3 The location and objectives of the trial excavations set out in Section 5 of the SSWSIs have been established in consultation with the projects' statutory consultees.
- 9.9.4 Each trial excavation has been assigned a unique ID number by the Project Archaeologist. The Archaeology Contractor shall not vary this number unless agreed by the Project Archaeologist in writing.
- 9.9.5 The dimensions of each trial excavation in plan, inclusive of the trench support system employed (if required) to secure personnel entry to the excavation, shall be set out in the Archaeology Design Consultant's Method Statement. Trial excavations shall be excavated to the first archaeological horizon or natural/undisturbed geology; the requirement to excavate to natural if archaeological horizons are identified will be established during site work. This shall be dependent on the agreed objectives of the excavation.
- 9.9.6 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 Project Archaeologist has agreed an alternative method).
- 9.9.7 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 Archaeology Contractor. The Principal Contractor shall cease work when archaeological evidence is revealed and allow the 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.

- 9.9.8 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-0.50m depth (dependant on specific site conditions), moving along the length of the trench or area. The 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 Project Archaeologist.
- 9.9.9 Each spit shall be examined carefully to assist the recovery of any archaeologically significant artefacts and thus to determine when to cease machine excavation.
- 9.9.10 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 shall need to be taken to ensure that damage does not occur to underlying remains.
- 9.9.11 The Archaeology Contractor shall undertake hand excavation and cleaning of any archaeologically significant horizons to fulfil the aims of the work. Within alluvial sequences the 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 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.
- 9.9.12 The Archaeology Contractor's excavation, sampling and recording policy shall be included in the 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.
- 9.9.13 The 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 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.

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

9.9.15 The Archaeology Contractor shall identify any temporary works and dewatering requirements associated with the archaeological investigation in the Archaeology Contractor's Method Statement and shall agree the detailed arrangements for such with the Principal Contractor. The 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 Archaeology Contractor's Method Statement.

9.9.16 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 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 Archaeology Contractor during the excavation of individual trenches and agreed with the Project Archaeologist.

9.9.17 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.

## **9.10 Recording systems**

9.10.1 The archaeological remains shall be recorded by the 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).

9.10.2 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;
- Photographs and other appropriate drawn and written records; and

- Other sections, including the half-sections of individual layers or features drawn as appropriate to scales of 1:10 or 1:20.

- 9.10.3 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.
- 9.10.4 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.
- 9.10.5 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 at a scale of 1:10 or 1:20 unless otherwise agreed with the Project Archaeologist. 'Single context planning' shall be used on deeply stratified sites. Drawing information shall be digitised for eventual CAD applications. The GLHER will accept Autocad DXF or .DWG format of extent of site and location of major features with the completed Sites and Monuments Report Form.
- 9.10.6 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 on to this diagram during the course of excavations.
- 9.10.7 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.
- 9.10.8 The Archaeology Contractor shall agree the appropriate level of recording and analysis for discovered standing structures with the Project 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.
- 9.10.9 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.

9.10.10 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 Project Archaeologist.

9.10.11 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 SSWSI and addressed in the Archaeology Contractor's Method Statement.

## 9.11 Archaeological science

9.11.1 The strategy for sampling archaeological and palaeoenvironmental deposits and structures (which can include soils, timbers, pollen, diatoms, animal bone, human bone etc.) will be developed by the Project Archaeologist in consultation with the English Heritage Regional Science Advisor and the Design Archaeologist. 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.

9.11.2 The finds retrieval policies of the appropriate recipient museum will be adopted. In accordance with the collection and retention strategy set out in the SSWSI, 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).

9.11.3 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.

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

9.11.5 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 Project Archaeologist.



- 9.11.6 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 Project 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).
- 9.11.7 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.
- 9.11.8 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 or consolidation shall be carried out to ensure the long-term survival of the material; this will be done with due consideration to possible future investigations.
- 9.11.9 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).
- 9.11.10 Samples for absolute dating shall be submitted promptly to the supply laboratory proposed by the Archaeology Contractor or other supplier as instructed by the Project Archaeologist. Delivery times shall be agreed to ensure that the results are available to aid development of specifications for subsequent mitigation strategies in the SWSI. 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.
- 9.11.11 Processing of all soil samples collected for biological assessment, or their sub-samples, 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.
- 9.11.12 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 Project 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).

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

9.11.14 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.

## **9.12 Generic specification for Environmental Sampling**

9.12.1 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 SSWSI.

9.12.2 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.

9.12.3 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. Institute for Archaeologists Standard and Guidance for Artefact and Environmental Study, Collection, Research and Conservation 2008d; English Heritage Geoarchaeology, 2007; English Heritage - Archaeological Science at PPG16 interventions: Best Practice Guidance for Curators and Commissioning Archaeologists, 2003).

9.12.4 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 Project 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.

9.12.5 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.

- 9.12.6 For 'bulk disturbed' samples the limits of the sample zone shall be recorded and identified on plan.
- 9.12.7 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. Two labels shall be attached to the outside with site name and code, feature/context number and depths of sample.
- 9.12.8 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 At Tunnel Datum (ATD). Where the sample crosses archaeological context boundaries these shall be noted on the sample recording pro-forma.
- 9.12.9 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.
- 9.12.10 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.

## 10 Deliverables

### 10.1 Archaeological Contractors Method Statement

10.1.1 The Archaeology Contractor shall provide a detailed Method Statement for the works for the Project 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 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 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 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 Archaeology Contractor's requirements and specification for services and facilities and attendances required to be supplied by the Principal Contractor or the Employer.

## 10.2 Site Archives

10.2.1 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.

10.2.2 For London archives, individual descriptions of all archaeological strata and features excavated or exposed shall be entered on to 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.

10.2.3 Archives shall be prepared to conform with current best practice (e.g. Brown and Duncan 2007; Institute of Field Archaeologists 2008f) 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 Archaeology Contractor shall complete the site archive and submit to the Project Archaeologist within eight weeks of completion of a fieldwork event.

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

## 10.3 Digital Data

10.3.1 The 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).

10.3.2 The 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.

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

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

10.3.5 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).

10.3.6 Prior to commencing the works, the 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 Project Archaeologist. The Archaeology Contractor shall inform the 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.

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

10.3.8 Where errors or inconsistencies are noted in the data, by either the Project Archaeologist or Archaeological Contractor, they shall be corrected by the Archaeology Contractor and a corrected data file issued to the Project 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.

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

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

10.3.11 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.

## 10.4 Interim Statement

10.4.1 Within seven days of completion of a Critical Phase or Phase 1 fieldwork event, or as otherwise instructed to do so, the Archaeology Contractor shall submit an Interim Statement to the Project Archaeologist.

- 10.4.2 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.
- 10.4.3 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.
- 10.4.4 The Interim Statement including illustrations shall be submitted as a single PDF file to the Project Archaeologist. CAD drawing files shall also be submitted.
- 10.4.5 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.
- 10.4.6 The Interim Statement shall include an approved report title sheet and QA page (to be supplied by the Employer).
- 10.4.7 The following shall appear in the footer or header of each Interim Statement: CRL Ltd, 20\$\$
- 10.4.8 Copies of the Interim Statement shall be provided by the Project Archaeologist to Kim Stabler (English Heritage) and the LBTH.

## 10.5 Survey Report

- 10.5.1 The 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 Archaeology Contractor to the Project Archaeologist within two weeks of the completion of fieldwork.
- 10.5.2 The 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.

## 10.6 Fieldwork Report

- 10.6.1 The evaluation, excavation and watching brief reports shall be prepared by the Archaeology Contractor within 6 weeks of the completion of the fieldwork (unless this is varied by the Project 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

10.6.2 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 Project Archaeologist.

10.6.3 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.

10.6.4 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.

10.6.5 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.

10.6.6 The 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 Project Archaeologist.

- 10.6.7 The assessment of results and statement of potential shall include the 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 project 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.
- 10.6.8 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 Archaeology Contractor in order to illustrate what level of confidence can be placed on the information. The Project Archaeologist will use that information as the basis for developing any further mitigation strategy and/or further analysis and publication.
- 10.6.9 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.
- 10.6.10 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 Project 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.
- 10.6.11 Copies of the Fieldwork Report shall be provided by the Project Archaeologist to Kim Stabler (English Heritage) and the LBTH.
- 10.6.12 The following shall appear in the footer or header of each Fieldwork Report:

CRL Ltd, 20\$\$

## **10.7 HER Summary Sheet**

- 10.7.1 The Archaeology Contractor shall complete a GLHER Summary Sheet for the works (i.e. one per fieldwork event). The Summary Sheet shall be included in the Fieldwork Reports.

## **10.8 Summary Report**

- 10.8.1 A short summary report of no more than 500 words (the Summary Report) for the works shall be prepared by the Archaeology Contractor for submission to the Project Archaeologist for subsequent publication within London Archaeologist or another local (county) journal or publication outlet specified by the Project Archaeologist.

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

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

### **10.9 Post excavation assessment**

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

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

## 11 Site Monitoring & Progress Reports

- 11.1.1 Prior to commencing the works the Archaeology Contractor shall agree a programme of weekly written progress reports and periodic progress meetings with the Project Archaeologist an/or Project Manager and shall be represented at such meetings to the satisfaction of the Project Archaeologist. The Archaeology Contractor shall provide information describing progress on-site to date, the processing of samples and artefacts and feedback from any initial assessment.
- 11.1.2 The LBTH, GLAAS officer and, if required the English Heritage Inspector for works affecting a Scheduled Monument (collectively the 'external consultees') shall be informed in writing at least one week in advance of commencement of fieldwork by the Project Archaeologist.
- 11.1.3 Periodic updates on the progress of the Crossrail archaeology programme shall be submitted to the external consultees by the Project Archaeologist. The Archaeology Contractor shall provide information to the Project Archaeologist as requested to inform this reporting.
- 11.1.4 The Project Archaeologist shall arrange and convene monitoring site visits by the external consultees, 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.
- 11.1.5 The 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 SSWSI. The detailed method for this work shall be agreed between the Archaeology Contractor and the Project Archaeologist at a site meeting and subsequently in writing between the Project Archaeologist and the relevant external consultees.

## 12 Personnel requirements

- 12.1.1 The Archaeology Contractor shall provide project personnel of experience as described below. The personnel shall be approved by the Project Archaeologist. Approval may be withdrawn by the Employer at their discretion and in accordance with the contract conditions.
- 12.1.2 The Archaeology Contractor shall submit CVs of all proposed personnel including any specialists, but excluding site technician grades, to the Project Archaeologist for approval if this has not already been done as part of the pre-qualification or tender process.
- 12.1.3 The works shall be managed, directed and staffed by appropriately qualified and experienced personnel. The Archaeology Contractor's Project Manager shall possess at least ten years directly relevant experience of similar projects.
- 12.1.4 The excavation, sampling and recording of the works shall be directed in the field by a Fieldwork Director (Supervising Archaeologist) who is a Member of the Institute of Field Archaeologists (MIFA). The Supervising Archaeologist shall be on site throughout the fieldwork stages.
- 12.1.5 The Archaeology Contractor's project team shall include a historic buildings specialist and an environmental archaeologist suitably qualified in archaeological science and geo-archaeological sediment description methods, and on site sample processing and assessment techniques.
- 12.1.6 The Archaeology Contractor's project team shall be staffed by technician grades with minimum six months experience in appropriate aspects of excavation and recording.
- 12.1.7 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).
- 12.1.8 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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## Appendix A — Drawings

Drawing Title	Drawing Number	Revision
Figure 1 Trench location plan	C123-JUL-T1-DDL-CR094_SH005-00060	P05.1
Figure 2 Trenches located over buildings on Rocque's 1746 map and extrapolated extent of Worcester House	C123-JUL-T1-DDL-CR094_SH005-00061	P05.1
Figure 3 Trenches overlain on the 1 <sup>st</sup> Edition Ordnance Survey map (1870)	C123-JUL-T1-DDL-CR094_SH005-00062	P04.1
Archaeology proposed Excavation Area	Drawing C123-JUL-T1-DDL-CR094_SH005-00064	P02.1

**Safety, Health and Environmental Information**  
 Notes below are additional to hazards/risks normally associated with this type of work:

**Construction**

Ci. Available data on contaminated land is limited & may not be reliable. Contaminated land report to be consulted on issue.

Cii. Available data on buried services is limited and may not be reliable. Surveys prior to excavation have been instructed under the contract

Ciii. Take precautions against possible voids from abandoned basements

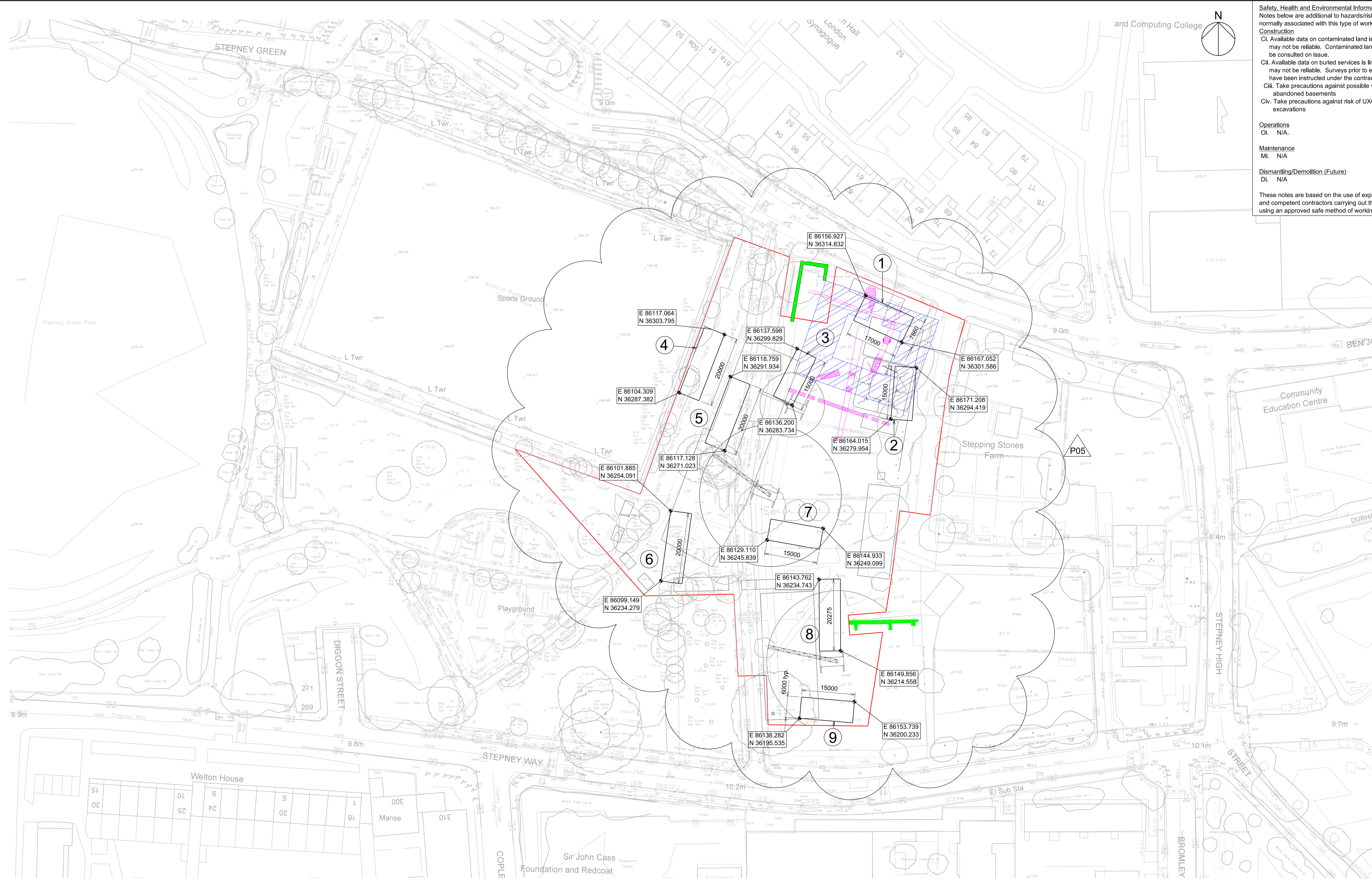
Civ. Take precautions against risk of UXO in excavations

**Operations**  
 Oi. N/A

**Maintenance**  
 Mi. N/A

**Dismantling/Demolition (Future)**  
 Di. N/A

These notes are based on the use of experienced and competent contractors carrying out the work using an approved safe method of working.



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Fit for authorisation

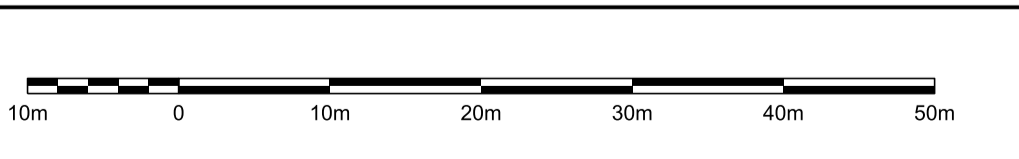
Rev.	Date	Description	By	Chkd	App	Auth
P01	06/08/2010	First Issue	TE	RS	RS	
P02	16/09/2010	Issued for Inclusion in Document No. C123-JUL-T1-RGN-CR094_SH005_Z_00001	TE	RS	RS	
P03	24/09/2010	Trench Locations Revised	PM	RS	-	
P04	28/09/2010	Trench Locations Revised	TE	RS	RA	
P05	03/11/2010	Trench Size and Locations Revised	PM	RS	RA	

**Notes**

- This drawing to be used in conjunction with information contained in the following report: Addendum to SWSI: Trial Trench Evaluation and Detailed Excavation Stepney Green Shaft (Document Reference: C123-JUL-T1-RGN-CR094\_SH005\_Z\_00001)
- Dimensions are in millimeters unless noted otherwise.
- Dimensions should not be scaled from this drawing.
- The coordinate system relates to London Survey Grid.

**Key**

- Boundary
- Extant Wall
- Scheme design
- Proposed Trial Trench Location
- 1 Trench Number
- Approximate location of Worcester House
- DGLA trenches dug in 1985. Cross hatch indicates structural elements found in 1985 trenches



**Crossrail**  
 25 Canada Square  
 Canary Wharf  
 London  
 E14 5LQ

Contract: Intermediate Shaft Design  
 Originator: Jacobs UK Limited  
 Location: Stepney Green Shaft

By: P.MARCHANT  
 Chk: R.SMART  
 App: R.ANDREWS  
 Auth: ...

Scale: 1:500@A1  
 Drawing and CAD file No: C123-JUL-T1-DDL-CR094\_SH005-00060  
 Rev: P05  
 Suitability: S4

RESTRICTED



**Safety, Health and Environmental Information**  
 Notes below are additional to hazards/risks normally associated with this type of work:

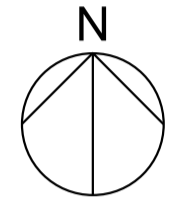
**Construction**  
 Ci. Available data on contaminated land is limited & may not be reliable. Contaminated land report to be consulted on issue.  
 Cii. Available data on buried services is limited and may not be reliable. Surveys prior to excavation have been instructed under the contract  
 Ciii. Take precautions against possible voids from abandoned basements  
 Civ. Take precautions against risk of UXO in excavations

**Operations**  
 Oi. N/A.

**Maintenance**  
 Mi. N/A

**Dismantling/Demolition (Future)**  
 Di. N/A

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Rev.	Date	Description	By	Chkd	App	Auth
P01	06/08/2010	Issued for IDR	TE	RS	RS	
P02	16/09/2010	Issued for Inclusion in Document No. C123-JUL-T1-RGN-CR094_SH005_Z_00001	TE	RS	RS	
P03	16/09/2010	Issued for Inclusion in Document No. C123-JUL-T1-RGN-CR094_SH005_Z_00001	TE	RS	RS	
P04	24/09/2010	Trench Locations Revised	PM	RS	RA	
P05	03/11/2010	Trench Size and Locations revised	PM	RS	RA	

- Notes**
- This drawing to be used in conjunction with information contained in the following report: Addendum to SWSI: Trial Trench Evaluation and Detailed Excavation Stepney Green Shaft (Document Reference: C123-JUL-T1-RGN-CR094\_SH005\_Z\_00001)
  - Refer to drawing number C123-JUL-T1-DDL-CR094\_SH005-00060 for size and setting out of trenches.
  - Dimensions are in millimeters unless noted otherwise.
  - Dimensions should not be scaled from this drawing.
  - The coordinate system relates to London Survey Grid.

**Key**

- Boundary
- Extant Wall
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- DGLA trenches dug in 1985. Cross hatch indicates structural elements found in 1985 trenches



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Contract: Intermediate Shaft Design  
 Originator: Jacobs UK Limited  
 Location: Stepney Green Shaft

**Title:**  
 Trenches located over buildings on Rocque's 1746 map and extrapolated extent of Worcester House  
 Figure 2

By: P.MERCHANT  
 Chk: R.SMART  
 App: R.ANDREWS  
 Auth: ...

Scale: NTS@ A1  
 Drawing and CAD file No: C123-JUL-T1-DDL-CR094\_SH005-00061  
 Rev: P05  
 Suitability: S4

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 For authorisation

**Safety, Health and Environmental Information**  
 Notes below are additional to hazards/risks normally associated with this type of work:

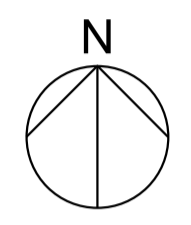
**Construction**  
 Ci. Available data on contaminated land is limited & may not be reliable. Contaminated land report to be consulted on issue.  
 Cii. Available data on buried services is limited and may not be reliable. Surveys prior to excavation have been instructed under the contract  
 Ciii. Take precautions against possible voids from abandoned basements  
 Civ. Take precautions against risk of UXO in excavations

**Operations**  
 Oi. N/A

**Maintenance**  
 Mi. N/A

**Dismantling/Demolition (Future)**  
 Di. N/A

These notes are based on the use of experienced and competent contractors carrying out the work using an approved safe method of working.



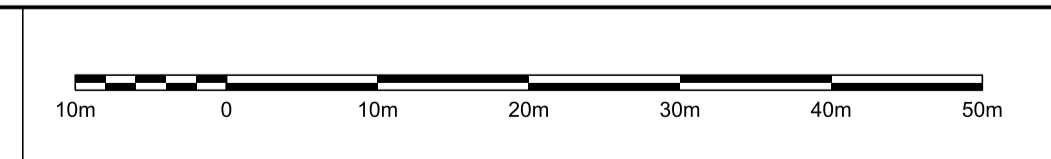
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Rev.	Date	Description	By	Chkd	App	Auth
P01	06/08/2010	Issued for IDR	TE	RS	RS	
P02	16/09/2010	Issued for Inclusion in Document No. C123-JUL-T1-RGN-CR094_SH005_Z_00001	TE	RS	RS	
P03	24/09/2010	Trench Locations Revised	PM	RS	RA	
P04	03/11/2010	Trench Size and Locations revised	PM	RS	RA	

- Notes**
1. This drawing to be used in conjunction with information contained in the following report: Addendum to SWSI: Trial Trench Evaluation and Detailed Excavation Stepney Green Shaft (Document Reference: C123-JUL-T1-RGN-CR094\_SH005\_Z\_00001)
  2. Refer to drawing number C123-JUL-T1-DDL-CR094\_SH005-00060 for size and setting out of trenches.
  3. Dimensions are in millimeters unless noted otherwise.
  4. Dimensions should not be scaled from this drawing.
  5. The coordinate system relates to London Survey Grid.

**Key**

- Boundary
- Extant Wall
- Scheme design
- Proposed Trial Trench Location
- 1 Trench Number
- Approximate location of Worcester House
- DGLA trenches dug in 1985. Cross hatch indicates structural elements found in 1985 trenches



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 25 Canada Square  
 Canary Wharf  
 London  
 E14 5LQ

Contract: Intermediate Shaft Design  
 Originator: Jacobs UK Limited  
 Location: Stepney Green Shaft  
 Title: Archaeology Trench Overlaying OS Map (1870)  
 Figure 3

By: P.MARCHANT  
 Chk: R.SMART  
 App: R.ANDREWS  
 Auth: ...

Scale: 1:500@A1  
 Drawing and CAD file No: C123-JUL-T1-DDL-CR094\_SH005-00062  
 Rev: P04  
 Suitability: S4

RESTRICTED

**Safety, Health and Environmental Information**  
 Notes below are additional to hazards/risks normally associated with this type of work:

**Construction**

Ci. Available data on contaminated land is limited & may not be reliable. Contaminated land report to be consulted on issue.

Cii. Available data on buried services is limited and may not be reliable. Surveys prior to excavation have been instructed under the contract

Ciii. Take precautions against possible voids from abandoned basements

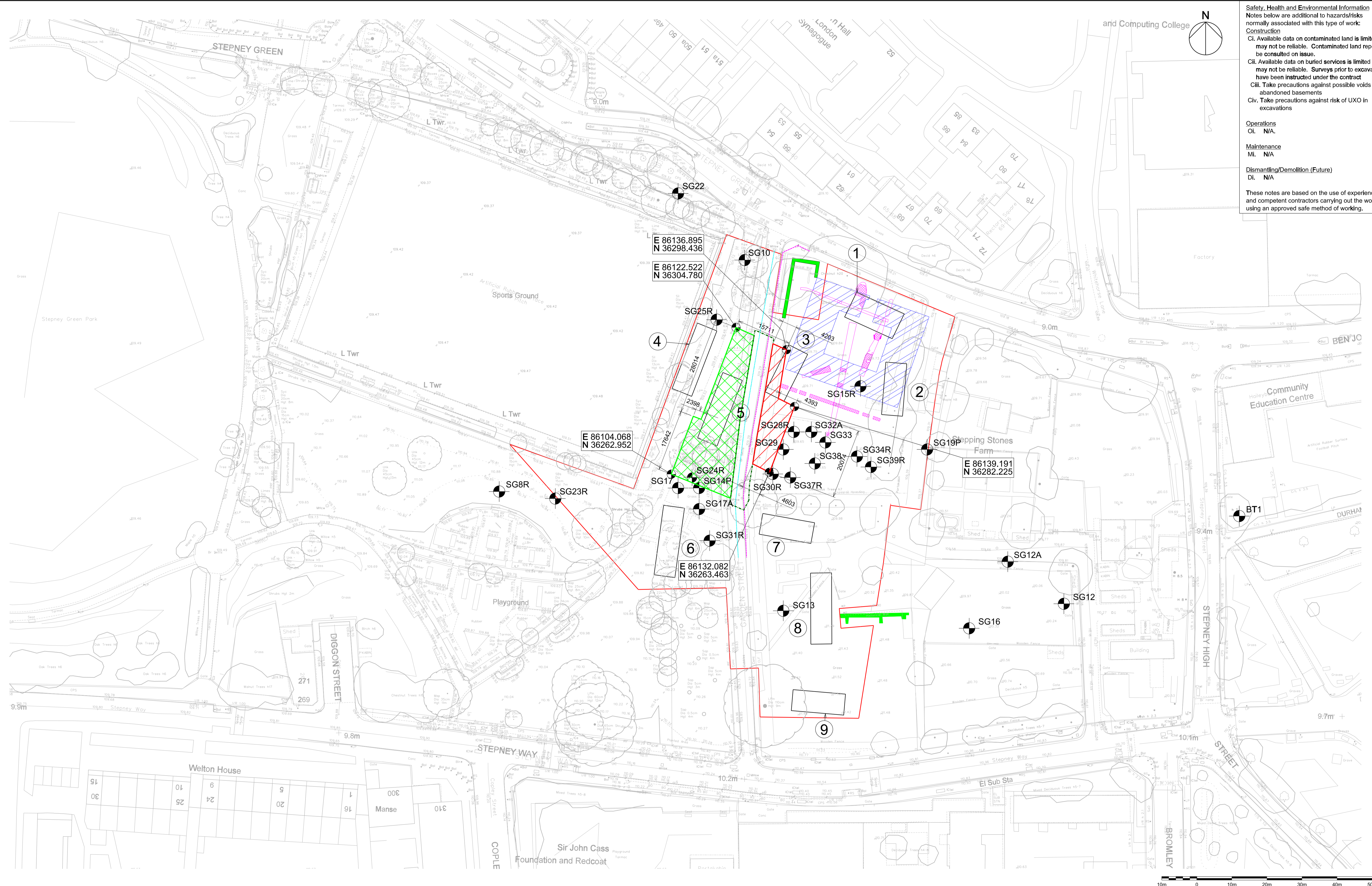
Civ. Take precautions against risk of UXO in excavations

**Operations**  
 Oi. N/A

**Maintenance**  
 Mi. N/A

**Dismantling/Demolition (Future)**  
 Di. N/A

These notes are based on the use of experienced and competent contractors carrying out the work using an approved safe method of working.



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Rev.	Date	Description	By	Chkd	App	Auth
P01	03/02/2011	Issued to PDP	TE	RS	RA	
P02	09/02/2011	Issue to PDP, Extension A added	PM	RS	RS	

**Notes**

- This drawing is to be used in conjunction with information contained in Stepney Green Shaft: SSWSI (C123-JUL-T1-TPL-CR094\_SH005\_Z-00001 Rev 7.0)
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- Dimensions should not be scaled from this drawing.
- The coordinate system relates to London Survey Grid.
- Refer to drawing C123-JUL-T1-DDL-CR094\_SH005-00065 for existing underground services and buffer area details.

**Key**

- Boundary
- Extant Wall
- Scheme design
- Proposed Trial Trench Location
- Trench Number
- Approximate location of Worcester House
- DGLA trenches dug in 1985. Cross hatch indicates structural elements found in 1985 trenches

- Buffer zone around live services
- High Voltage Cable
- Combined Sewer
- Trench Extension A
- Trench Extension B
- Monitoring Well Location

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 Canary Wharf  
 London  
 E14 5LQ

Contract: Intermediate Shaft Design  
 Originator: Jacobs UK Limited  
 Location: Stepney Green Shaft  
 Title: Archaeology Proposed Excavation Area

By: P.MARCHANT  
 CHK: R.SPALDING  
 App: R.SPALDING  
 Auth: —

Scale: 1:500 @ A1  
 Drawing and CAD file No: C123-JUL-T1-DDL-CR094\_SH005-00064  
 Rev: P02  
 Suitability: S4