






C257 ARCHAEOLOGY CENTRAL
Method Statement
Archaeological Excavation and General
Watching Brief
Broadgate Area 5 West (XSM10)

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2a. Stakeholder (Principal Contractor: C502 LOR) review required? YES NO

(If NO, strike out sections 2a & 2b and go to section 3)



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Note for Readers

Various readers of this method statement and risk assessment are likely to be directly interested in different parts of the document. The following table is intended to help readers identify which sections cover their main interests.

Reader's main interest	Most relevant sections
Principal Contractor	2.1, 2.3 3.1 4 5 15 16 17 21 22
Health, Safety, & Environment	15 17 21 22
Contractual	1.1 2 4 7 8 10 14 18 19 20
Archaeological methodology	1 3 5 6 9 10 11 12 13

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Fig 1 Plan showing location of TWB Area 5 West

1 Introduction

Archaeological investigations are to be carried out on this site by the Museum of London Archaeology (MOLA). The requirements are set out in:

- A Crossrail **Site-specific Written Scheme of Investigation (SS-WSI): Liverpool Street Station, Site-specific Written Scheme of Investigation, Doc. No. C138-MMD-T1-RST-C101-00001 Version 2, 29.04.10**
- A Crossrail **WSI Addendum: C502 Liverpool Street Station SS-WSI Addendum for Archaeological Excavation and Watching Brief at Broadgate Ticket Hall (XMS10), Doc. No. C502-XRL-T1-RST-CR101-50002, Version 2, 01.07.14**

The tasks from the WSI Addenda which this method statement covers are:

Task	Principal Contractor	Provisional Programme
<ul style="list-style-type: none"> • General Watching Brief/ Detailed Archaeological Excavation in Area 5 West (part of station northern escalator box) 	C502 Laing O'Rourke	Start GWB: 14th July 2014 Duration: approximately 3 weeks

This task only covers excavation of burials, and therefore corresponds to only two of the four phases in the WSI (section 3.1):

- Phase 1: Removal of modern overburden and disarticulated human remains by the C502 Principal Contractor and exhumation contractor)
- Phase 2: Archaeological excavation of burials by C257 MOLA

The overall purpose of these tasks is to mitigate the impact of the works upon archaeological remains, by making an adequate record of them in during the construction ground works (a mitigation strategy of *preservation by record* in line with Crossrail requirements).

These archaeological investigations form part of the mitigation for the Broadgate Ticket Hall site, and correspond to Phase 1 and 2 as detailed in the WSI Addenda (section 3).

This Method Statement has been developed in conjunction with the Principal Contractor, C502 Laing O'Rourke, who will be responsible for ensuring that the archaeological works may be carried out as specified.

If the project design or scope/method of working are subject to changes during the works, the method statement will be updated and re-issued to the Project Archaeologist for approval, in accordance with the specified document control procedures (see 10).

1.1 Site Description

The Broadgate Ticket Hall worksite (site of a new ticket hall) consists of an area in the road and pavement of Liverpool Street, to the east of Blomfield Street and to the south and west of the existing ticket hall/sub-station (see Fig 1). This lies within the City of London. Area 5 West lies in the northern part of the site where part of the future escalator box will be constructed.

1.2 Previous work on the site

The Broadgate Ticket Hall site has been the subject of a series of archaeological evaluation trenches/pits, and various watching briefs on utilities and other works. The results are included in the following sections, and are reported on in:

- MOLA for Crossrail, 2012a *Central Section Project, Fieldwork Report, Archaeological Evaluation and Watching Brief Broadgate Ticket Hall (XSM10)*, Doc. No. C257-MLA-X-RGN-CRG02-50064, v2, 07.03.12.
- MOLA for Crossrail, 2012b *C257 Archaeology Central, Fieldwork Report, Archaeological Excavated Evaluations and Watching Briefs, Pit 4, Pit 11, Trench 14 and 15, Pile Line Pits and SSET/UKPN Utility Diversions, Broadgate Ticket Hall (XSM10)*, Doc. No. C257-MLA-X-XCS-CRG02-50015, v2, 20.06.12.
- MOLA for Crossrail, 2014 *Fieldwork Report, Archaeological Excavation and Watching Briefs, Broadgate Ticket Hall Utilities Combined Report 2013 (XSM10)*, Doc. No.: C257-MLA-T1-RGN-CRG03-50014, v1 15.04.14

1.3 Geological and Topographical setting

The site lies on the sands and gravels of the Third (Taplow) Thames Terrace. The river terrace deposits are overlaid by a layer of alluvium, probably associated with the River Walbrook and its tributaries. Sporadic deposits of brickearth have been known to occur in areas of the site, overlying the terrace gravels.

Previous Crossrail archaeological fieldwork on the Broadgate Ticket Hall site, together with boreholes, suggest that the terrace gravels lie at c 107.3m ATD (c 107.25 to 107.4m ATD) over much of the length of the site.

This level is likely to decrease in the western c 20m, perhaps to approx 106m ATD or below, reflecting the slope of the former Walbrook valley dipping into the stream channel.

1.4 Archaeological and Historic Background

The archaeological and historic background was covered in the Detailed Desk Based Assessment (DDBA) (Crossrail 2008) and the SS-WSI (see section 1 above) and the reports listed in section 1.2. Only the archaeological potential of the site is summarised below. The presence of many of the predicted deposits has been demonstrated by previous work on the site, and is described as 'demonstrated potential'.

Overall, the Broadgate Ticket Hall site has:

- **Demonstrated potential for Roman remains** such as Walbrook deposits (potentially channels, alluvium with palaeoenvironmental evidence, revetments, overbank flooding), reclamation of the Walbrook valley, land drainage ditches, re-deposited human bone and grave goods (possibly *in situ*), as-yet undefined extra-mural activity and possibly occupation.
- **Demonstrated potential** for the fringes of the Saxon (or earlier) to medieval **Moorfields Marsh**, including artefacts such as the bone skates and leather working remains recovered in evaluation.
- **Demonstrated potential for reclamation/consolidation dumps** (and possibly quarrying) from reclamation of the marsh the **medieval and early post-medieval** periods.

- *Low potential* for Saxon activity, owing to the presence of the Moorgate Marsh. *Low potential* for prehistoric activity, which is likely to be limited to stray finds and sporadic truncated features.
- Demonstrated potential for post-medieval remains in the form of both disarticulated human remains and *in situ* burials relating to the Bethlehem hospital burial ground (BG208), the dumping of waste artefacts from craft industries such as bone and glass working, and the later post-medieval buildings and occupation of the area.

Only the latter, the Bethlehem Burial ground and subsequent post-medieval activity, is predicted in the first 3m below ground level which is the subject of the targeted watching brief in Area 5 West.

1.5 Deposit survival

Predicted Schematic typical sections

1.5.1 North-west corner of the site

Note: the exact depth of existing utilities and modern truncation is not currently known, but is predicted to be at least 1m bGL. This predicted schematic typical section is based on the results of the recent Open Cut Sewer Trench, and the 1985 excavation trench TP7 (LSS85). NB Phases 3 and 4 do not form part of the current task covered by this method statement

Deposit	Thickness	Depth of Surface below ground level – Approximate	Depth of base below ground level – Approximate
Phase 1: MODERN (overburden/truncation)	Estimated c 1–1.5m	0m (Ground level = c 112.9m ATD)	c 111.4–111.9m ATD (c 1.0–1.5m bGL)
	c 0.3m	Disarticulated human remains c 111.9m ATD (c 1–1.5m bGL)	c 111.6–110.2m ATD (1.3–1.8m bGL)
Phase 2: BURIAL GROUND (c 8 bodies per m ³ in LSS85 excavation, immediately east (3 to 6 per m ³ in previous XSM10 fieldwork))	c 1.2–1.5m	c 111.3m ATD (c 1.5m bGL)	c 109.9–110.1m ATD (c 2.8–3.0m bGL)
Phase 3: BURIAL GROUND CONSOLIDATION	c 0.3–1.1m	110.20–110.80m ATD (c 2.7–2.1m bGL)	c 109.1–109.9m ATD (c 3.0–3.8m bGL)
Phase 3: MOORFIELDS MARSH (medieval to early post-medieval)	c 0.5m	c 109.9m ATD (c 3.0m bGL)	c 109.5m ATD (c 3.5m bGL)
Phase 3: MOORFIELDS MARSH (Late-Roman to medieval)	c 0.9–1.1m	c 109.5m ATD (c 3.5m bGL)	c 108.4–108.6m ATD (c 4.1–4.3m bGL)
Phase 4: ROMAN DEPOSITS (Road surfaces, potentially meeting the main Roman Walbrook river channel with possible revetment and bridge structures)	c 1m	c 108.5–108.6m ATD (c 4.30m bGL) Second road surface = c 108.6m ATD First road surface = c 108.3m ATD	c 107.5–107.6m ATD (c 5.3–5.4m bGL)
Phase 4: RIVER CHANNEL (Pre-Roman Road)	c 1m	c 107.5–107.6m ATD (c 5.3–5.4m bGL)	106.5–106.7m ATD (c 6.3–6.5m bGL)
TERRACE GRAVELS (archaeologically sterile)	Unknown	106.5–107.5m ATD (c 5.5–6.5m bGL)	

2 Interfaces and Communication Plan

2.1 Interface with Project Archaeologist

The Method Statement has been developed jointly with the Principal Contractor, Laing O'Rourke and then submitted to the Project Archaeologist for approval. Any comments have been incorporated. Regular progress reports will be submitted to the Project Archaeologist and will be augmented by progress meetings and site visits when required, in order to optimise communications and feedback.

2.2 Interface with C257 Contract Administrator

MOLA shall submit costings and timesheet reports in accordance with the C257 Contract to the Contract Administrator.

2.3 Interface with Principal Contractor

MOLA has liaised with the Principal Contractor, Laing O'Rourke to prepare the Method Statement. The archaeological investigations will be undertaken under the auspices and supervision of the Principal Contractor. This interface extends to joint Health and Safety planning under CDM requirements. MOLA will provide the Principal Contractor with all necessary information to support site start-up (eg names of staff for inductions), health and safety planning; and (if required) to support the Principal Contractors' Permits to Dig/Penetrate. The majority of this information will be contained in this Method Statement. MOLA will liaise with the Principal Contractor regarding access, order of works, programme and commencement date. The Principal Contractor shall give MOLA 4 weeks' notice of start date(s) for each work area or task.

2.4 Interface with Crossrail Archaeologist

MOLA shall liaise with Crossrail Archaeologist to implement the correct archaeological design specification, described in the SS-WSI (Section 1 above).

2.5 Interface with External Consultees

The Crossrail Archaeologist shall liaise with the City of London and English Heritage to inform them of the archaeological works.

3 Scope of Works

3.1 Planned Fieldwork Events

This Method Statement sets out the methodology and health and safety requirements for the tasks described in section 1 for the future Crossrail Broadgate Ticket Hall in Liverpool Street.

The mitigation strategy for the site is *preservation by record*.

3.2 Confirmation of Methods and Standards

The archaeological fieldwork and reporting will be conducted in accordance with the following guidance and standards:

- Brickley M and McKinley JI 2004. (eds.) Guidelines to the Standards for Recording Human Remains, BABAO/IFA paper no. 7
- Campbell, G, Moffett, L and Straker, V 2011 'Environmental Archaeology. A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition)'. Portsmouth: English Heritage
- Corporation of London Department of Planning and Transportation, 2004 Planning Advice Note 3: Archaeology in the City of London, Archaeology Guidance
- Crossrail Environmental Minimum Requirements (Crossrail 2008)
- Crossrail Archaeology Generic Written Scheme of Investigation (draft July 2009)
- Crossrail Archaeology Specification for Evaluation & Mitigation (including Watching Brief) (CR-PN-LWS-EN-SP-00001)
- Crossrail Code of Construction Practice
- Crossrail SS-WSI – Liverpool Street Station, Site-specific Written Scheme of Investigation, Crossrail April 2010, Doc. No. C138-MMD-T1-RST-C101-00001 Version 2 and addendum to the SS-WSI: C502 Liverpool Street Station SS-WSI Addendum for Archaeological Excavation and Watching Brief at Broadgate Ticket Hall (XMS10), Doc. No. C502-XRL-T1-RST-CR101-50002, Version 2
- English Heritage, 2004, Geoarchaeology: using earth sciences to understand the archaeological record
- English Heritage/Church of England, 2005, Guidance for best practice for treatment of human remains excavated from Christian burial grounds in England
- English Heritage, July 2009, Standards for Archaeological Work, London Region, External Consultation Draft
- Institute for Archaeologists (IFA) Standards and guidance for watching briefs and field evaluation (IFA 2001a and 2001b)
- Mays S, Brickley M, and Dodwell N, 2004, Centre for Archaeology Guidelines. Human Bones from Archaeological Sites: guidelines for producing assessment documents and analytical reports. English Heritage
- McKinley, J and Roberts, C, 1993, Excavation and Post-Excavation treatment of cremated and inhumed human remains. IFA technical paper 13
- Museum of London Archaeological Site Manual (1994)

- Museum of London General Standards for the preparation of archaeological archives deposited with the Museum of London (1998)
- Museum of London (Powers N (ed.)), 2008, Human osteology method statement, <http://www.museumoflondon.org.uk/NR/rdonlyres/2D513AFA-EB45-43C2-AEAC-30B256245FD6/0/MicrosoftWordOsteologyMethodStatementMarch2008.pdf>
- Museum of London Archaeology Service (Powers N), undated, Guidelines for the assessment of inhumations and disarticulated bone, unpublished
- United Kingdom Institute for Conservation's Conservation Guidelines No. 2

3.3 Aims and Objectives

3.3.1 Research Aims

The original aims and objectives were listed in the WSI (Crossrail 2010) and stated that 'Archaeological investigation and mitigation within the Crossrail worksites for Liverpool Street Station have the potential to contribute to the research themes set out below:

Evidence relating to the Medieval Bethlehem Hospital precinct and cemetery (BG208), bisected by Liverpool Street, may provide data relevant to the following themes:

- Understanding the differences, if any, between burial practices in the city and outlying cemeteries;
- Understanding life expectancy, origins and belief, seen through studying health, diet and disease, and preparing models for future research;
- Considering the relationship between cemeteries and major or minor roads, in terms of symbolism, status, privacy and convenience; and
- Synthesising data on known religious sites and buildings, their chronology, use and influence locally, regionally and nationally.

3.3.2 Fieldwork Objectives

The overall objectives of the watching briefs are to mitigate the impact of the relevant parts of the Crossrail works within their footprint, contributing to the wider mitigation for the Broadgate Ticket Hall. The task-specific aims and objectives from the Addendum to the WSI (Version 2, section 2.3) which are relevant to this task (WSI Phases 1 and 2) are:

3.3.2.1 Pre-New Churchyard/Bedlam burial ground

- RM8 What evidence is there for reclamation of the area of the area in the medieval or post-medieval period ?

3.3.2.2 New Churchyard/Bedlam burial ground:

- BB1 - Characterise and date the sequence of late medieval dumping and reclamation associated with the establishment of the cemetery. What evidence is there for the original boundary of the burial ground, its subsequent rebuilding and any intra site spatial organisation?
- BB2 - Characterise and refine the sequence and dating of burials. How was the cemetery filled up? Is there evidence for intermittent import of other soils and hiatus

referred to in historic documents? Does structural evidence for the alleged pulpit survive?

- BB3 - Can different burial practices be defined? Use of shrouds, coffins, mass burial pits? How does it change spatially and chronologically? What indication is there for formal organisation/management and zoning? Can burial episodes be related to historic events such as documented plagues?
- BB4 - Is there a zone of multiple or pit burials in the northern part of the site around Trenches 13 and 14, and the 1985 excavations? [*nb this includes the area of Area 5*]
- BB5 - What date did the cemetery go out of use and how was the site prepared for subsequent re-use as gardens and then development? Can the gradual encroachment of Georgian buildings and plots in the 18th century be phased and dated?
- BB6 - Can gravestones or marker/ledger slabs provide evidence which will identify individuals, and can these be correlated with documentary sources?
- BB7 - What evidence is there for coffin use, construction type, furniture and coffin plates? Although preservation of these has been shown to be poor what use of specialist recovery methods and scientific testing could be applied?
- BB8 - How can osteology studies be used to describe the population of the burial ground and what scientific samples should be taken to determine the role of various pathogens particularly in relation to potential plague victims?
- [un-numbered] Can scientific sampling of soil samples be used to illuminate any of the other research objectives?
- BB9 - Can skeletal evidence, injury, or other indicators be correlated with biographic details derived from burial records?
- BB10 - Can the skeletal evidence be correlated with burial records to build a picture of the population of the cemetery as a whole and establish chronological trends during the use of the cemetery relating to parish origin, age and cause of death, gender, social, occupation, and religious belief profiles etc.?

3.3.2.3 Other post-medieval:

- PM1 - What is the date and taphonomy of deposition of the important worked bone assemblage? For example, do these fly tipping deposits post date the cemetery deposits, or do they represent intermittent deposition during and after the use of the cemetery ?
- PM2 – Can any spatial and chronological patterns of the different types of bone artefact be identified in different parts of the site?
- PM3 – Can documentary research identify evidence for the activities and industries in the surrounding area that are likely represented by waste materials dumped in the cemetery ?
- PM4 – How was the burial ground location treated in the Georgian and Victorian eras with reference to the character and date of the structural remains relating to 18th and 19th-century urbanisation and development ?

3.4 Event Codes

The sitecode is **XSM10**.

4 Site Management Plan

4.1 Tools and Equipment

Tools and equipment appropriate for the archaeological works will be ordered by the Supervising Archaeologist and delivered to site by the MOLA Equipment Officer from the MOLA central store. See 21.8.2 for details.

4.2 Training and Certification

MOLA provides Safety Training for its staff as follows:

- Induction Training for all staff (undertaken on joining MOLA, and as appropriate on individual projects).
- General H&S Training for supervisory staff (an H&S awareness course targeted at Field and Support Staff).
- Specialist H&S Training (designed to cover specialist areas and to update professional knowledge; as appropriate to deployment)

All MOLA staff on site will be competent to carry out their archaeological work. On site all staff will be supervised by a competent person.

For certain specific aspects of MOLA work only those members of staff with the relevant training and certification will be allowed to undertake them. These include Cable and Pipe/Underground Service Location, Chainsaws, Confined Spaces (see 21.7.3). However, only the confined spaces training is likely to be required on this site.

All MOLA staff have passed a CITB Health and Safety Test to operative level and will carry the CSCS card on site at all times (CSCS, Construction Related Organisation CRO White Card for Archaeological Technician, Code 5363; other cards are available for site visitors etc).

All staff will have their MOLA ID cards with them (see 21.6.1).

4.3 Site Monitoring

The site will be monitored by the MOLA Project Manager (Nicholas Elsdon, BSc) via site visits, as and when required, in order to provide advice and support to the MOLA Supervisor. The MOLA H & S Compliance Manager, Ian Grainger will also regularly monitor the site, see 15.4.

4.4 Progress Reporting

MOLA has agreed a programme of weekly written progress reports and progress meetings (If appropriate) with the Project Archaeologist. MOLA shall provide information describing progress on-site to date, the processing of samples and artefacts and feedback from initial assessment, and a BMOS report (see 15.6).

4.5 Resource Plan

Excavation:

- The excavation will be supervised by a MOLA Supervisor (Grade 4 or 5) assisted by up to an estimated 4 members of the MOLA field team (Grade 6), with support from MOLA Geomatics, Geoarchaeology, and Photographic team members when required. Other archaeological specialists (Grade 8) may be called in if necessary.

General Watching Brief:

- The watching briefs will be supervised by a MOLA Supervisor (Grade 4 or 5) with support from MOLA Geomatics, Geoarchaeology, and Photographic team members, and other specialists (Grade 8), as necessary.

Staff will be drawn from the pool of CVs submitted to Crossrail for approval.

The named Supervisor will be confirmed to Crossrail and the Principal Contractor in advance, and added to subsequent versions of this method statement, once the firm start date has been notified to MOLA. Other staff to be assigned when required

For the tasks in this method statement:

- Site Supervisor:
Robert Hartle, BA (Hons), MA, Senior Archaeologist, overall responsibility for site supervision and conduct of the fieldwork.
Direct Line (office): 020 7410 2238
Mobile: 07834 794517

Other staff and specialists are to be determined when required.

All archaeological staff are direct MOLA employees, ordinarily full time. The working hours are set out in 4.7 below.

4.6 Provisional Programme

The predicted overall start dates and durations for the work are included in section 1.

4.7 Working Hours

Work on site will take place within the core Crossrail working hours, which are between 0800 to 1800 on weekdays and 0800 to 1300 on Saturdays as specified in the Environment Requirements (Section 4 of Works Information Vol 2). Operations anticipated to cause disturbance are limited to these hours (or as specified within a Section 61 consent obtained by the Principal Contractor), in order to minimise disruption to local residents and the general environment.

5 Fieldwork Methodology

*It should be emphasised that the levels quoted for archaeological deposits are **general predictions** based on the earlier fieldwork on the site. They are **likely to vary considerably** across the site, with both depths of modern disturbance and the thickness of archaeological features. Therefore, it is **not possible to give precise levels** for removal of modern overburden to the surface of archaeological deposits, or for the base of archaeology. Approximate levels are given here, to the nearest 0.1m, but in practice the levels at which archaeological deposits are present will need to be **determined by the MOLA supervisor** during the course of the work.*

5.1 Phase 1: General Watching Brief (GWB) Methodology

5.1.1 Site-specific General Watching Brief methodology

In Phase 1 (WSI, 3.1) The C502 Principal Contractor Laing O'Rourke will remove **modern overburden** using a mechanical excavator with a flat-bladed ditching bucket (where practical). If deposits containing disarticulated human bone are encountered then the C502 exhumation contractor (TCS) will remove these down to the first archaeological horizon (the burial ground, expected at approximately 111.3m ATD).

MOLA will monitor all work undertaken by C502 Principal Contractor Laing O'Rourke and the C502 exhumation contractor TCS as a GWB to identify and record any surviving archaeological remains. Where requested by Crossrail, monitoring will also include any further relevant works undertaken by the contractors that risk disturbing archaeological deposits.

In the event of in-situ human remains being uncovered during the GWB then the status of the fieldwork event will be redefined as an Archaeological Excavation (see 5.1). This redefinition, if authorised by the Project Archaeologist, will permit additional resources in terms of staff and attendance to allow for more intensive recording. The decision to either excavate or remove any *in-situ* remains encountered at this stage will be made in conjunction with the Project Archaeologist.

5.1.2 Generic General Watching Brief methodology

A general watching brief consists of a basic monitoring presence to observe the works carried out either by the Principal Contractor or their sub-contractor without constraint on their working methods (Crossrail 2009 Archaeology Specification for Evaluation & Mitigation (including Watching Brief) CR-PN-LWS-EN-SP-0001, version 3). This includes making a basic record of notes, measurements, drawings and photographs consistent with an observation role: eg depth, character, date and survival/truncation of deposit sequence, height of natural geology. Monitoring and recording during a general watching brief will generally be made by observation from ground level. During a general watching brief MOLA staff will only enter the trench or area of excavation by agreement with the Principal Contractor or their sub-contractor (providing that there is proper access and that it is safe to do).

5.2 Phase 2: Detailed Excavation Methodology

Summary of methodology for Detailed Excavation at Area 5 West, Broadgate

(approximate area shown on Fig 1)

Phase 1:

- Initial ground reduction by C502 to the level of the burial ground will be monitored as a General Watching Brief (ie monitoring and recording of deposits exposed by the ground reduction), see 5.1.

Phase 2:

- C502 MOLA will archaeologically excavate the burial ground (using hand tools such as trowels, shovels, mattocks, hoes, and dumpy level) to its base at an estimated c 2.8–3m bGL (109.9–110.1m ATD). For the archaeological excavation methodology for human remains see 5.3.1 and 7.2.
- It is anticipated that detailed excavation will **stop** at the 3m bGL formation level for Area 5 West.
- If burials continue below 3m bGL over an extensive area, MOLA will consult with C502 and Crossrail before excavating the remainder of the burials. However, it is expected that all burials will need to be removed rather than leaving *in situ* a small depth of human remains that would be exposed at the construction level, which is to be backfilled and re-excavated at later date.
- MOLA will also record the surface of any deposits which underlie the burial horizon (expected to be 16th-century land raising dumps for the cemetery). However, if burials cease above 3m bGL, MOLA will record and excavate the remaining deposits down to the 3m bGL formation level.
- *It is expected that the Principal Contractor will need to install protective materials (eg Terram or similar, and possibly sand if required) before backfilling. This will be determined by the Crossrail Project Archaeologist.*

5.3 Recording Methods

The archaeological remains will be recorded to best practice standards, in order to achieve archaeological objectives. The site recording will include as a minimum:

- The written record of individual context descriptions on appropriate pro-forma sheets.
- The drawn record: including, plans and section drawings of appropriate features, structures and individual contexts (1:10 1:20 or 1:50). Isolated archaeological remains (artefacts) may be spot located in plan and a height provided where possible. Deposits which are regular in plan (pits and ditches) may be located though co-ordinates, annotated with dimensions, and may be recorded digitally.
- A stratigraphic matrix of the sequence of deposits and structures encountered in each trench will be produced.
- The photographic record: photographs taken with a digital camera of resolution of 12 megapixel or greater, providing similar resolution to a conventional 35mm SLR. The photographic record will include photographs of archaeological features, appropriate groups of features, structures, and quaternary deposits. Each photograph will be recorded on site using a proforma photographic record sheet, showing image number,

area/test pit, context number(s), subject/description, direction of view, and date. In addition, appropriate record photographs will be undertaken to illustrate work in progress.

- Levels on plans, sections and other fieldwork records shall be related to OS datum.
- Other appropriate drawn and written records will be produced (for environmental sampling etc).

5.3.1 Detailed Excavation Methodology for Human Remains

- In the case of post-medieval cemeteries the burials tend to be highly standardised and it is unnecessary to plan both skeleton and coffin. Where they exist, coffins will be planned to scale; skeletons will only be planned to scale if there is no coffin and will comprise c 6–8 points at eg the skull and joints, to indicate its position and location. Otherwise a sketch on the reverse of the skeleton recording sheet will suffice.
- Where skeletons and/or coffins conform to a standard, it will be noted as such on the relevant recording sheet, and only aspects which differ from the norm will be described.
- Any finds associated with the skeleton or coffin fittings will be located on the sketch (or scale plan), as appropriate.
- At all stages of archaeological work, human remains encountered will be treated with care and respect.
- An osteologist will be available throughout the project to offer advice to staff and will carry out regular site visits as required.
- The archaeologists will avoid leaving remains exposed overnight wherever possible.
- Excavated remains will be retained in secure storage at the Liverpool Street worksite prior to transfer to the processing facilities.
- Digital record photographs will be taken of all burials and significant deposits of disarticulated bone and other features.
- Infant and neonatal burials will be block-lifted to ensure full recovery. Where foetal remains are found in utero, they will be given a unique context number but will be retained with the remains of the mother throughout the post-excavation process.
- The skeleton will be lifted and placed in archive quality perforated plastic bags each containing two 'tyvek' labels with site code, context number and details. One label should be contained within the bag, the other stapled to the outside.
- Human burials will be recovered and bagged individually on site in a large opaque plastic bag to ensure that the integrity of each burial is retained.
- Any fragile or usual remains for example those with pathological lesions will be carefully packaged and stored on site and will be given priority for transportation to the MOLA offices at Mortimer Wheeler House to avoid damage.
- If intact sealed coffins or vaults are encountered, these will not be opened. Work will halt at that location; a specific risk assessment and revision to the method statement will be produced in conjunction with the Project Archaeologist, Principal Contractor and the MOLA Health and Safety Advisor. Coffins will be wrapped in a protective sleeve (thick gauge polythene and tape or similar) either by MOLA staff or a specialist contractor and removed from site for reburial.

5.4 Survey and setting out method

MOLA will obtain from either the Principal Contractor C502 Laing O'Rourke or Crossrail's survey department the locations and values of the project datums in the area of the site.

MOLA surveyors will normally survey to LSG grid MOLA's local baselines, or the features, as appropriate to the remains encountered. If Crossrail survey control is not available, then they will reference locations to OSGB36 co-ordinates, using GPS/GNSS, and these will then be converted to LSG. See also section 13.

In some circumstances, **such as watching briefs**, it may be appropriate and more efficient for the Principal Contractor's surveyors (if they are available) to survey any MOLA temporary baselines. This will be determined by liaison between MOLA and the Principal Contractor. MOLA will also obtain from the Principal Contractor or Project Archaeologist CAD plans to London Survey Grid of the area as-dug.

6 Environmental archaeology investigation methodology

6.1 Sampling strategy for Broadgate Ticket Hall

This sampling strategy addresses the whole archaeological project for the Broadgate Ticket Hall, Liverpool Street.

Sampling will be conducted taking into account the samples already taken in (albeit limited) parts of the site, with the aim of obtaining coverage of both the full area of the site and of different types and periods of features.

6.1.1 Overview

The aim of this sampling is to evaluate the degree of preservation and range of environmental remains preserved within the archaeological deposits, assess their ability to address the overall site objectives and identify any additional research aims that might also be addressed by the archaeological deposits surviving on the site. For the excavation of burials only in Area 5 West, the focus of the environmental archaeology work will be on the post-medieval burials.

Selected negative features or burials will be targeted for environmental sampling, where suitable. Specifically, the work may potentially include the following types of deposit, if present and suitable:

- Burials

In general, sampling will be undertaken by the archaeologists excavating each trench. However, a geoarchaeologist will be on call to visit the site, advise and where necessary record and take samples from selected deposits.

6.1.2 General Methodology

For each trench the Project Manager(s) and Site Supervisor(s) will ensure the following with the support of a MOLA Environmental Archaeologist / Geoarchaeologist:

- That a range of suitable samples are collected from the site for the recovery of an appropriate range of environmental evidence that will contribute to the research strategy that underpins the requirement for excavation and recording.
- That the environmental procedures outlined in the *Archaeological Site Manual* (MoL 1994) and *Environmental archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation* (English Heritage 2011) are followed.
- Wherever possible, any geo-archaeological or environmental sequences obtained will be dated, for example with spot samples for dating.
- That general bulk samples, 40 litres in size (20L if waterlogged) will be the standard samples taken and that the processing methods are designed to recover a wide a range of materials from the same deposit in a single sample.

Sample	Sampled by	Material	Processing
Hand Collected	Archaeologist	Human Bone	Hand washing
	Archaeologist	Large/small mammal, bird, fish	Power-hosed
Bulk (general 40 litre sample)	Archaeologist	Large/small mammal, bird, fish, reptile, amphibian, marine molluscs, eggshell, plant macrofossils	Flotation or wet sieving
		Insects	Paraffin flotation
		Artefacts	Hand Washed

- The sampling strategy will be monitored throughout the excavation and adapted in light of the preservation and the type of features encountered. A MOLA Environmental Archaeologist/Geoarchaeologist will undertake site visits to provide advice and additional advice will be sought from the EH Regional Archaeological Science Advisor when necessary. A MOLA Environmental Archaeologist will be present to discuss the sampling and results of any processing undertaken during any site visit made by the EH Regional Science Advisor and, if requested, by Kathryn Stubbs (Senior Archaeologist, Corporation of London, Planning Department).
- As a general policy, uncontaminated negative features will be bulk sampled and bone collected by hand. Horizontal stratigraphy, if it survives, will be sampled on a spatial basis where appropriate. Unstratified contexts, make-up layers and contexts thought to have a high degree of residual or intrusive material will not be sampled. Bulk samples may also be taken to recover artefacts such as evidence for metalworking and/or other industrial activity.
- If excavated by MOLA, human burials will be recovered individually and bagged on site. Samples will be taken for analysis of the abdominal area only if discrete individuals can be securely identified, uncontaminated by deposits from other burials, and if the soil conditions are wet or moist. **Such conditions are unlikely for the dense post-medieval burials at Broadgate Ticket Hall.** Control samples will also be taken by consultation with the appropriate Specialist.
- That the environmental procedures outlined in section 3.2, and in particular the following documents are followed if required and requested by the Project Archaeologist:
 - Archaeological Site Manual (MoL 1994)
 - Environmental archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation (English Heritage 2011)
 - Centre for Archaeology Guidelines. Human Bones from Archaeological Sites: guidelines for producing assessment documents and analytical reports (English Heritage (Mays S, Brickley M, and Dodwell N) 2004)
 - Human osteology method statement (Museum of London (ed. Powers N) 2008)

6.1.3 Sampling approach to main features anticipated

- *Human remains*: articulated burials (inhumations) will be recovered individually. Where redeposited and/or disarticulated human remains are encountered, they will be lifted and labelled by context and retained for examination by the Osteologist. It is not anticipated that cremations will be present on this site, however if present, they will be subject to 100% sampling.

7 Archaeological Science Strategy

Where necessary the strategy for sampling archaeological and environmental deposits and structures (which can include soils, timbers, animal bone and human burials) will be developed by MOLA in accordance with English Heritage and IFA guidelines. Advice will be sought from appropriate MOLA specialists and if additionally required from English Heritage. Subsequent on-site work and assessment of the processed samples and remains will be undertaken by MOLA Specialists.

If necessary, samples for absolute dating such as C14 or timber samples for dendrochronology will be submitted to nominated MOLA external laboratories. This will only be done with the prior approval of the Project Archaeologist where there are particular research objectives to be addressed by such dating. It may be necessary to date (eg radiocarbon) environmental sequences, such as pollen.

See 6.1 for the site-specific sampling strategy.

7.1 Specialist Strategy

An appropriate programme of ceramic dating and study of other excavated artefactual and environmental materials will be undertaken by MOLA Specialists as their contribution to the Fieldwork Report.

7.2 Excavation and Recording of Human Remains

The required methodology for human remains is set out in detail in the SS-WSI and the MOLA Framework Method Statement (Technical Submission 2.4, section 4.6) and is not repeated here. It is anticipated that human remains will be present on this site, and therefore an exhumation licence has been applied for by C257 MOLA and received from the Ministry of Justice (see 14.4).

If human remains are present, the **Principal Contractor, Laing O'Rourke will be required to screen the burials from any public view, including views from above** – eg windows of buildings overlooking the site on Liverpool Street, Blomfield Street and Old Broad Street (see 21.8.1, also WSI Addendum 3.2.5).

Any *in situ* human remains will be recorded (cleaned, location recorded and photographed). The advice of a MOLA Osteologist will be sought where appropriate (see 5.3.1).

Any re-deposited, disarticulated human bones will be collected for possible further examination. At the end of the fieldwork, a MOLA osteologist will determine whether further examination of the disarticulated material is required, taking into account not only the condition and deposition etc of the bones, but any *in situ* burials excavated.

The soil from grave fills and cemetery deposits, even where hand excavated, has potential to contain human remains. Such soils will be visually inspected by MOLA staff, and will be stored separately by the Principal Contractor from other spoil. If deemed necessary by the Crossrail Project Manager, they will be subsequently taken by an exhumation contractor to remove human remains and rebury them in accordance with the burial licence.

It currently appears unlikely that soft tissue, sealed or unsealed lead coffins, sealed crypts, (or animal hair with potential for Anthrax spores), might be present. If they are encountered, work will stop immediately, the excavation area will be vacated, and the specific individual circumstances will be assessed. Work will not recommence until a new task specific risk assessment has been produced, and its requirements enacted (eg provision of task-specific PPE (see Risk Assessment 34), and method of safe removal and storage of remains).

7.2.1 Processing of Human Remains

Where detailed excavation of in-situ burials has been required, the following processing methodology will be employed:

- Treatment of all remains and samples will be to professional standards and in accordance with United Kingdom Institute for Conservation guidelines.
- Inhumations will be washed over a 1mm mesh using a spray hose. Any block lifted remains such as those of neonates, will be processed using a flotation tank with a 1 mm mesh to ensure complete recovery.
- The remains will be washed and packaged.
- Separate processing methods exist for cremated remains but it is not currently envisaged that these will be encountered during evaluation.
- The remains will be transferred to a purpose-built facility where they will be slowly air dried.
- The remains will then be packaged to archive standard under the direction of the Senior Osteological Processor. Human bone will not be marked.

7.2.2 Assessment Scanning of Human remains

Following processing as in 7.2.1, the following assessment scanning methodology will be employed:

- Inhumations will be assessed by a MOLA Human Osteologist. Assessment of all stratified deposits of human remains will be carried out according to English Heritage Centre for Archaeology Guidelines 2004 and MOLA standards (Powers, unpublished).
- Assessment data will be recorded in an Excel worksheet. For each context, the level of preservation and completeness will be estimated and a basic catalogue (by body area, not bone, ie skull, dentition, arms, legs etc) will be compiled.
- The remains will be rapidly scanned to provide basic demographic data. Remains will be classified as adult or subadult. Subadults will be subdivided into age groups based on the timings of the eruption of the molar teeth. Basic observation on adult sex will be made.
- Gross pathological changes will be noted using a coding system compatible with that used at analysis.
- The minimum number of individuals within each context will be noted.
- A summary catalogue of disarticulated bone will be produced if appropriate, to aid in establishing the number of individuals within each trench.

8 Artefact Recovery and Conservation

Sampling strategies are developed on a site specific basis to meet the evaluation objectives stated in the Crossrail Site-specific WSI; and the following professional standards, in consultation with appropriate specialists;

- MOL Archaeological Finds Procedure Manual (2006)
- Relevant English Heritage Centre for Archaeology Guidelines eg on Environmental Archaeology (English Heritage 2011)
- Guidelines of the Society of Museum Archaeologists for the Selection, Retention and Dispersal of Archaeological Collections (SMA 1993).
- IFA Guidelines to the standards for recording human remains (2004)
- Minimum Standards for the Processing, Recording, Analysis and Publication of Post-Roman Ceramics produced by the Medieval Pottery Research Group Occasional Paper 2, (Slowikowski, A, Nenck, B. and Pearce, J 2001)

In general all material from stratified archaeological deposits is retained unless it is clearly residual or part of a large but routine assemblage, in which case samples of both typical and diagnostic items are retained.

Due allowance will be made for occasional specialist attendances which may be needed on and off-site to complete the investigation to the appropriate specified standard. These would only be called upon on a case-by-case basis, if significant structures or strata are revealed. Such attendances may include artefact conservation, photography, surveying, environmental sampling, finds assessment, geoarchaeology and scientific dating. MOLA has a full range of in-house specialists and can therefore deploy such resources at short notice, if needed, eg to advise on sampling strategies.

All finds and samples will be treated in a proper manner and to Museum of London standards. They will be exposed, lifted, cleaned, conserved, marked, bagged and boxed in accordance with the guidelines set out in the United Kingdom Institute for Conservation's Conservation Guidelines No. 2 and the Museum of London's Standards for the Preparation of Finds to be permanently retained by the Museum of London. Metal objects will be x-rayed and appropriate objects then selected for conservation.

8.1 Retention and Disposal

The finds retrieval policies of the Museum of London will be adopted. An adequate and representative sample of finds and deposits as advised by appropriate MOLA specialists who will be available to attend site as required (see 7.1).

9 Treasure

All finds falling within the definitions of treasure (Treasure Act 1996) 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.

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

10 Deliverables and Submission Programme

MOLA shall provide the following reports in accordance with the C257 Contract and the Site Specific Written Scheme of Investigation (C138-MMD-T1-RST-C101-00001) and Addendum to the Project Archaeologist, or as otherwise instructed by the Project Archaeologist:

- Organisation of site monitoring visits, as and when requested by the Project Archaeologist.
- A weekly illustrated progress report to the Project Archaeologist containing the information required at part 5.10 of the C257 Contract.
- Additional Reporting will be determined by the Crossrail Project Archaeologist based on results, potentially combined with later fieldwork, but may include:
 - A short illustrated interim statement.
 - A survey report within 2 weeks of the completion of fieldwork (only where MOLA have conducted the surveying).
 - A fieldwork report will comprise a combined report with previous archaeological works undertaken for the utilities corridor for the Broadgate Ticket Hall.
 - A Summary Report of no more than 500 words for the works shall be prepared by MOLA for submission to the Project Archaeologist for subsequent publication within the London Archaeologist Annual Fieldwork Round-up.
 - MOLA will complete an SMR (OASIS) Summary Sheet for the works (ie one per fieldwork event). This Summary Sheet will be included in the Fieldwork Report if required.
- All levels cited in these reports should be Above Tunnel Datum (TD = OD +100m). All Co-ordinates cited in these reports should be based on the Crossrail survey grid, apart from archive copies which will use OS National Grid.
- MOLA will produce monthly progress photographs of archaeological work on the sites in this method statement to contribute to the 30 per month required across the whole of the C257 contract (see 14.3).

11 Document Control and Record Keeping

MOLA will access the Crossrail eB control system for transmitting reports and other deliverables. The primary report deliverables (as per 10) will be submitted to the Project Archaeologist in draft form (Version 1.0). Any tracked changes or comments added by the Project Archaeologist will then be incorporated and future dated versions (2.0 etc) will be returned via eB accompanied with the appropriate Checklist with Contractor's responses.

12 Archiving and Dissemination Method

The required methodology for off-site work including specialist method statements, assessment, analysis, publication and archive is set out in the SS-WSI and is not repeated here.

The site-specific publication and archive requirements will be agreed in conjunction with the Project Archaeologist in the light of the overall approach being developed for the Crossrail project (eg publication format and the extent to which individual sites may be grouped spatially or thematically; and degree to which the archive will be systematised and deposited as a single whole).

13 IT Capability – Digital Survey Recording, Data Capture and Curation

The required methodology for IT (including site survey) will be carried out in accordance with the C257 Contract and project standard survey requirements.

- For the GWB on the utilities corridor, it is assumed that the Principal Contractor will survey the as-dug location of the corridor, and that the plans will be passed to MOLA.
- Targeted Watching Briefs: the Principal Contractor's surveys, *if available*, may be requested to assist with the location of temporary base lines and the plotting of significant archaeological features where appropriate.
- Otherwise, in the excavation, and if required the targeted watching brief, MOLA Geomatics staff will survey MOLA's local baselines to Crossrail London Survey Grid co-ordinates, using Crossrail survey control (where available).
- In the event of MOLA Geomatics staff surveying without Crossrail survey control (*unlikely at Liverpool Street*), then they will reference locations to OSGB36 co-ordinates, through using GPS/GNSS.
- It is expected that the survey methodology employed will vary depending on the individual circumstances of each site, and the availability or suitability of using London Survey Grid control and co-ordinates.
- Upon completion of the fieldwork a Site Survey Report will be compiled for any surveying conducted by MOLA.

14 Additional Details

14.1 Standards and Guidance

See Section 3.2.

14.2 Unexpected and Nationally-important remains

In cases where unexpected discoveries cannot be preserved in situ, the response plan would revert to the normal Crossrail mitigation strategy of further archaeological investigation (preservation by record). The aim would be a rapid and commensurate response, targeted to just those remains unavoidably affected by the works. Recording and sampling methods would also be proportionate to the significance of the remains. Additional archaeological resources would be deployed to achieve this, in order to minimise any delay to the Principal Contractor's works. With flexibility and good communication it is often possible for the development works to continue in other areas while localised discoveries are recorded.

14.3 Progress Photographs

In addition to the archaeological photography specified in the SS-WSI and this Method Statement MOLA will submit a monthly professional photographic record of the progress of the archaeological scope of works. The photographs from the sites in this method statement will form part of the 30 required each month across the whole of the C257 contract.

14.4 Management of Consents

MOLA will liaise with the Employer and Principal Contractor regarding supply of any necessary information in support of required consents, eg road closures, Permit to Dig.

In general separate consents for archaeological works are unlikely to be required, the exception being human remains.

Burial licence 11-0110 to exhume human remains for archaeological purposes has been applied for by MOLA (variation letter (OPR/072/60, 21.09.11)) and received by MOLA in advance of the fieldwork. **This covers work by both TCS as the C502 exhumation contractor and MOLA.** It has been forwarded to the Project Archaeologist for distribution to the Principal Contractor and any others who require them. A copy will be kept on site with the site supervisor. It covers **fieldwork up to 24th December 2014** on the whole Crossrail Broadgate Ticket Hall site.

15 Health and Safety

15.1 CDM Responsibilities and Reporting

- MOLA will be supporting and reporting to the Principal Contractor and to the Crossrail Project Archaeologist and CDM Co-ordinator:
- MOLA will be implementing archaeological designs in the SS-WSI prepared by the appropriate FDC consultant or the Project Archaeologist, therefore not acting as CDM Designer under the Construction (Design and Management) Regulations 2007.

MOLA will provide:

- A current health and safety policy, including defined operational procedures and managerial responsibilities, risk assessment/control, and measures to ensure that a safe method of working is implemented by the archaeological team on site, including appropriate advice and support from office-based managers.
- Adequate safety information in the MOLA site accommodation including the WSI, current Health and Safety Policy, Health and Safety at Law Poster, Data Protection Compliant Accident Book, and copies of Public and Employers Liability Insurance. The Supervisory Archaeologist is responsible for ensuring that this information is made available.
- Compliance with current legislation and HSE guidance; including the Construction Design and Management Regulations (CDM) 2007 as a Designer; and the Principal Contractor's Health and Safety Policy, safety inductions and fire and emergency procedures.
- Field staff qualified to operative level (or higher) of the CITB Health and Safety test and therefore eligible to carry a Construction Related Organisation (CRO) White Card for Archaeological Technician (Code 5363).
- Services of a Contract Manager and Supervisory Archaeologist to manage site investigations, including liaison with the Principal Contractor's Health and Safety Co-ordinator and Principal Contractor, attendance at site meetings etc. The Supervisory Archaeologist will act as principal liaison with the Principal Contractor.
- Services of the MOLA H&S Compliance Manager, and a professional health and safety consultant to attend site when required; reporting to the Supervisory Archaeologist, with any concerns or recommendations copied to the Principal Contractor's site manager
- A safety monitoring/reporting procedure. This should include accident reporting by the Supervisory Archaeologist to non RIDDOR and RIDDOR standard and any necessary liaison and follow-up of agreed safety actions with the Principal Contractor's site manager
- All necessary staff supervision, training and personal protective equipment (PPE) including tool box talks and safety inductions for new staff.
- Review and compliance with the Principal Contractor's Construction Phase Plan under the CDM Regulations 2007.
- Trained First Aiders, 'Where to get First Aid' poster and a First Aid kit (to be located in the MOLA site accommodation). The Principal Contractor will also have first aid facilities on site.

The Principal Contractor will provide:

- Overall control and supervision of the site and a safe working environment. The archaeological organisation will be unable to complete the specified works in any area where this is not provided.
- Technical services and attendances to the archaeologists as required. These services may include providing, site accommodation, plant for the excavation of trenches and other equipment such as handrails, shoring and ladders. These requirements are listed in detail in separate documents.
- Construction Phase Plan (CPP).

The CDM Co-ordinator will provide:

- Overall co-ordination of health and safety planning and management.
- A communications structure; including contact details for key personnel, meetings, reporting, etc.
- Supply of material information: eg services and contamination reports; any relevant requirements regarding rights of way, noise, hours of operation, etc.

15.2 Rail Sites

This is not a designated rail site.

15.3 Highway Sites

The majority of the works in Liverpool Street are on a highway, but in a closed-off worksite – MOLA will comply with any Principal Contractors regulations.

15.4 Health and Safety Reporting

Adherence to health and safety procedures will be monitored by the MOLA Health and Safety Compliance Manager, Contract Manager, and Site Supervisor. The H&S Compliance Manager will attend site for regular monitoring visits and, on each occasion, will supply a report on the archaeological work, containing any necessary health and safety recommendations. This will be forwarded to the Principal Contractor's site manager. Where appropriate to the scale of work, regular on-site progress meetings will be held between MOLA, the Project Archaeologist and the Principal Contractor at which any safety issues may be discussed, agreed and actioned.

15.5 Liaison with Principal Contractor

The MOLA supervisory archaeologist will act as the principal point of contact with the Principal Contractor's site manager throughout the periods of site investigation. Contact details will be exchanged. The supervisory archaeologist will be supported and advised by the MOLA project management team as needed.

15.6 Behavioural Safety BMOS

Mobile phones, personal CD players, i-pods and similar will not be used by MOLA staff in archaeological trenches or areas of work. Smoking and naked flames are not permitted in the trenches or areas of work. Alcohol is not permitted on site. This aspect will be monitored by the MOLA Supervisor and H and S Compliance Manager and reported on in the progress report (see 4.3).

16 Emergency Response

16.1 Emergency Preparedness & Response Plan

MOLA staff will comply with the Principal Contractor's Emergency Plan.

An Emergency Preparedness/Continuity Plan is has been prepared by MOLA and submitted to Crossrail for approval.

A General Emergency Preparedness Plan (EPP) was prepared within the MOLA Health and Safety Plan for C257 – Document Number: C257-MLA-X-XWI-CRG02-50003 v2. This should be referred to for generic emergency and accident issues.

Site-specific issues are as follows:

Employers Incident Response Contact	Crossrail Incident Response Desk – 020 8197 5000
Principal Contractor Incident Response Contact	<ul style="list-style-type: none"> • John Winter, LOR Health and Safety Manager • Mobile: 07584 584525
MOLA Incident Response Contact	<ul style="list-style-type: none"> • Nicholas Elsdon, Assistant Project Manager nelsden@museumoflondon.org.uk Direct Line: 020 7410 2282 Mobile: 07 872 127 296
Local A&E location	<p><i>Full A & E at:</i> The Royal London Hospital Whitechapel Road London E1 1BB Telephone 0207 377 7781 Tube: Whitechapel (Hammersmith and City and District Lines)</p> <p><i>Minor A& E at:</i> St Bartholomew's West Smithfield Street, EC1 Telephone 020 7377 7000 Tube: St Paul's (Central Line)</p>

16.2 Training

MOLA provides Safety Training for its staff as in Section 4.2.

The MOLA Senior Archaeologist will attend all emergency training/inductions on Preparedness/Response Plan provided by the Principal Contractor.

16.3 Emergency & Accident Equipment

- MOLA Archaeologists when working singly on the watching brief tasks will carry a single person First Aid Kit and mobile phone.
- During larger tasks a first aid box will be located in the archaeological office on site.
- It expected that the Principal Contractor will also provide basic first aid facilities on site.

16.4 Monitoring & Testing

MOLA staff will comply with Crossrail requirements.

16.5 Emergency & Accident Incident Reporting

All accidents and emergencies must be reported to the Principal Contractor, who will call the emergency services, if required.

Principal Contractor (C502 LOR) Incident Response Contacts:		
Contact	Name (if applicable)	Telephone Number
LOR Health and Safety Manager	John Winter	07584 584525
LOR Construction Manager	Kevin Laney	07771 843614
LOR Duty Phone		07584 468284

They will also be reported to the Incident Report Desk, call: 020 3197 5000. In critical situations, MOLA staff will call for an ambulance immediately, and then inform the site manager.

All accidents and emergencies must be reported to the following personnel at Crossrail and MOLA:

- Jay Carver, Project Archaeologist, Crossrail Central, Crossrail Ltd, 25 Canada Square, London E14 5LQ
DD 0203 229 9258, Int 2258
Mobile 07870 191 705
- Projectwide CDM Co-ordinator, Crossrail Central, Crossrail Ltd, 25 Canada Square, London E14 5LQ
Mobile 07718 861941
- Nicholas Bateman, Director of Development Services, Museum of London Archaeology, Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED
DD 0207 410 2248

- Ian Grainger, H&S Compliance Manager, Museum of London Archaeology, Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED
DD 0207 410 2200, Int 2255

17 Environmental Management

The archaeological works will be carried out whilst the Principal Contractor is in possession of the site. MOLA will therefore request a copy of the Principal Contractor's Environmental Management Plan prior to commencement and will supply any necessary inputs with regard to MOLA works. MOLA will comply with the Principal Contractor's Environmental Management System as documented in their Environmental Management Plan, and contribute to their EMS reporting if required.

If any remedial action is needed, eg controls for dust, water, noise or controlled waste, this will be agreed with and undertaken by the Principal Contractor as part of the required attendances (see 15 and Appendix: 21.8.1). In addition an updated MOLA corporate Environmental Management Plan is currently being prepared for submission to Crossrail.

The nominated environmental person is: Alison Telfer, atelfer@museumoflondon.org.uk, 020 7410 2276.

17.1 Contamination

MOLA will comply with the Principal Contractor's requirements in relation to any contamination issues. MOLA staff will not disturb or damage asbestos, or undertake asbestos removal from a building, structure, or buried material. If asbestos is found the Principal Contractor will be responsible for having it dealt with by a licenced contractor.

17.2 Water Disposal

The Principal Contractor is responsible for disposal of any ground water pumped from the trenches or other excavations, in accordance with their environmental management plan, with which MOLA will comply.

17.3 Site Waste Management Plan

MOLA staff will adhere to the Principal Contractor's site waste management plan.

It is anticipated that very little waste will be removed from the site from the archaeological works, but any produced will be disposed of by the Principal Contractor in accordance with their Waste Management Plan.

17.4 Vehicles/Motorised Equipment

MOLA staff will liaise with the Principal Contractor to provide safe access and parking for MOLA vehicles if required to attend site. The vehicles are compliant with Crossrail requirements.

All deliveries must be booked in advance using the C502 Laing O'Rourke **Vehicle Movement Booking form**, and the vehicle will be Crossrail-compliant. The form is stored on the MOLA network at: <P:\MULTI\1051\XSM10\Field\Broadgate C502 Van Booking Requirements>.

NAME	VEHICLE REG NO
M Cox	KC54 XTZ & DY59 YWB
A Chopping	KC54 XTZ & DY59 YWB
G Spurr	KC54 XTZ & DY59 YWB
M Nicholls	EA55 NBJ
S Jones	KC54 XTZ & DY59 YWB
C Drew	KC54 XTZ & DY59 YWB
M Burch	KC54 XTZ & DY59 YWB
V Yendell	KC54 XTZ & DY59 YWB
CONTACT (All)	020 7410 2200

17.5 Other Requirements

MOLA staff will always be courteous with any members of the public they have dealings with.

18 Quality Assurance Plan

An updated Quality Assurance Plan has been prepared for submission to Crossrail in accordance with the format specified at part 5.4 of the C257 contract. Records will be kept and supplied to Crossrail in accordance with procedures set out in Crossrail Specification CR-PN-LWS-EN-SP-00001, as amplified by the SS-WSI. The MOLA responsible procurement representative is Dawn Jackson, who is a member of the Senior Management Group.

19 Community Relations

19.1 General

MOLA will co-operate with the Principal Archaeologist and Principal Contractor regarding any notified community relations issues in relation to the Construction Community Relations Strategy Framework as defined in the Works Information.

19.2 Confidentiality

MOLA will in the first instance refer any media enquires or community relation issues to the Crossrail Helpdesk and the Project Archaeologist.

All MOLA staff working on Crossrail projects will be instructed before commencement to adhere to the confidentiality clause (Conditions of Contract 19.2, and Works Information vol. 2 – 9.7) that they **must not disclose information about any Crossrail project to the public, media or other parties (including social networking sites); either before, during or after working on a Crossrail project.** This instruction will be repeated at toolbox talks on a regular basis on site.

20 Responsible Procurement

An updated Responsible Procurement document was submitted to Alison Jackson, Crossrail on 15th January 2013.

21 Health and Safety Method Statement

21.1 Introduction and Purpose

21.1.1 Project Background

Archaeological investigations are to be carried out on this site by Museum of London Archaeology (MOLA). The requirements are set out in the WSI and WSI Addendum (see section 1).

21.2 Scope of Document

This Method Statement sets out the specific MOLA safe methods of working to be applied to the tasks listed in section 1 of the method statement, above.

This method statement has been developed in conjunction with the Principal Contractor, who will be responsible for ensuring that the archaeological works may be carried out as specified.

21.3 Responsible Persons and Site Management

21.3.1 Site Management

The MOLA Senior Archaeologist/Site Supervisor will ensure that a copy of the MOLA Welfare, Health & Safety Method Statement is made available to the Principal Contractor at the site. Where further changes or additions to the WH&S Method Statement are required and agreed these should be appended to the site master copy by the MOLA Senior Archaeologist/Site Supervisor.

All changes to the WH&S Method Statement will be signed off by the Project Archaeologist, Crossrail H & S Advisor, MOLA Senior Contract Manager and MOLA H&S Compliance Manager.

21.4 Scope of Works

21.4.1 Proposed archaeological works

The scope of archaeological works is set out in section 1 of the method statement, above.

21.5 Methodology, Programme and Sequence

The overall programme is set out in section in the table in section 1 of the method statement, above.

21.6 Health and Safety Control Measures

21.6.1 Site Access/Vehicle Movements

On arrival at the site, MOLA staff will sign in, establish contact with the nominated Site Manager (or equivalent) attend any inductions etc. in accordance with the required access procedure for the site (to be notified to MOLA in advance by the Principal Contractor, Laing O'Rourke). All MOLA staff working on site will carry identification and CSCS cards.

Safe access routes from the site gate to work Areas and any offices and/or facilities will be erected and maintained at all times throughout the course of the archaeological monitoring of the works by the Principal Contractor.

21.6.2 Services

The location and making safe of live services before or during archaeological works is the responsibility of the Principal Contractor, Laing O'Rourke in control of the site. MOLA staff will exercise care and due diligence and report any discovery of unexpected services or other ground hazards promptly to the Principal Contractor, Project Archaeologist and MOLA H & S Officer.

MOLA will comply with any **Permit to Enter or Penetrate/Dig** procedure operated by the Principal Contractor.

21.7 Safety of Excavations

21.7.1 Entering the trenches during watching briefs

- MOLA staff will not enter any excavation until the Principal Contractor, Laing O'Rourke has issued a **Permit to Enter** confirming that it is safe to do so and that there is safe access/ingress to the archaeological investigation areas, provided by the Principal Contractor.
- The Principal Contractor will also ensure that the excavations are maintained in safe condition for the duration of the archaeological investigation. The Principal Contractor will supply attendances as required in 21.8.1.
- MOLA Staff will not enter a shaft/trench if it is declared unsafe by the Principal Contractor.

21.7.2 Shoring

- Where required, a trench will be shored in a suitable manner by the Principal Contractor and safe access arranged.

21.7.3 Confined Spaces

- At the time of writing no areas have been defined by MOLA or the Principal Contractor as Confined Spaces. This will be kept under constant review by MOLA and the Principal Contractor. The **TWB in Area 5 West** will be provided with gas monitoring equipment and an escape plan will be put in place.

21.7.4 Machine Excavation

- The machined trenches will be monitored by MOLA Senior Archaeologist/ Site Supervisor, but will at all times be under the control of the Principal Contractor.

21.7.5 Hand Excavation

- Hand excavation will be limited to selected times/areas defined by the MOLA Senior Archaeologist/ Site Supervisor, with the agreement of the Principal Contractor, and will be properly fenced, demarcated and signed.

21.7.6 Lone Working

- The monitoring MOLA Supervisor will complete the necessary signing in procedures for each site visit and will also notify the Principal Contractor's Site Manager of their presence, which works are to be monitored. The MOLA Supervisor will only be providing an attendance to observe, monitor and record the defined Principal Contractors works and therefore will not be working alone. In particular the MOLA Supervisor will not attend works or enter excavations when the Principal Contractor is not present.

21.7.7 Contamination – General

- C502 have stated that the only issues identified are from human remains and Leptospirosis.
- If ground contamination is present or suspected, the Principal Contractor will implement the measures required to protect those affected by the works, including provision of suitable additional PPE and adequate welfare facilities for the changed situation (PPE in addition to that included in section 21.8.3 will need to be provided by the PC, rather than MOLA).
- MOLA shall be issued with all relevant contamination test results for above and below ground hazards by the Principal Contractor prior to commencement. Any necessary remedial action will then be agreed with the Principal Contractor as part of the H & S Plan and supplied as an attendance item (9.1 below). Wherever possible such action must be undertaken by the Principal Contractor prior to MOLA commencement on site. If this is not done there may be operational constraints on the MOLA safe method of working that could restrict achievement of the archaeological scope of works set out in the SS-WSI.

21.7.8 Ordnance

Information previously provided by the C502 Principal Contractor (and provided to them in their contract) states that:

The potential for unexploded ordnance to be present within the Superficial Deposits is discussed in detail in the Construction Phase Explosive Ordnance Threat Assessment volumes 1 and 2 provided for information in the Site Information. Volume 2 of this document: Royal Oak Portal to Pudding Mill Lane makes reference to Liverpool Street and states that:

“The risk of encountering UXO on this route is considered possible, based on the level of bombing in the region and the items found post-WWII. However, given the active region, the possibility of UXO existing is considered remote.

[...] for the Works at Liverpool Street Station, the Baseline Statement relating to unexploded ordnance is:

- Unexploded ordnance will not be encountered during the construction of the Works.

MOLA staff shall comply with the PC's rules. If Ordnance is unexpectedly found the MOLA Supervisor shall inform the PC immediately and withdraw to a safe place outside the area designated by the PC.

21.7.9 Site Rules

- All MOLA Staff will comply with the Principal Contractor's site rules and with the MOLA single person watching brief rules (when applicable).

21.8 Planning and Resources

21.8.1 Principal Contractor's Supply of Attendances

The site specific requirements for services, facilities and attendances to be provided by the Principal Contractor, to enable MOLA to undertake the defined archaeological works are set out above. Those items in **bold (21.8.1.1) are likely to be required** for these sites, depending on site conditions, which will be reviewed on site by the MOLA Supervisor in conjunction with the Principal Contractor's nominated Site Manager (these requirements will be communicated to the Principal Contractor in the event that they are needed):

21.8.1.1 Likely to be required

- **general site security** including hoardings, gateway, warning notices, etc; to create a secure site perimeter, sufficient to prevent unauthorised access. If the Principal Contractor has retained security guards, it is recommended that the archaeological investigation areas be added to their schedule for regular patrols, particularly out of hours.
- **specific site security**: it will be necessary to separately secure individual excavation areas via a physical barrier (such as Heras fencing) as the trenches are located in public areas. Secure storage (eg lockable tool store/hut) is required for finds, samples, and tools and equipment (and any human remains: *not likely to be recovered from the pile line*), other at the worksite in Liverpool Street.
- **providing safe access** to the site and the specified archaeological investigation areas via separately identified pedestrian routes, signing, safety guard-rails, secure ladders etc. This includes segregating these areas from any vehicles and plant operating nearby eg via a robust physical barrier.
- **adequate ventilation and protection from noise, fumes and dust where plant is in use, especially within confined spaces and standing buildings**
- **temporary roofing and side screening to archaeological excavations where burials are exposed** (eg monoflex on scaffolding frame or similar) in order to screen any human remains from public view, including views from above – eg windows of buildings overlooking the site on Liverpool Street, Blomfield Street and Old Broad Street (see WSI

Addendum 3.2.5). This will allow sufficient light through for archaeological work (eg translucent plastic sheeting/tarpaulin). The roof needs to have adequate water drainage and ventilation and temporary openings will need to be incorporated into the design to enable the safe removal of spoil from the trench. Any areas adjacent to the trench where spoil containing human remains may be visible from surrounding buildings should also be screened from the public gaze.

- **managerial services** – nominated points of contact for Principal Contractor and other key members of development team.
- **site accommodation and welfare facilities with electricity and water.** To include furnished main base cabin as work space; separate male/female changing areas, toilets and washing facilities; plus additional steel cabin for secure storage of MOLA PPE, equipment, camera and paperwork and finds. It is estimated that accommodation for a minimum of **2 persons** will be required, depending on phase of fieldwork.
- **accreditation and supervision of operatives, plant and equipment**, including supply of sufficient qualified banksmen and slinger/signallers to control plant movements and lifting, and adequate certification for plant and all operatives.
- **temporary support:** design, installation and maintenance of appropriate temporary support to excavations, where deeper than c 1.2 m (or as required in unstable ground). This will be via benching/battering back and/or shoring (the sides of the utilities corridor are secant pile walls), depending on a depth and ground conditions.
- **other safety measures in deep excavations** Air quality will be monitored and rescue facilities and equipment will be provided in any areas defined by the Principal Contractor as a **confined space**. Beyond a depth of 1.2m within such areas gas monitoring equipment will be required to ensure appropriate air quality for those working there.
- **locating and making safe any live services or hazardous substances** (above or below ground): preliminary services searches should be carried out by the Principal Contractor via the statutory undertakers etc, plus on-site inspection and testing where required. Where there is reason to believe from previous uses that the ground or adjacent buildings may be contaminated the Principal Contractor should make arrangements for advance inspection, sampling, testing and where necessary specialist remediation. The results of such surveys should be forwarded to MOLA *prior to commencement on site*. Any identified hazards will be addressed in the health and safety planning. Any unexpected hazards encountered during the investigations will also need to be made safe by the Principal Contractor before archaeological fieldwork may continue. In the event of the accidental disruption of a live service by archaeologists or sub-contractors under archaeological supervision the MOLA supervisor will inform both their project manager and the Principal Contractor and, when appropriate, call the relevant emergency number. Any remaining exposed services will be protected by the PC prior to the works starting. Any utilities remaining live in excavation areas will be clearly demarcated, safely segregated and suitably protected.
- **development of a safe method of working:** archaeologists will not be able to work within excavations whilst attendances (such as installing temporary support or removing spoil) are taking place, and when demolition, construction or heavy plant activity occurs adjacent or overhead.
- **First Aid:** provision of First Aid facilities, and an emergency plan. On watching briefs with small numbers of staff, MOLA may not be able to supply a first aider. In that case, the services of the Principal Contractor's qualified first aider(s) may be required.
- **removal of spoil from trenches and lifting operations.** Equipment (eg hoists/machine) will be operated by a suitably qualified person supplied by the Principal Contractor, and checked at the intervals specified in the Principal Contractor's method

statement/risk assessment for the use of the equipment. Should mechanical or electrical hoists be used, the area in which the hoist is in use must be clearly demarcated. **MOLA staff will leave the area before the bucket is raised or lowered (and in the interval between these operations) and not re-enter until completed (in accordance with MOLA H&S Policy).** The PC will supply a banksman to control plant at all times and an experienced slinger/signaller to control the lift to ensure that the bucket is not re-lowered or suspended over the trench while staff are working below in the trench. The PC will ensure the provision of only certified lifting equipment and implement an approved Lifting Plan.

- **transport/mounding/storage of spoil** from archaeological investigation areas. This includes removal from site, if necessary
- **Any spoil which may contain human remains will be stored separately and dealt with by an exhumation contractor.** Such spoil will also need to be screened from public view both during transportation and temporary storage.

21.8.1.2 Unlikely to be required separately for MOLA

The following items are not likely to be required specifically for MOLA within the context of a general watching brief, although some may apply generally to C502 works:

- **site preparation and clearance.** Removal of structures, vegetation, rubbish, spoil heaps, demolition materials, slab, modern obstructions, infill, made ground, etc. as required, prior to and during the archaeological investigation. The majority will be mechanical excavator, under archaeological supervision, but occasional hand work by labourers may be needed (eg clearing individual obstructions or removing spoil from investigation areas if the machine cannot re-enter).
- **supply of plant and equipment;** supplied with driver, toothed digging bucket and toothless ditching blade. Other plant such as ~~dumpers, compressor/breakers, and~~ pumps may also be needed.
- **pumping-out:** a suitable method to keep the trenches dry.
- **technical advice** to be available if required (eg via client or Principal Contractor's consulting engineer) re protection of adjacent streets and buildings, removal of obstructions, depth of excavation, live services etc.

21.8.2 Equipment

Equipment will be supplied by the MOLA equipment central store:

- First Aid Kit
- Hand tools, dumpy levels, stationary, grid pegs, digital camera, etc.

Any specialised equipment such as power augers (not likely in the Area 5 West TWB) will have certification of maintenance kept at MOLA headquarters.

21.8.3 Basic PPE

All MOLA staff are supplied with and will wear or use the following PPE where required and as appropriate:

Safety Helmets (EN397)

Hi-visibility vests **and trousers** (EN471) - **Orange**

Ear Defenders (EN 352-3)

Safety spectacles (EN166)

Dust masks plain and valved (EN149 2001)

Gloves Nitrile and latex disposable, PVC, EN374

Safety footwear - steel toecap and mid-sole boots and Wellingtons EN345-47 (No riggers are allowed)

21.8.4 Additional PPE

Any PPE in addition to that included in section 21.8.3 will need to be provided by the PC, rather than MOLA.

21.8.5 Staff

See detailed programme in section 4.6.

MOLA will notify the Principal Contractor if more staff are required.

21.9 Briefing Arrangements

21.9.1 MOLA Staff Induction – New Starters

- All MOLA staff shall receive a full induction including Health and Safety on commencement of their first day of work with the organisation. A record of the induction is kept.
- The MOLA Supervisor will be briefed by MOLA Project Manager/Assistant Project Manager on all relevant aspects of work before work commences. This briefing will include all SS-WSI, Method Statements (PC's and this document).
- The MOLA Supervisor will be responsible for briefing any other MOLA staff on site before they commence work on all aspects of the work and documents.

21.9.2 Site Specific Inductions, Weekly Briefings and Tool Box Talks

- Where a site is under the control of a Principal Contractor (as in this case), MOLA staff will attend all initial site inductions and subsequent toolbox talks as required and managed by the Principal Contractor.
- There will also be a daily briefing from the Principal Contractor, which MOLA will record using records sheets, and example of which is appended to this document.
- Irrespective of whether the site is controlled by MOLA or a Principal Contractor, on larger projects eg those with more than 2 to 3 staff and of a week or longer duration, regular toolbox talks will be given by the MOLA Supervisor or other suitable member of staff using the CITB: construction site safety tool box talks manual. As a minimum requirement these talks will occur 1 to 2 times per week and be of 10 to 15 minutes duration.

21.10 First Aid

21.10.1 Trained First-Aid Personnel

Where possible with the small numbers of MOLA staff during watching briefs and small evaluations or excavations, there will be at least one MOLA Archaeologist who is a qualified First Aider (ie 3 day FA at work course) on site. If not, the Principal Contractor's first aider(s) responsible for the watching brief task(s) will be identified by MOLA at the Principal Contractor's Induction, and their services used if required.

21.10.2 First Aid Documents

The MOLA site safety documents will be located with the first aid kit in the site office/mess hut/canteen. The safety documents will include a minimum of:

- Current Health and Safety at Law Poster for display where legislation requires
- Accident Reporting Forms compliant with the Data Protection Regulations.
- MOLA Public Liability Insurance & Employers Liability Insurance for display
- Where To Get First Aid poster – to be displayed if required.
- Current MOLA Health and Safety Policy
- A copy of the site Welfare, Health and Safety Method Statement, extracted from the Site WSI, and modified as agreed during the course of the site.

21.10.3 First Aid Equipment

For 1 person watching briefs, a 'bum bag' will be carried by the MOLA Senior Archaeologist at all times. During larger scale work, a MOLA First Aid kit, of an appropriate size for the site, will be located in the site office/mess hut/canteen.

21.11 Accident, Incident, Near Miss and Environmental Incident Reporting

21.11.1 Reporting of Accidents/Incidents and Dangerous Occurrences

The Reporting of Injuries, Diseases and Dangerous Occurrences (RIDDOR) Regulations, sets out requirements for the reporting of certain types of accidents. RIDDOR notifiable accidents will be reported immediately by the MOLA site supervisor as specified in Section 16.5 of the method statement, above.

21.11.2 Documentation

In order to identify quickly problem areas and allow corrective action to be taken all accidents, dangerous occurrences and near misses, including those that do not cause injury, will be reported immediately to:

Principal Contractor's Site Manager

MOLA supervisor

MOLA H&S Compliance Manager

MOLA Senior/Project Manager

Crossrail Project Archaeologist

Crossrail Incident Response Desk

The site accident books/reporting forms for *both the Principal Contractor and MOLA* should be filled in giving details of the incident.

21.11.3 Investigation of Accidents and Dangerous Occurrences

MOLA will comply with the Principal Contractor's and Crossrail procedures.

MOLA will also initiate internal procedures as follows:

- Initial accident/incident report to MOLA Senior Contract Manager and Field Manager and action taken as appropriate.
- Non Riddors investigated by Senior Contract Manager/H&S Compliance Manager.
- Riddors investigated and reported on to Senior Management Consultant by MOLA H&S Compliance Manager.

21.11.4 Key Project Personnel

- Nicholas Elsdon, Project Manager, MOLA
- Nicholas Bateman, Director of Development Services, MOLA

21.12 Emergency Procedures – Site General

All MOLA staff will comply with the Principal Contractor's procedures as outlined at the Site Specific Induction.

21.13 Emergency Services Contact Details

The Principal Contractor will confirm the hospital location:

Full A & E is at:

The Royal London Hospital

Whitechapel Road

London E1 1BB

Telephone 0207 377 7781

Tube: Whitechapel (Hammersmith and City and District Lines)

Minor A& E at:

St Bartholomew's

West Smithfield Street, EC1

Telephone 020 7377 7000

Tube: St Paul's (Central Line)

The MOLA supervisor will dial 999 for fire, ambulance and police in the case of an emergency if the Principal Contractor's Site Manager or his deputy is not present on site.

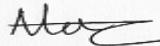
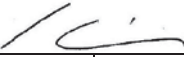
21.14 Route to Hospital

The Principal Contractor will advise on route to hospital at their site specific induction (see C502 MS).

22 Risk Assessments

MOLA RISK ASSESSMENT REGISTER													
For Site/Task: Crossrail, Broadgate Ticket Hall Excavation and Watching Briefs (XSM10)						Type: Watching Briefs							
Persons Affected			No			Classification			No				
Employees			2-4			Experienced			2-4				
Other workers			-			Inexperienced			-				
Public			-			Disabled			-				
Known and Suspected Hazards on site with Remaining Risk (mark as appropriate) and include numbered risk assessment in WSI													
	L	M	H				L	M	H		L	M	H
1 Access	x			26 Dust			x			50 Glass Recording			
2 Ladders	x			27 Noise			x			51 COSHH: Stihl Lubricant			
3 Plant	x			28 Deep Excavations			x			52 COSHH: Stihl two stroke oil			
3a Plant (loading and unloading)				29 Power Tools						53 SHARPS (hypodermics)			
4 Dumpers	x			30 Vibration						54 Task Lighting (laniro etc)			
5 Scaffolding (inc Towers)	x			31 Vehicles (Driving)						55 Site Walk Over			
6 Excavations	x			31a Vehicles (Site)						56 Processing: Finds washing			
7 Work at height				31b Vehicles (loading/ unloading)						56a Processing: Environ samples			
7a Work at Height (Cherry Picker)				32 Lifting Equipment			x			56b Processing: Artefact marking			
8 Slips, Trips, falls	x			33 Plant (lifting)			x			56c Processing: Manual handling			
9 Underground services	x			34 Human Remains			x			56d Processing: Power hose			
10 Overhead Power Lines				35 Public Safety						56e COSHH: Paraffin (Processing)			
11 Electrical				36 Violence						57 Office Work			
12 Fire (inc LPG)				37 Chainsaw						58 DSE (Work Stations)			
13 Confined spaces				38 Power Auger (COBRA)						59 Young Person			
14 Breaking Out				38a Power Auger (Compressor)						60 Person Specific/Expectant Mother			
15 Hand Tools	x			38b Power Auger (Electric)						61 Light Duties			
16 COSHH: Spray paint				39 Hand Auger			x			62 Individual Stress			
17 Contaminated Land				40 Foreshore/water									
18 Weil's Disease	x			41 Adverse Weather			x						
19 Psittacosis				42 Spoil Mounding									
20 UXO				43 LPG(Butane)									
21 Asbestos				44 Waste									
22 Welfare	x			45 Storage									
23 Lone working				46 Animals									
23a Empty Premises				47 Non-ionising radiation									
24 Manual Handling	x			48 COSHH: Petrol									
25 Fumes/Gas				49 Spot Dating									

General Controls		
<p>Contracts Manager in overall charge of project is: Nicholas Elsden Tel: 020 7410 2282, m. 07872 127296</p> <p>Supervisor(s) in daily charge of project is: TBC</p> <p>Number, training and experience of supervisors will be sufficient for the project</p> <p>Supervisor(s) holds IOSH Supervising Safely Cert</p> <p>All staff will comply with the: MOLA H&S policy, Principal Contractors site rules, all WSIs, Risk assessments, safe systems of work Permits to work.</p> <p>All staff will have sufficient training and experience for the tasks they undertake or be under close supervision</p> <p>All staff will be CITB H&S tested and hold a CSCS card appropriate to their profession</p> <p>All staff will be fit to undertake their work</p> <p>All staff will be inducted on first day of work, briefed on the WSI and the specific hazards and control measures attendant on their work on site.</p> <p>The full site induction will be undertaken by the MOLA supervisor if no Principal Contractor present.</p> <p>All staff will sign the induction and WSI register to confirm that they have received, understood and will comply with both.</p> <p>Tool box talks/staff briefing will be conducted on the hazards and control measures on a regular basis (at least weekly or more frequently if circumstances dictate)</p> <p>Appropriate PPE to be worn for each task.</p> <p>Minimum site PPE (unless otherwise stated by supervisor): Steel Toe-cap/midsole boots, Safety helmet, Safety spectacles, Gloves, high visibility vest (orange) or jacket (orange)</p> <p>First Aid kit on site, First aider/appointed person on site. Nearest accident and emergency unit located and contact numbers obtained</p>		
<p>Competent Person(s) appointed to take action:</p> <p>MOLA Ian Grainger H&S Compliance Manager</p> <p>MOLA Project Manager: Nick Elsden</p> <p>MOLA Senior Archaeologist:</p> <p>Principal Contractor –</p> <p>Laing O’Rourke H&S Manager & Emergency Manager</p> <p>Laing O’Rourke Site Supervisors:</p> <p>Crossrail Site Manager</p>	All Risk Assessments seen by (initials)	
	PM	Archaeologists
	SA(s)	
	Client	
	Contractor	
Other		

MOLA RISK ASSESSMENTS					SITE: Area 5 West, Crossrail Broadgate Ticket Hall, Liverpool Street, (XSM10)			
APPROVAL (Name and Title)					SIGNATURE			DATE
Prepared by:		A Lertz						04.07.2014
Approved by:		I Grainger						07.07.2014
RA N ^o	ACTIVITY	Hazards	RISK	Risk Class L/M/H	N ^o at Risk	Control Measures	Final Risk L/M/H	Action by
01	ACCESS general site access routes	Fall of persons from height, Fall of objects from height, Vehicle/plant collisions, Slips Trips falls	Personal Injury, Equipment Damage	M	Staff Contractors Visitors	Obey warning signs, verbal and written PC and traffic marshal instructions. Use pedestrian access gate. Keep to designated pedestrian routes. Be aware of plant and vehicle routes and movements. Do not obstruct pedestrian routes – be tidy. Report unsafe routes.	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr
02	LADDERS	Fall of person from ladder, Fall of material from ladder, Collapse of ladder	Personal Injury, Equipment Damage	M	Staff Contractors Visitors	Use correct length and type, not painted. Daily inspection when in use, do not use if damaged. Must project at least 1.50m above stepping off point. Check/Fix securely at top and base. Check/Install at an angle of 75 degree (1:4 ratio over length). Three points of contact: make sure any load can be carried comfortably with one hand free for ladder. Arrange stair access if possible.	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr MOLA SA and staff PM
03	PLANT Used as lifting equipment (see 33)	Persons Struck by Machine Shovel or load dropping Hydraulic fluid spray Overturning of machine Fire/explosion	Personal Injury, Equipment Damage	M	Staff Contractors Visitors	MOLA staff will not operate plant. Check operator trained and certificated and not permit uncertified operators to start work. Operator must inspect plant before work commences and before each shift. Defective plant must not be used. Service and repair by qualified contractor only. Operations supervised by MOLA staff (supervisor or deputy). Plant to be switched off and secured when not in use. No work with or near plant operator under influence of drugs/alcohol or behaving erratically. Operations to be under supervision of MOLA supervisor or deputy and trained banks person also where applicable. Staff working near machine to ensure that the operator has seen them and that they are at a safe distance. Staff briefed on plant operations and changes to them. High visibility clothing. Separate routes and work areas for plant and pedestrians, warning	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr

						signs to be displayed where practicable.		
04	DUMPERS eg 2.5 tonne dumper	Overturning or tipping. Falling into excavations. Falls of persons and load. Collision.	Personal Injury, Equipment Damage	M	Staff Contractors Visitors	MOLA will not drive dumpers Check training and certification of drivers and not permit uncertified drivers to commence work. Drivers must be over 18. Operator must inspect and certify dumper as fit to operate before use and carry out checks prior to each shift. Checks will include brake testing. A banksman will be used where driver's vision is impaired or operating in congested areas. Dumpers are not to be left unattended with engines running or keys in. Dump skips are to be kept clean A site speed limit will be imposed Separate pedestrian and vehicle routes and work areas will be established where practicable and warning signs will be displayed. No work with or near dumper driver operator under influence of drugs/alcohol or behaving erratically. Use designated pedestrian routes where available. Caution: be vigilant of dumper movements in work area, maintain safe distance. Staff to be briefed on dumper movements and changes to them.	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr
05	SCAFFOLDING (Access)	Fall of persons Fall of material Collapse of scaffolding	Personal Injury, Equipment damage	M	Staff Contractors Visitors	MOLA staff will not erect scaffolding. Only use scaffolding (inc stairs) that displays green scaffold tag with current weekly inspection record. Do not use if obviously damaged. Do not use in high winds and/or heavy rain. Maintain three points of contact, always have one hand free for guard rail when carrying load.	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr
06	EXCAVATION	Collapse of sides Fall of persons Falls of Plant, equipment, material Flooding	Personal Injury, Equipment damage	M	Staff Contractors	A Permit to Dig will operate. Determine the depth for the installation of shoring/ battering back as outlined in WSI. Shoring will be installed by competent sub-contractor and maintained by them. Shoring will be inspected by competent sub-contractor or MOLA supervisor instructed by them. If Netlon fencing or similar is erected it must be at least 1m back from trench edge and warning signs displayed. If Herras fencing is erected it must be at least 1m or more back from trench and warning signs displayed. Robust scaffolding edge protection will be erected and warning signs displayed Inspect all excavations before each day/shift and record results. Supervisor will report unsafe excavations to principal contractor. Staff will not enter any excavation they consider unsafe until it is made	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr

						safe. Staff will report unsafe excavation to supervisor. Shoring installed by contractor under direction of the principal contractor. Edge protection installed by contractor under direction of the principal contractor. Warning and information signs in MOLA excavations. Pumps if required inspected and certified.		
08	SLIPS/TRIPS/FALLS	Falls of persons Dropping of equipment/material	Personal injury, Equipment damage	M	Staff Contractors Visitors	Assess work in adverse weather and suspend if appropriate. Keep all surfaces level and dry where practicable. Keep all areas free of unnecessary obstruction and debris. Keep all areas well lit. All safe pedestrian routes to be sign posted. Staff to be physically fit for the conditions on site. No running or horseplay. Be cautious moving about site.	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr
09	UNDERGROUND SERVICES (UTILITIES)	Electrocution Flooding Asphyxiation Fire/explosion Bacterial infection	Personal injury, Equipment and environmental damage, Annoyance to public	M	Staff Contractors	A Permit to Penetrate will operate. Briefing on live utilities to be given to all staff Competent C502 staff will use a cable location scanner calibrated within last 12 months to scan for live electrical services: before initial breaking out; before machine clearance of first level; and each machining level thereafter. All existing services that will be exposed will be protected prior to the works starting. Any utilities remaining live in excavation areas will be clearly demarcated and segregated. - 1m either side zone. All staff will wear flame retardant overalls in trenches with remaining utilities. The Principal Contractor will protect live services using timber box-outs or plastic rigid ducts, supported by straps and a fixed ladder beam	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr
15	HAND TOOLS Covers use of: Mattock, Shovel, spade, pick axe, trowel, draw hoe, garden fork, hand shovel, brush, lump hammer, sledge hammer, chisel, bolster and similar simple non mechanical tools	Manual handling Impact from tool Impact from flying debris	Personal injury, property damage	M	Staff	All hand tools to be to industry safety standard. Inspect tools on delivery. Discard tool if not fit for purpose. Assess staff fitness to use tools. Task briefing where applicable. Training and supervision for inexperienced staff. Adequate breaks/rest periods	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr
18	WEILS DISEASE (Leptospirosis) RATS	Rat (and Cattle) faeces and urine	Personal injury illness	L	Staff Contractors Visitors	Brief staff on hazard. Carry HSE G 406 instruction card Wear gloves. Clean and cover any cuts or abrasions promptly with a waterproof plaster. Wash hands before eating, drinking, smoking. No eating drinking and smoking outside designated areas. Keep Welfare facilities dry, tidy and	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr

						secure. Keep food covered and secure. Basic surveillance of staff for flu like symptoms. Report ill health.		
22	WELFARE Welfare facilities being provided by the PC	Fire/explosion Electrical Filth/bacteria Cold/damp	Personal Injury and illness, property damage	L	Staff Contractors Visitors	Larger projects: toilets, office, canteen, tool storage, drying rooms, heating, hygiene facilities (hot & cold running water). Separate Male and female facilities. COSHH and DSEAR controlled substances will be not be stored in office/canteen. Welfare facilities to be kept clean and tidy. Cleaning Rota will be established where cabins not cleaned by contractor. No Smoking in welfare facilities. No eating or drinking in work areas.	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr
24	MANUAL HANDLING	Too heavy, big, awkward load, Too prolonged Dropping load	Personal injury, Equipment damage	M	Staff Contractors	General Remove the need for manual handling where possible. Use mechanical aids where possible. Reduce horizontal and vertical distances. Reduce size and weight of individual load. Ensure team sufficient and fit for task. Ensure that route planned, well lit, obstruction free, and as dry as possible. Liaise with others to keep route safe, use lookouts. Brief and train staff. Rotate staff and/or sufficient breaks for prolonged tasks Use gloves Personal Assess weight before lifting, stay comfortably within personal lifting capacity. When picking up load: stand close with feet slightly apart, crouch do not bend at waist, keep head up and maintain natural curvature of spine, thrust/lift through hips, keep object close to body, maintain clear field of vision and do not run. Use MOLA Manual handling check lists for all significant manual handling tasks 0024a-e : Planks, ladders and boards Drums/round containers Bags and sacks Finds/irregular shaped objects on site Office work – boxes etc	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr
26	DUST Prolonged dry conditions Plant movements	Breathing problems Reduced visibility Dirty office/canteen Public nuisance	Personal injury	M		Vacate area where there is excessive airborne dust. Do not return until it is safe Wear eye protection Wear P3 rated dust masks. Dampen down dust making activities. Report all unwell symptoms		MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr

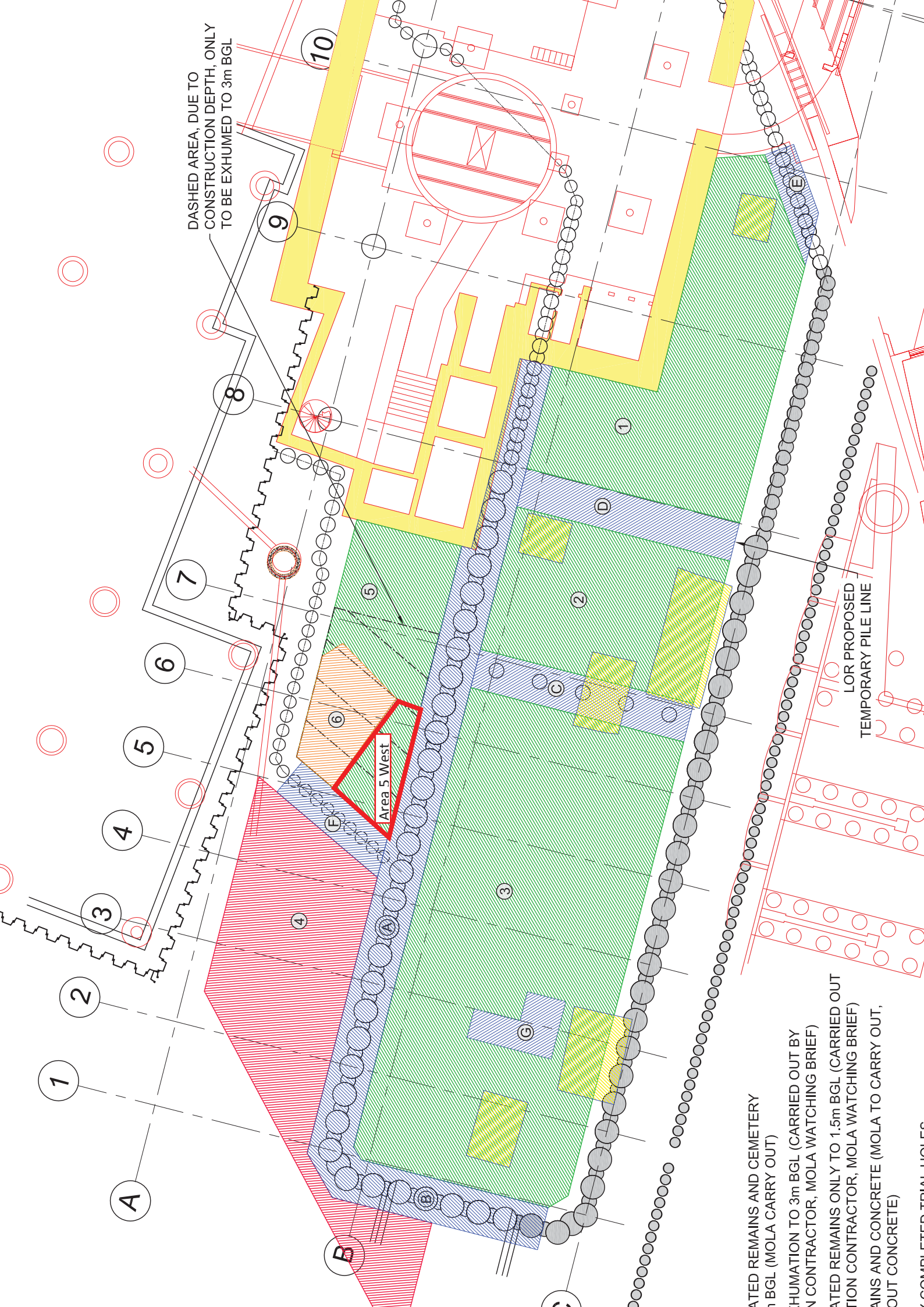
						immediately Keep facilities dust free, close doors, regular cleaning Provide sterile eye wash		
27	NOISE Plant and breaking out operations, related to both MOLA and Principal Contractor works within the site.	Excessive, prolonged noise levels, Nuisance to public	Personal injury – temporary or permanent damage to hearing, loss of hearing Headache/ nausea	M	Staff Contractors Visitors	Minimise exposure– rotate staff, plan work to avoid noisy times/work areas if possible. Wear appropriate ear protection. Report unwell symptoms immediately. Vacate area if headaches/nausea etc.	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr
28	DEEP EXCAVATIONS	Collapse of sides Fall of persons Falls of Plant, equipment, material Flooding Hazardous atmosphere (see RA 13)	Personal injury, Equipment damage	M	Staff Contractors	Determine the depth for the installation of shoring/ battering back as outlined in WSI. Shoring installed and maintained by competent sub-contractor. Shoring inspected by competent sub –contractor or MOLA supervisor instructed by them. Access ladders/scaffolding installed and inspected by competent contractor. Edge protection –fixed scaffolding barrier –installed around trench by a competent person 'Danger Deep Excavation' Warning signs displayed ie on site boundary/entrance, trench edge protection Where appropriate a fixed hoist to remove spoil rather than a crane or mechanical excavator. Hoist and plant operators will be briefed on MOLA works and operating procedures for deep trenches. The size and shape of the bucket or skip used for spoil disposal will be suitable for the size of trench, shoring, and other obstructions. Task specific briefing before commencement. Only staff physically fit and suitable. Basic visual health surveillance. report all unwell, symptom immediately. A mechanical pump(s) where necessary. Gas monitoring equipment where appropriate.	L	MOLA SA and staff PM Nick Elsdon LOR Supervisor Crossrail site mgr

33	<p>LIFTING EQUIPMENT (PLANT)</p> <p>Machine used as hoist, steel bucket for spoil removal</p>	<p>falling bucket, material, collapse, Striking overhead obstruction</p>	<p>Personal Injury, equipment or property damage</p>	M	<p>Staff Contractors</p>	<p>MOLA staff will not operate plant Only trained plant operatives will operate plant. Plant used as crane must be correctly fitted to do so. All loads/skips/buckets must be within the safe working load of the machine. A banksman will be present for all operations. Loads will not be slewed over staff below Exclusion zone in area of lift operation while the skip/bucket is being raised or lowered or in the interval between if operations are ongoing. See MOLA H&S Policy.</p> <p>As Area 5 West is only c 5m x 3m, MOLA staff will need to VACATE THE TRENCH during such periods.</p>	L	<p>MOLA SA and staff PM Nick Elsden</p> <p>LOR Supervisor Crossrail site mgr</p>
34	<p>HUMAN REMAINS</p> <p>Possible Roman inhumations and cremations</p> <p>Early post-medieval cemetery inhumations, with potential for moderately well preserved coffins or possibly lead coffins.</p>	<p>Sharp bone/wood</p> <p>Lead: solid and dust (coffins)</p> <p>Parasite eggs, mould, spores</p> <p>Pathogens/ micro-organisms</p> <p>public outrage, affront to Staff personal/religious belief</p>	<p>Personal injury, psychological distress, disease</p>	L	<p>Staff Contractors</p>	<p>Follow national and local authority environmental health guidelines and rules, and requirements of Burial Licence. Brief on the specific hazards and safe system of work Provide adequate hygiene facility hot/cold running water, paper towels, soap. No eating/drinking/smoking in work area. Report all unwell symptoms immediately. If soft tissue, sealed or unsealed lead coffins, sealed crypts are encountered, work will stop immediately, the excavation area will be vacated, and the specific individual circumstances will be assessed. Work will not recommence until a new task specific risk assessment has been produced, and its requirements enacted, and method of safe removal and storage of remains). Staff will be suitable/willing to work with human remains. Adequately screen and secured from public view. Professional attitude to human remains at all times. Be courteous - refer all public enquiries to Supervisor.</p>	L	<p>MOLA SA and staff PM Nick Elsden</p> <p>LOR Supervisor Crossrail site mgr</p>
39	<p>HAND AUGER</p>	<p>Manual handling</p> <p>Contact with underground service</p>	<p>Personal injury, equipment damage</p>	L	<p>Staff</p>	<p>Staff will be trained and supervised Inspect before use, obviously faulty equipment will not be used. Assess for physical aptitude for task Assess location to ensure that there is sufficient room for use, and that the deposits are suitable. Do not overstrain driving the auger into the ground. Rest breaks during prolonged periods of use. Cease work if an obstruction is encountered.</p>	L	<p>MOLA SA and staff PM Nick Elsden</p> <p>LOR Supervisor Crossrail site mgr</p>
41	<p>ADVERSE WEATHER SUMMER</p>	<p>Extreme heat Bright sunshine/UV Baked ground Slips trips and falls</p>	<p>Personal Injury, equipment damage, lost time</p>	M	<p>Staff Contractors Visitors</p>	<p>Monitor weather forecasts. Ensure staff can get to and from work safely in reasonable time – send home early if necessary. Assess site conditions before commencement. Advise staff to</p>	L	<p>MOLA SA and staff PM Nick Elsden</p> <p>LOR Supervisor Crossrail site</p>

		Sudden rain/ electric storms-				keep cool, avoid over-work. Rotate staff/volunteer tasks Wear appropriate clothing Provide sunblock Provide shaded safety spectacles. Provide rehydration, and salt replenishment Observe staff for signs and symptoms of heat exhaustion. Staff to Report unwell symptoms. Suspend on site work in excessive rain.		mgr
All persons affected by these hazards must be made aware of the contents of this Risk Assessment								

23 Figures

Fig 1 Plan showing location of TWB Area 5 West



DASHED AREA, DUE TO CONSTRUCTION DEPTH, ONLY TO BE EXHUMED TO 3m BGL

FOR PROPOSED TEMPORARY PILE LINE

EXHUMED REMAINS AND CEMETERY TO 3m BGL (MOLA CARRY OUT)
 EXHUMED REMAINS ONLY TO 1.5m BGL (CARRIED OUT BY CONTRACTOR, MOLA WATCHING BRIEF)
 EXHUMED REMAINS AND CONCRETE (MOLA TO CARRY OUT, CONTRACTOR, MOLA WATCHING BRIEF)
 EXHUMED REMAINS ONLY TO 1.5m BGL (CARRIED OUT BY CONTRACTOR, MOLA WATCHING BRIEF)

Area 5 West

24 Registers

HEALTH & SAFETY METHOD STATEMENT REGISTER			
Date	Name of Inductee	Signature of inductee To: confirm that you have read this Method Statement and understood its contents and you will work in accordance with the method statement.	Confirmation Signature of Supervisor/Manager

MOLA INDUCTION REGISTER			
Date of Induction	Name of Inductee	Signature of inductee To confirm that you have attended the induction and understood its contents and that you will work in accordance with the induction content, MS, Risk assessments and resulting safe systems of work and all legal and reasonable safety requirements and instructions	Confirmation Signature of MOLA inductor