

C257 ARCHAEOLOGY CENTRAL Method Statement Archaeological Watching Brief and Excavation Moorgate Shaft

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2a. Principal Contractor (C501 BNK) review required? YES 🖾 NO 📋

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

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This document is acceptable for tran	smittal to <u>Crossrail</u> for	no objection to the	works being execu	ted as
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Stakeholder Organisation	Job Title	Name	Signature	Date	Acceptance
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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

Contents

1	Introd	luction	. 5
	1.1	Site Description	5
	1.2	Geological and Topographical setting	6
	1.3	Archaeological and Historical Background	6
	1.4	Deposit survival	8
2	Interf	aces and Communication Plan	10
	2.1	Interface with Project Archaeologist	10
	2.2	Interface with C257 Contract Administrator	10
	2.3	Interface with Principal Contractor	10
	2.4	Interface with Crossrail Archaeologist	10
	2.5	Interface with External Consultees	10
3	Scope	e of Works	11
	3.1	Planned Fieldwork Events	11
	3.2	Confirmation of Methods and Standards	11
	3.3	Aims and Objectives	12
	3.4	Event Codes	13
4	Site N	lanagement Plan	14
	4.1	Tools and Equipment	14
	4.2	Training and Certification	14
	4.3	Site Monitoring	14
	4.4	Progress Reporting	14
	4.5	Resource Plan	15
	4.6	Programme	15
	4.7	Working Hours	15
5	Fieldv	vork Methodology	17
	5.1	Site preparation	17
	5.2	Detailed Excavation Methodology	18
	5.3	General Watching Brief methodology	18
	5.4	Survey and setting out method	19
	5.5	Recording Methods	20
6	Envir	onmental archaeology investigation methodology	21
	6.1	Sampling strategy for the Moorgate Shaft work site	21
7	Archa	eological Science Strategy	24
	7.1	Specialist Strategy	24

	7.2	Excavation and Recording of Human Remains	.24					
8	Artefa	tefact Recovery and Conservation25						
	8.1	Retention and Disposal	.26					
9	Treas	sure	26					
10)Deliv	erables and Submission Programme	26					
11	l Docu	ment Control and Record Keeping	27					
12	2Archi	ving and Dissemination Method	27					
13	BIT Ca	pability – Digital Survey Recording, Data Capture and Curation	28					
14	4Addit	ional Details	28					
	14.1	Standards and Guidance	.28					
	14.2	Unexpected and Nationally-important remains	.28					
	14.3	Progress Photographs	.28					
	14.4	Management of Consents	.29					
1	5Healt	h and Safety	29					
	15.1	CDM Responsibilities and Reporting	.29					
	15.2	Rail Sites	.30					
	15.3	Highway Sites	.30					
	15.4	Health and Safety Reporting	.31					
	15.5	Liaison with Principal Contractor	.31					
	15.6	Behavioural Safety BMOS	.31					
16	6Emer	gency Response	32					
	16.1	Emergency Preparedness & Response Plan	.32					
	16.2	Training	.33					
	16.3	Emergency & Accident Equipment	.33					
	16.4	Monitoring & Testing	.33					
	16.5	Emergency & Accident Incident Reporting	.33					
17	7Envir	onmental Management	34					
	17.1	Contamination	.34					
	17.2	Water Disposal	.34					
	17.3	Site Waste Management Plan	.34					
	17.4	Vehicles/Motorised Equipment	.34					
	17.5	Other Requirements	.35					
18	3Quali	ty Assurance Plan	35					
19) Comr	nunity Relations	35					
	19.1	General	.35					
	19.2	Confidentiality	.35					

20 Resp	onsible Procurement	36
21 Healt	h and Safety Method Statement	37
21.1	Introduction and Purpose	37
21.2	Scope of Document	37
21.3	Responsible Persons and Site Management	37
21.4	Scope of Works	37
21.5	Methodology, Programme and Sequence	37
21.6	Health and Safety Control Measures	38
21.7	Safety of Excavations	38
21.8	Planning and Resources	40
21.9	Briefing Arrangements	42
21.10	First Aid	43
21.11	Accident, Incident, Near Miss and Environmental Incident Reporting	43
21.12	Emergency Procedures – Site General	44
21.13	Emergency Services Contact Details	44
21.14	Route to Hospital	45
22 Risk	Assessments	46
22.1	MOLA Risk Assessment – Targeted Watching Brief	46
Annex 1	: Figures	55
23 Regis	ters	57

Figures

(In Annex 1 at back of document)

Fig 1 Moorgate Shaft – Mitigation areas

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 Design Package 138,* Crossrail, April 2010, Document No C138-MMD-T1-RST-C101-00001, Revision 2.0 and the *addendum to the SS-WSI for the Moorgate Shaft*, July 2010, Document No C138-MMD-T1-TCP-C101-0001, Revision 2.0).

The tasks covered by this method statement are as follows:

Tasks (Fig 1)		Principal Contractor	Provisional Programme (actual start dates may be at least two weeks later)
•	Archaeological Excavation Areas A and B	C501 Bam Nuttall - Kier JV (BNK)	21st October – TBC (4 psn x 5* days x 2 shifts) *5 <i>shifts</i> each (assumed consecutively)
•	Archaeological Excavation Area C	C501 Bam Nuttall - Kier JV	GWB on slab removal: 7th October 2013 (1 psn, intermittently, 1 week) Excavation: 14th October 2013 (6 persons x 5 days x 2 shifts)
•	Archaeological Watching brief Area D	C510	Beginning of November, 2–3 days x up to 3 shifts - TBD

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

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 7).

1.1 Site Description

The Crossrail worksite at Moorgate is situated in two discrete blocks of property located on either side of Moorfields in the City of London.

The works in this method statement (see Fig 1) comprise:

- Areas A and B, below the former roadway of Moorfields
- Areas C and D beneath the former 91–109 Moorgate and 12–20 Moorfields

1.2 Geological and Topographical setting

The geological and topographical setting was covered in detail in the WSI and is summarised below.

The drift geology consists of Pleistocene terrace gravels of the third (Taplow) Thames terrace, recorded between 107.60m ATD and 108.05m ATD during the previous archaeological evaluation at Moorgate (MOLA for Crossrail, 2012, Fieldwork Report, Archaeological Evaluations and Borehole Watching Brief, Moorgate Shaft (XSP10), Doc No: C257-MLA-X-RGN-CRG02-50069 v2). They are one of the youngest and lowest of the Thames river terrace remnants, deposited between 130,000 to 190,000 years ago during ice-age conditions when the flow of the Thames was considerably stronger than it is today. Generally fine with mixed inclusions of sand and silt, they are commonly overlaid by brickearth (Langley Silt Complex, a silty loam overlying the terrace gravels, formed from re-worked, fine-grained sediments laid down by wind or surface water.

The archaeological potential of the terrace gravel deposits is considered to be very low.

1.3 Archaeological and Historical Background

The archaeological potential of the Moorgate Shaft site is summarised below, and covered in detail in the detailed desk based assessment for Liverpool Street Station: Crossrail 2008, and the WSI SS-WSI – *Liverpool Street Station Design Package 138,* Crossrail, April 2010, Document No C138-MMD-T1-RST-C101-00001, v 2.0. This is informed by the results of the archaeological evaluation (MOLA for Crossrail 2012).

There is limited potential for prehistoric remains in this area; such horizons have been removed in the majority of cases by Roman and later activity. Prehistoric evidence, if present, is likely to be limited to residual artefacts found in later deposits, such as the piece of residual prehistoric pottery retrieved from a later Roman levelling dump in the evaluations on the site (MOLA for Crossrail 2012), and the small quantities of Iron Age pottery from Riverplate House (sitecode RIV87) in Finsbury Circus.

Fieldwork *c* 80m to the north of site in 1989 at Moorgate Hall revealed a single Roman inhumation burial. This, however, was interpreted by the excavators to be isolated, and not part of the extra-mural cemeteries which existed to the north of the Roman city (LAARC summary for MOH88). Another isolated burial was found immediately adjacent to the site at Moor House (LAARC summary for MRL98), as well as disarticulated human remains. A single human adult humerus was recovered from the Moorfields Marsh during the recent stage of sewer diversion works in the southern area of the site (MOLA for Crossrail, 2013, Fieldwork Report, Archaeological Watching Briefs on Sewer Diversions at Moorgate Shaft (XSP10), Doc No: C257-MLA-X-RGN-CRG03-50044, v2). The most likely explanation being that this was washed on to site by a tributary of the Walbrook.

The Roman cemetery at Eldon Street (eg ENS03, BSP91, ELD88), some 200m to the north-east of the current site, forms the nearest of the significant cemeteries currently identified. However, there are two antiquarian records of cremations in the immediate vicinity of the site, albeit imprecisely-located, from Moorgate and the western side of Finsbury Circus, and a number further afield from the eastern side of Moorgate. These may suggest an area of cemetery or individual burials that has been masked by the Moorfields Marsh. No clear evidence of other Roman extra-mural activity, such as buildings or burials, was observed during the evaluation (MOLA for Crossrail 2012) or recent targeted watching brief (MOLA for Crossrail 2013) on the current site, although layers of redeposited brickearth containing Roman material may represent preparation for a building. The majority of Roman activity in the immediate area has been limited to ditch cuts (probably for drainage) and occasional occupational evidence (beam slots and floors) especially in the northernmost area of Moor House (MRL98). It therefore appears likely that, in addition to the known burial areas, there was some form of occupation in this area during the Roman period.

The line of the Roman and medieval City Wall near Moorgate runs approximately along the line of the modern London Wall road, some 60m south of the Moorgate Shaft site. Constructed between *c* AD 180 and 225, the wall fell into disuse at the end of the Roman period, and from the 9th until the 16th centuries both the ditch and the City Wall were continually enlarged, repaired, rebuilt, re-cut and reused.

The City Wall (or later lack of maintenance of drainage through it) appears to have impeded drainage of the area and encouraged the development of the Moorfields Marsh. The marsh was recorded in recent fieldwork on the present site (MOLA for Crossrail 2012), at Finsbury Circus (MOLA for Crossrail, 2011a, MOLA for Crossrail, 2011a, Archaeological Evaluation and Watching Briefs, Finsbury Circus Shaft (XRZ10), Doc No C257-MLA-X-RGN-CRG03-50012 v1), and the sewer diversions on the main site at Moorgate (MOLA for Crossrail 2013). This is historically documented by Fitz Stephen in the late 12th century, who described this area as a 'great fen or moor'. In 1415, the Mayor of London Thomas Falconer built a postern gate at the lower end of Moorgate at the junction with London Wall (demolished in 1762), and he ordered the digging of ditches to try and drain the area. In 1512 and 1527 further drainage schemes were carried out in the Moorfields area, which allowed this area of wasteland to be utilised for the first time since Roman times. Previous fieldwork approximately 100m to the west of Fore Street Avenue, by W. Grimes in the early 20th century (Cripplegate Buildings and the City Ditch site, both WFG17) identified multiple phases of ditch, dating from the 2nd century AD to the mid 17th century (and backfilled sometime after the Civil War). The Agas map of c 1560s shows a road (Little Moorfields) leading north from the postern gate, flanked on its western side by drying cloth being stretched on tenter frames. John Stow writing in *c* 1600 noted the presence of gardens and tenter-yards here. Rocque's map of London (1746) shows that the road leading north from the Moorgate was now known as Finsbury, and it was flanked to the west by suburban development, behind which was another parallel street (Little Moor Fields), now known as Moorfields.

1.4 Deposit survival

1.4.1 Areas A and B

Note: the exact depth of 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 2011 evaluation and recent sewer diversions watching briefs).

Area A and B predicted Deposits	Thickness	Depth of Surface below ground level – <i>Approximat</i> e	Depth of base below ground level – Approximate
MODERN (overburden/truncation)	Estimated c 1.0m	Approx. Ground level = c 111.0 m ATD	c 110.0m ATD (Base sewer protection slab at 109.25m ATD)
Marsh reclamation (post-medieval)	c 0.3m (not surviving under sewer protection slab)	c 110m ATD	c 109.3–109.7m ATD
MOORFIELDS MARSH (medieval to late Roman)	c 1–1.2m (c 0.4m under sewer protection slab)	c 109.3–109.7m ATD	c 108.4–109.0m ATD
Roman Deposits	<i>c</i> 0.2–0.5m	<i>c</i> 108.4–109.0m ATD	c 108.3m ATD
TERRACE GRAVELS (archaeologically sterile)	Unknown	c 108.3m ATD	

1.4.2 Areas C and D

Note: the exact depth of modern truncation is not currently known, but results from the evaluation in 2011 suggest the basement slab varies in thickness (This predicted schematic typical section is based on the results from trench 6 from the evaluation).

Area C and D predicted Deposits	Thickness	Depth of Surface below ground level – Approximate	Depth of base below ground level – <i>Approximat</i> e
MODERN (concrete slab and overburden)	Estimated c 0.6–1.6m	Basement slab at c 110.00 m ATD	c 109.40m ATD (Base of concrete slab)
MOORFIELDS MARSH (medieval to early post-medieval)	c 0.5m	up to <i>c</i> 109.4m ATD	c 108.9m ATD
BRICKEARTH AND GRAVEL DUMPS (Late-Roman)	<i>c</i> 0.7m	c 108.9m ATD	c 108.2m ATD
TERRACE GRAVELS (archaeologically sterile)	Unknown	c 108.2m ATD	

2 Interfaces and Communication Plan

2.1 Interface with Project Archaeologist

The Method Statement has been developed jointly with the Principal Contractor 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 costing 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 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. The majority of this information will be contained in this Method Statement. MOLA will liaise with the Principal Contractors regarding access, order of works, programme and commencement date. The Principal Contractors shall give MOLA 4 weeks notice of start date(s) for each work area or phase.

2.4 Interface with Crossrail Archaeologist

MOLA shall liaise with Crossrail Archaeologist, Jay Carver and/or lain Williamson, 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 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 task described in section 1 at the Moorgate Shaft site.

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
- 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 Design Package 138, Crossrail, April 2010, Document No C138-MMD-T1-RST-C101-00001, Revision 2.0 and the addendum to the SS-WSI for the Moorgate Shaft, September 2010, Document No C138-MMD-T1-TCP-C101- 0001, Revision 3.0).
- English Heritage, 2004a, Geoarchaeology: using earth sciences to understand the archaeological record
- English Heritage, 2004b, Centre for Archaeology Guidelines. Human Bones from Archaeological Sites: guidelines for producing assessment documents and analytical reports (Mays S, Brickley M, and Dodwell N)
- 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
- English Heritage, 2011, Environmental archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation
- 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 SS- WSI Liverpool Street Station (Doc. No. C138-MMD-T1-RST-C101-00001, see section 3.2) and stated that 'Archaeological investigation and mitigation within the Crossrail worksites for Liverpool Street Station have the potential to contribute to the research themes (from Museum of London 2002, *A research framework for London archaeology 2002*) set out below':

Specifically, the archaeological investigations have the potential to recover:

- Artefacts of prehistoric date redeposited in later deposits.
- Remains of Roman extra-mural activity, potentially including burials.
- Evidence of the defensive ditch associated with the Roman and medieval City
 Wall
- Waterlain deposits from the Roman to medieval Moorfields Marsh, with the potential for organic preservation and palaeoenvironmental evidence.
- Late medieval and post-medieval drainage ditches, rubbish dumps and remains associated with the reclamation of Moorfields Marsh.
- In areas not truncated by later activity: remains of mid-17th-century or earlier buildings on the western side of Moorfields, and late 17th/early 18th-century or later buildings across the whole site.

3.3.2 Fieldwork Objectives

The overall objectives of the investigation are stated in the WSI Addendum:

 to mitigate the impact of Crossrail construction through a programme of archaeological works carried out in accordance with the Crossrail Generic WSI (document number CR-PN-LWS-EN-SY-00001) and the standards listed therein. The following task-specific research questions have been devised by MOLA for this work:

- 1. What is the character and level of the **natural geology** across the site, and can the cause(s) of these variations be deduced (truncation or topography) ?
- 2. What is the nature and date of any **Roman** extra-mural activity (eg quarrying, farming, burials, etc) ?
- 3. What is the character of the waterlain deposits from the Roman to medieval **Moorfields Marsh** ? What evidence is there for the **formation processes and date** of the marsh ?
- 4. Is there any evidence for late medieval and post-medieval drainage ditches, rubbish dumps, or remains associated with the **reclamation** of Moorfields Marsh ?

3.4 Event Codes

The sitecode is XSP10.

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. However, these are unlikely 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 Projects Managers, Elaine Eastbury, BSc, and/or Nicholas Elsden, 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, lan Grainger, and if required their Advisor (AgilityUK, formerly Hascom) 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

Crossrail shall monitor staff resource on a per shift basis to ensure compliance with the shift team numbers.

Three or four staff in each shift will be required in each of Areas A and B

Six staff in each shift will be required in **Area C**.

It is expected that the general watching brief in **Area D** will normally require one member of staff, with more if required.

They will be supported by MOLA Geomatics and Photographic team members, and other archaeological specialists (Grade 8) may be called in if necessary, eg a geoarchaeologist.

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

The named Supervisor will be as below. Other staff and specialists are to be determined when required.

Person	Role	Responsibility	Qualifications
Sam Pfizenmaier	Early shift Supervisor (and leading site supervisor).	Overall site supervision	BA (Hons) Archaeology
Antonietta Lerz	Late shift Supervisor	Overall site supervision	MLitt Archaeology BA (Hons) Archaeology

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

4.6 Programme

The predicted start dates and durations for the work are contained in Section 1.

4.7 Working Hours

In the excavation of Areas A, B, and C, MOLA will work two shifts, from 7:00 to 15:00, and 15:00 to 23:00. There will be a half hour lunch break, resulting in 7.5 hour shifts.

In addition there will be a half hour handover period (see 4.8) for the two shift supervisors. This will be flexible, either from 3:00 to 3:30 (additional $\frac{1}{2}$ hour working time for the early shift supervisor) or from 2:30 to 3:00 (additional $\frac{1}{2}$ hour working time for the early shift supervisor).

The initial general watching brief on slab removal in Area B will require only periodic visits (eg daily), which can be accomplished within normal working hours.

The requirements for the GWB in Area D will be determined closer to the start date, when archaeological survival and practical issues are better known.

The Principal Contractor will obtain Section 61 consent for the extended hours.

4.8 Shift handover

In the shift handover period (see 4.7 for times) the early shift supervisor will brief the late shift supervisor on the preceding shift's work, work predicted for the next shift, any health and safety issues identified, and all other relevant information to allow continuity of work. As this will not be possible for the end of the day, the late shift supervisor will leave full written notes for the early shift supervisor to cover the next day.

5 Fieldwork Methodology

It should be emphasised that that the levels quoted for archaeological deposits are general predictions based on the evaluation trenches and sewer diversions. 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, 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 General

The site is broken down into four distinct areas of archaeological work, based on predicted zones of archaeological survival (Fig 1):

- Area A, located in the north-west of the site, bounded by the diaphragm walls to the north, west and south. This area is truncated north–south down the centre by the 19th-century cut and cover sewer (in manhole S4 to the south, this cut was approximately 2.5m wide), measuring approx. 11m x 7m.
- Area B, located in the south-west of the site, bounded by the diaphragm walls to the north, west and south. This area is truncated north–south down the centre by the 19th-century cut and cover sewer (in manhole S4 to the south, this cut was approximately 2.5m wide), measuring approx. 10m x 8m.
- Area C located in the south-west of the site, roughly rectangular in shape (bounded by the diaphragm walls to the north, east and south, and the 19th-century sewer cut and/or the foundations for 91–109 Moorgate to the west), measuring 16m x 10m.
- Area D Located in the north-east of site, roughly rectangular in shape (bounded by the diaphragm walls to the north, east and south, and the 19th-century sewer cut and/or the foundations for 91–109 Moorgate to the west), measuring 16.5m x 10m.

5.2 Site preparation

In each area, any slab or piling mat (where applicable) and modern overburden will be removed by C501 by or at the start of work. Given that the levels at which archaeological deposits are present are likely to vary from the general predictions (see box above), the last approx. 1.0m of overburden will be removed under archaeological supervision. It is proposed that pile caps will be left *in situ* until after the archaeology is completed.

5.3 Detailed Excavation Methodology

Detailed archaeological excavation is required in Areas A, B, and C (see 5.1 & Fig 1).

5.3.1 Site-specific excavation methodology

Site-specific methodology for Detailed Excavation Areas A to C, Moorgate shaft

The **overall excavation strategy** for Areas A, B, and C is based on the predicted simple sequence of Moorfields Marsh deposits, in places overlying Roman levelling or dumped deposits, approx. 1.2–1.7m deep. However, a limited number of discrete features may also be present (eg pits or possibly occupation features).

- Removal of basement slabs and modern overburden by C501 under archaeological supervision, including the piling mat and sewer protection slab. The predicted surface of archaeological deposits is *c* 110.0m ATD in Areas A and B (109.25m ATD beneath the sewer protection slab), and 109.4m ATD in Area C. Pile caps will be left in until after the archaeological excavation is completed.
- 2. a) Archaeological excavation by MOLA of the marsh deposits. Approximately 50% of the marsh deposits in Areas A, B, and C, will be excavated either by hand or a mixture of hand and careful machine work under close archaeological control and supervision. Any individual features will be fully recorded, and excavated. ('standard excavation').

It is expected that modern truncations, previous evaluation trenches, foundations, and the cut and cover sewer will probably prevent production of a simple running section, and that a composite section across each area will be produced.

b) In the **remaining 50%**, the **marsh** will be rapidly excavated. The full extent of extensive deposits recorded. After recording, these deposits will be **removed by machine** under close archaeological control. Any individual features exposed during this will be fully recorded, and excavated. ('rapid excavation')

The interface of the marsh and underlying Roman or natural deposits is of particular importance for understanding the formation processes, and date of the marsh. Care and attention will be paid to deposits at the interface, in particular those which contain Roman artefacts, to record evidence that might contribute to the research aims relating to the formation and date of the marsh.

3. a) **Archaeological excavation by MOLA** of the underlying Roman horizons, predicted to consist of levelling/dump deposits. These will be cleaned by hand, and examined for any features, which will be fully recorded and excavated. Extensive homogenous levelling/dump deposits will then be **50% excavated by hand or carefully machining** (as 2a), continuing the composite section where possible.

b) The remaining 50% will be excavated by careful machining under close archaeological supervision (as 2b).

4. This is predicted to reach the surface of the **natural geology** (terrace gravels), which will be recorded. After this the individual area will be handed back to C501.

5.4 General Watching Brief methodology

General Watching Brief is required for Excavation by C510 in Area D (see 5.1 & Fig 1), down to natural geology (terrace gravels).

It is currently predicted that Area D will be heavily truncated, and have similar deposits to those predicted for Areas A, B, and C (see 5.3.1).

If any significant remains are present (unlikely), the Crossrail Project Archaeologist will be informed as soon as possible, and a suitable response will be determined.

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 adjacent ground level (or equivalent in basements etc). 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).

Generally monitoring will only be undertaken when areas or trenches have been dug down the level of potential archaeological interest. For this reason, a flexible approach will be taken and kept under review. The monitoring presence may alternate between full and part-time depending upon the Principal Contractor's programme (eg the nature and intensity of ground works, extended hours) and the archaeological results. The MOLA Senior Archaeologist undertaking the monitoring will make an appraisal inspection during the Principal Contractor's initial breaking out, removal of overburden etc. in order to determine at what depth the relevant deposits (if present) occur.

If potentially significant (but localised) remains are exposed, such that they cannot be recorded adequately under basic monitoring, then the status of the fieldwork event will be reviewed by Project Archaeologist and it may be redefined as a Targeted Watching Brief. This redefinition if authorised by the Project Archaeologist would permit additional resources in terms of staff and attendance to allow for more intensive recording.

5.5 Survey and setting out method

MOLA will obtain from either the Principal Contractor 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 (eg shaft) asdug.

5.6 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).

6 Environmental archaeology investigation methodology

Environmental archaeology examines the plant, animal and human remains associated with past human activity and the past landscape context of this activity, in order to obtain a better understanding of the economic, social and environmental setting of archaeological evidence. It involves input from a wide range of specialisms to cover the varied spectrum of environmental remains (from microscopic pollen and diatoms, to snails, seeds, insects, bird and fish bone, large mammal bone and human remains) that might be preserved in the soils and sediments excavated on an archaeological site. In addition, in order to understand how the archaeological deposits built up and to reconstruct their depositional environment geoarchaeologists examine the archaeological deposit sequence *in situ*.

Geoarchaeology is the study of soils and sediments in either a natural or anthropogenic context, that either contain human cultural material or are contemporary with human habitation within the region being studied (ie the Pleistocene/Lower Palaeolithic and later).

Within the Moorgate shaft site excavations, the focus of the environmental archaeology work will be the Moorfields Marsh, and its relationship with any surviving Roman stratigraphy, and *if surviving*, evidence for post-medieval urban expansion (eg refuse, cess pit or drain fills) that may truncate/seal it. The Marsh sequence (depending on levels of preservation) is likely to require specialist geoarchaeological identification, recording, and sampling. Potentially the work may include the following types of deposit, if present and suitable:

- Roman features (burials, quarry pits etc) sealed and subtly effected by the marsh formation process
- The marsh itself (including the important interface with earlier deposits, see)
- Cut features such as rubbish or cess pits, drains, and ditches

This work will be conducted under the overall environmental archaeology sampling strategy (archaeological science strategy) for the Moorgate site, see below.

6.1 Sampling strategy for the Moorgate Shaft work site

Overview

Selected Roman, medieval and post-medieval negative features, as well as any 'natural' deposits relating to past topography or burials (if present), will be targeted for environmental sampling, where suitable. The aim of this sampling is to characterise the environmental remains preserved within the archaeological deposits, in particular the Moorfields Marsh, and its interface with underlying Roman deposits, in order to assess the potential 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.

In general, sampling will be undertaken by the archaeologists undertaking the watching brief. If required, an environmental archaeologist will be on call to visit the site, advise and where necessary record and take samples from selected deposits.

General Methodology

The Project manager and MOLA Supervisor 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 archaeology standards and 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)
- That general bulk samples, 40 litres in size (20L if waterlogged) will be the standard samples taken (depending on the volume of the feature) and that the processing methods are designed to recover a wide a range of materials from the same deposit in a single sample. In addition, as a number of post-excavation analytical techniques will be employed on the material recovered, a number of different sampling approaches will be required. These might include: gridded/spatial bulk samples, to sample horizontal stratigraphy where it survives (ie floor layers), the sample size will depend on feature; column bulk samples (*c* 2–20L) to sample ditches, deep refuse deposits and natural deposits; spot samples for dating; monolith and micromorphology samples to recover *in-situ* blocks of sediments or complex strata.

Sample	Sampled by	Material	Processing
Hand	archaeologist	Human Bone	Hand washing
Collected	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
Column bulk (20 litre)	Archaeologist on advice of geoarchaeologist	Freshwater and terrestrial molluscs, ostracods	Disaggregated and wet sieved
Monolith	geoarchaeologist	Sediments	Laboratory cleaning
		Pollen and Diatoms	Sub-sampled for external Specialist
Kubiena	geoarchaeologist	Soils/complex strata	External Specialist
Spot/Grab	archaeologist	Coprolites, unidentified organic materials	Specialist
	geoarchaeologist	Pollen, diatoms, ostracods, forams, radiocarbon	Sub-sampled from augerhole cores for external specialists

- Where appropriate and possible, geo-archaeological or environmental sequences obtained (for example pollen) will be dated, for example with spot samples for dating.
- 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 will undertake site visits to provide advice, and additional advice will be sought from the EH Regional Archaeological Science Advisor when necessary.
- 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.

Sampling approach to main features anticipated

- Stream/Ditches/Linear cuts (in particular, the Moorfields Marsh): will be sampled at several locations where practicable (40 litre bulk samples at intervals for macro-remains (plants, insects, molluscs) and 20 litres for waterlogged deposits). Any natural accumulations encountered within such features will have monolith samples taken (for study of sediments and micro-organisms, eg pollen), with an adjacent column of continuous bulk sample slabs, respecting context interfaces, for macro-remains.
- Cess/rubbish pit fills: in general a 40 litre sample will be taken from each fill within • the pit (in addition to hand recovered animal bone). If the fill is deep, homogeneous samples should be taken from the top, middle and base of the fill. The sample size may be reduced to 20 litres if waterlogged.
- Discrete rubbish dumps/middens; a single 40 litre sample will be taken, if they are • extensive these will be sampled spatially with smaller bulk samples (for example: 10-20 litres at 1m intervals), and if deep, at different depths, as there may be variations within the deposit. If large dumps of animal bone are present, an animal bone specialist will visit the site to assess and advise on retention and sampling policies, as required.

7 Archaeological Science Strategy

Where necessary, the strategy for sampling archaeological and environmental deposits and structures (see section 6) 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 onsite 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

It is possible, but probably less likely, that small quantities of human remains will be revealed by the tasks covered by this method statement. The Crossrail works at Moorgate have to date identified a single redeposited adult humerus in the sewer diversions (Manhole S4, southern edge of the site). However, these remains were not articulated, and a burial license has not been applied for this stage of work; this will be reviewed if remains are encountered.

If human remains are present, the Principal Contractor will be required to screen the burials from public view (see 21.8.1, also WSI Addendum 3.2.5).

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.

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

Any re-deposited, disarticulated human bones will have to be collected by MOLA for reburial by Crossrail elsewhere in accordance with the terms of any burial licence, as it will not be possible to rebury them on the mitigation sites.

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). If significant quantities of animal hair are present, HSE guidelines for Anthrax will be followed (see 21.7.7).

8 Artefact Recovery and Conservation

Sampling strategies are developed on a site specific basis to meet the 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 2002)
- 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, Nenk, 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 (C136-SWN-C2-JLT-M123-00001) and Addendum (C136-SWN-T1-XAP-M123_WS098-00001) to the Project Archaeologist or as otherwise instructed by the Project Archaeologist:

- Organisation of site monitoring visits, as and when requested by the Principal Archaeologist.
- A weekly illustrated progress report to the Project Archaeologist containing the information required at part 5.10 of the C257 Contract.
- A short illustrated interim statement within 1 week of the completion of fieldwork if required.
- A survey report within 2 weeks of the completion of fieldwork.
- A Fieldwork Report will be prepared within 6 weeks 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).
- 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.

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.

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 7) will be submitted to the Project Archaeologist (and Crossrail CDM Advisor in the case of Method Statements) in draft form (Version 1.0). Any tracked changes or comments added by the Project Archaeologist and/or Crossrail CDM Advisor 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 developed for the Crossrail project (eq 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.

- Detailed Excavation: MOLA Geomatics section staff will survey and maintain the MOLA baseline(s) with reference to the LSG project grid, using Crossrail LSG survey control points.
- General Watching Brief: archaeological features will be recorded in different ways, according to their importance and the circumstances of the fieldwork. They may be located onto the project LSG grid via the Principal Contractor's survey of discrete areas such as trial pits or grout shafts, measurements from features shown on project or Ordnance Survey mapping, or if appropriate (eg highly significant features whose precise location or orientation is important) by MOLA Geomatics staff, as above.
- Upon completion of the fieldwork, a Site Survey Report will be compiled, and an as-dug trench location plan in Microstation, to the agreed Crossrail CAD Team requirements *where MOLA have conducted the surveying*.

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. It is possible that these may be present, but currently appears unlikely (see 7.2). Should any human remains be found, they will be treated with due care and decency, work will stop work, they will be covered and the MoJ contacted. MOLA will fully comply with any requirement that they have for excavation of the remains (eg burial licence, screening the area from public view, etc).

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 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 Reporting Forms, 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 Project 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.
- H&S site inductions to MOLA staff
- Technical services and attendances to the archaeologists as required (see 21.8.1).
- Construction Phase Plan (CPP).

The Crossrail 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

This is not a designated highway site.

15.4 Health and Safety Reporting

Adherence to health and safety procedures will be monitored by the MOLA Health and Safety Compliance Manager, Project 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 C261 – Document Number: C261-MLA-X-XWI-CR140-50005. 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 3197 5000					
Principal Contractor	Steve Lowder 0207 562 4700 mob. 07 785 770 590					
Contacts	Alex Mowe 07887 632269					
	Gary James 07920 077338					
	H&S advisor Stuart Green mob. 07 794 214 901					
MOLA Incident	Elaine Eastbury, Project Manager					
Response Contact	eeastbury@museumoflondon.org.uk					
	Direct Line: 020 7410 2237					
	Mobile: 07 730 646 063					
	or					
	Nicholas Elsden, Project Manager					
	nelsden@museumoflondon.org.uk					
	Direct Line: 020 7410 2282					
	Mobile: 07 872 127 296					
Local A&E location	Full A & E at:					
	The Royal London Hospital, Whitechapel Road, E1 1BB					
	Telephone: 0207 377 7781 Tube: The hospital is located opposite Whitechapel underground station. It is served by the Hammersmith and City and District lines as well as the London Overground (formerly the East London line).					
	Minor A & E at:					
	St Bartholomew's West Smithfield Street, EC1 020 7377 7000					
	Tube: Barbican, Farringdon, St Paul's					

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

(Areas A–D Project Manager BFK: Steve Lowder 0207 562 4700 mob. 07 785 770 590) who will call the emergency services, if required. 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
- George Dennis, Senior Project Manager, Museum of London Archaeology, Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED

DD 0207 410 2200, Int 2256

• 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, <u>atelfer@museumoflondon.org.uk</u>, 020 7410 2276.

17.1 Contamination

MOLA will comply with the Principal Contractor's requirements in relation to any contamination issues.

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 for MOLA vehicles if required to attend site.

Vehicle deliveries will be arranged in advance with Dave Powell (<u>Dave.Powell@bamnuttall.co.uk</u>, 07786391990). Vehicles will be compliant with Crossrail requirements and go via the lorry holding area in London Wall.

NAME	VEHICLE REG NO
M Cox	KC54 XTZ
A Chopping	KC54 XTZ

G Spurr	KC54 XTZ
M Nicholls	YT60 UFS
S Jones	KC54 XTZ
C Drew	KC54 XTZ
M Burch	KC54 XTZ
V Yendell	KC54 XTZ
CONTACT (AII)	020 7410 2200

17.5 Other Requirements

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

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 3.2).

21.2 Scope of Document

This Method Statement sets out the specific MOLA safe methods of working to be applied to:

- Detailed archaeological excavations in Areas A, B, & C
- Archaeological watching brief in Area D

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 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, MOLA Senior Project 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 21.2 above, and in section 1 of the method statement.

21.5 Methodology, Programme and Sequence

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

The first task to start is currently expected to be approx. 7th or 14th October 2013 (Area C excavation).

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). 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. C501 will operate a daily **Permit to Dig** to their machine driver and banksman, which will also cover MOLA's hand excavation (as well as machining).

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 Compliance Manager.

21.7 Safety of Excavations

21.7.1 Entering the Trench during Watching Briefs

- MOLA staff will not enter any excavation until the Principal Contractor has confirmed that it is safe to do so, and that there is safe access/ingress to the archaeological investigation areas. 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 trench if it is declared unsafe by the Principal Contractor.

21.7.2 Shoring

- As currently envisaged, this is unlikely to be necessary for the tasks in this method statement.
- 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.

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. Modern concrete and overburden will be removed with a flat bladed ditching bucket prior to MOLA supervision.
- The Principal Contractor will provide a small machine, with flat-bladed ditching bucket, driver, banksman, and associated spoil removal for phases 2 and 3 in 5.3.1. This will only take place under instruction and close supervision from the C257 MOLA Site Supervisor/Senior Archaeologist.
- Spoil removal during the Excavations and watching brief, from both machine and hand excavation, will be arranged by the Principal Contractor in a way that it does not affect archaeological deposits.
- Machining will be monitored and supervised by MOLA Senior Archaeologist/ Site Supervisor, but will at all times be under the control of the Principal Contractor.

21.7.5 Hand Excavation during General Watching Briefs

Only limited localised hand excavation is likely in a General Watching Brief. If
required, it will be limited to selected times/areas defined by the MOLA Senior
Archaeologist/Site Supervisor, with the agreement of the Principal Contractor.
The need for it to be properly fenced, demarcated and signed to allow safe
working will be assessed and if required enacted by the Principal Contractor.

21.7.6 Lone Working

• For the general watching brief, 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

- 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

- In the event of MOLA not having been issued with an Ordnance Report from the Principal Contractor, the MOLA Supervisor and staff will 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 during the archaeological fieldwork

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) will be required** for these sites – others may be required (21.8.1.2)0), 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

- Supply of plant and equipment during the excavation: a small mechanical excavator will be required to work within excavation Areas A to C. It needs to be small enough to work in the area without tracking over undisturbed archaeology, to fulfil the methodology in section 5.3.1. To be supplied with accredited driver and banksman, toothless ditching bucket and toothed digging bucket. Other plant such as dumpers, compressor/breakers, hoist and pumps may also be needed.
- **Spoil removal**: a system for removal of spoil, from the detailed excavation area, both from hand and machine excavation.
- **110v. site lighting** for access routes to excavations, plus individual task lighting within trenches (eg tripod-mounted spotlights) if required. Overall fixed lighting will also be necessary, *but is not adequate on its own for archaeological work*. The need for lighting depends on the time of shifts, depth of trench etc, season and weather conditions.

21.8.1.2 <u>Unlikely to be required</u>

- *Pumping-out*: a suitable method to keep the trenches dry, eg pumping into a previously investigated trench, to create a sump.
- *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.
- *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, depending on a depth and ground conditions.
- If burials should be present (currently appears unlikely): 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 (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.

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, hand auger, etc.

Any specialised equipment such as power augers will have certification of maintenance kept at MOLA headquarters.

21.8.3 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)

Additional PPE to the above, eg for contamination, restricted entry, or confined spaces, will need to be supplied by the Principal Contractor

21.8.4 Staff

The timing and overall duration of the excavations will be determined by the contractor's programme and the nature and extent of any surviving remains. It is envisaged that the fieldwork tasks will generally be carried out as in the table below. Occasionally, other archaeological specialists may be called in as necessary, usually for less than a day at a time.

Tasks	Normal MOLA Staffing (plus up to 3 visiting specialists)
Excavation in areas A and B	4
Detailed archaeological excavation in Area C	6
General Watching Brief in Area D	1

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 including 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.
- Irrespective of whether the site is controlled by MOLA or a Principal Contractor, on larger projects eg those with more than 2–3 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 1–2 times per week and be of 10–15 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, 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 to 2 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 accommodation.

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, 1995 sets out requirements for the reporting of certain types of accidents. RIDDOR modifiable 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 reporting forms/books 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 Project Manager and Field Manager and action taken as appropriate.
- Non-Riddors investigated by Senior Project 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

- George Dennis, Senior Project Manager, MOLA
- Elaine Eastbury, Project Manager, MOLA
- Nicholas Elsden, Assistant Project Manager, 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 – *although MOLA will not be working on site without C501 supervision being present.*

21.14 Route to Hospital

The Principal Contractor will advise on route to hospital at their site specific induction.

22 Risk Assessments

22.1 MOLA Risk Assessment – Targeted Watching Brief

MOLA RISK ASSESSMENT REGISTER														
For Site/Task:	Мо	org	ate		Ту	pe E	Exca	vatio	n and watch	ing br	riefs	5		
Persons Affect	ted			No	Cla	assi	ficati	ion				No		
Employees				1–14	Ex	peri	ence	d		1–14				
Other workers				-	Ine	expe	rienc	ed						
Public				-	Dis	sable	ed							
Known and Si	Isn	ecte	d Haza	rds on site with	Ren	nain	ina F	Risk I	mark as ann	propria	ate	an	d	
include numb	oro	d rie	k asso	sement in WSI	i (chi	lam	ing i			nopin	alo	un		
			MH			L	м	н			I	L	м	н
1 Access		x		25 Manual Handling		x			49 COSHH: P	etrol	_			
2 Ladders		Х		26 Fumes/Gas		x			50 Spot Dating	g				
3 Plant		х		27 Dust		x			51 Glass Reco	ording				
3a Plant (loading and unloading)				28 Noise		x			52 COSHH:St Lubricant	hil				
4 Dumpers				29 Deep Excavations		x			53 COSHH:St two stroke oil	hil				
5 Scaffolding		х		30 Power Tools					54 SHARPS					
(inc Towers)		v							(hypodermics))				
6 Excavations		^		31 Vibration					(laniro etc)	ng		x		
7 Work at height				32 Vehicles (Driving)					56 Site Walk (Over				
7a W at Height (Cherry Picker)				32a Vehicles (Site)					57 Processing Finds washing): }				
8 Slips, Trips, falls		X		32b Vehicles (loading/ unloading)					57a Processir Environ samp	ig: les				
9 Underground services				33 Lifting Equipment		x			57b Processir Artefact marki	ng: ng				
10 Overhead Power Lines				34 Plant (lifting)		x			57c Processin Manual handli	ig: ng				
11 Electrical		Х		35 Human Remains		x			57d Processir Power hose	ig:				
12 Fire (inc LPG)				36 Public Safety					57e COSHH: Parafin (Processing)					
13 Confined spaces		X		37 Violence					58 Office Wor	k				
14 Breaking Out		X		38 Chainsaw					59 DSE (Work Stations)	(
15 Hand Tools		Х		39 Power Auger (COBRA)					60 Young Per	son				
16 COSHH: Spray paint		X		39a Power Auger (Compressor)					61 Person Specific/Experimentary Mother	ctant				
17 Contaminated Land				38b Power Auger (Electric)					62 Light Dutie	s				
18 Weil's Disease	X			40 Hand Auger					63 Individual S	Stress				
19 Psittacosis	Х			41 Foreshore/water					Long Hours/ S work	Shift		x		
20 Tetanus				42 Adverse Weather		x								
21 UXO				43 Spoil Mounding		X								
22 Asbestos (Buildings)				44 LPG(Butane)										

22a Asbestos	45 Was	te										
Contam)												
23 Welfare	46 Stora	age					\square					
24 Lone Working 24a Empty	47 Anim 48 Non-	ionising					+	+				
Premises	radiatio	וסוווסוווק ו										
General Controls	General Controls											
Contracts Manager in overall charge of project is: Nicholas Elsden Tel: 020 7410 2282, m. 07872127296												
Supervisor(s) in daily charge of project is: Sam Pfizenmaier (TBC) Tel: 02074102260, m. 07738883738												
Number, training and experience of supervisors will be sufficient for the project												
Supervisor(s) holds IC	OSH Supervising Safe	ely Cert										
All staff will comply win safe systems of work	th the: MOLA H&S permits to work.	olicy, Principa	l Contrac	tors site	e rules, a	all WSIs, Risk	assess	ment	S,			
All staff will have suffic	cient training and exp	erience for th	e tasks th	ney und	ertake c	or be under cl	ose sup	ervisi	on			
All staff will be CITB H	1&S tested and hold a	a CSCS card	appropria	te to the	eir profe	ession						
All staff will be fit to ur	ndertake their work											
All staff will be inducted measures attendant of	ed on first day of work on their work on site.	k, briefed on th	ne WSI a	nd the s	pecific l	hazards and o	control					
The full site inductio	on will be undertake	n by the MOL	A super	visor if	no Prin	ncipal Contra	actor pr	esent	t.			
All staff will sign the will comply with both	induction and WSI h.	register to c	onfirm th	at they	have r	eceived, und	lerstoo	d and				
Tool box talks/staff bri weekly or more freque	iefing will be conducte ently if circumstances	ed on the haz dictate)	ards and	control	measur	es on a regul	ar basis	at le	east			
Appropriate PPE to be	e worn for each task.											
Minimum site PPE (u	unless otherwise sta	ated by supe	visor): S	Steel To	e-cap/n	nidsole boot	s, Safe	ty				
helmet, Safety spect	acles, Gloves, high	visibility ves	st (orang	e) or ja	cket (or	range)						
First Aid kit on site, Fir contact numbers obtain	rst aider/appointed p/ ined	erson on site.	Nearest	acciden	t and er	nergency uni	t located	1 and				
Competent Person	n(s) appointed to	All Risk A	ssessm	nents s	een by	/ (initials)						
take action:		РМ				Archaeolo	gists					
MOLA Ian Grainger	H&S Compliance	SA(s)										
Manager		Client										
MOLA Project Mana	ager: Nicholas	Contracto	r									
Elsden		Other										
MOLA Senior Archa Pfizenmaier	aeologist: Sam											
Principal Contractor	– Kier											
C501 Bam Nuttall - Manager – Steve L	- Kier JV Project .owder											

мо	LA RI	SK A	SSESSI	MENTS		SIT	E: Moorgate Worksi	te	
APPROVAL (Name and Title)						DATE			
Prep by:	ared	Sam	Pfizenmaie	r			Song Phran,		01.10. 13
Appr by:	oved	lan G	Grainger				1c		01.10. 13
RA N ^o	ACTIN	/ITY	Hazards	RISK	Risk Clas s L/M/ H	N° at Risk	Control Measures	Fina I Risk : Insi g or L/M/ H	Action by
0001	ACCESS	3	Fall of persons from height, Fall of objects from height, Vehicle/pla nt collisions, Slips Trips falls	Personal Injury, Equipment Damage	M	1–14	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.	Ĺ	MOLA SA and staff PM Nick Elsden
0002	LADDER Arrange access if possible.	8S stair	Fall of person from ladder, Fall of material from ladder, Collapse of ladder,	Personal Injury, Equipment Damage	M	1–14	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.	L	MOLA SA and staff PM Nick Elsden
0003	PLANT 10–20 to machine excavato	nne ors	Persons Struck by Machine Shovel or Ioad dropping Hydraulic fluid spray Overturning of machine Fire/explosi on	Personal Injury, Equipment Damage	Н	1–14	MOLA staff will not operate plant. 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.	M	MOLA SA and staff PM Nick Elsden
0005	Scaffoldi (Towers Access) Covers H stairs an	ng and Iaki d	Fall of persons Fall of materiel	Personal Injury, Equipment damage	М	1–14	MOLA staff will not erect scaffolding. Only use scaffolding (inc stairs) that displays green scaffold tag with current weekly inspection	L	MOLA SA and staff PM Nick Elsden

	similar					record.		
		Collapse of scaffolding				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 quard rail when carrying load		
0006	EXCAVATION	Collapse of sides Fall of persons Falls of Plant, equipment, material Flooding	Personal Injury, Equipment damage	M	1–14	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 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.	L	MOLA SA and staff PM Nick Elsden
0008	SLIPS/TRIPS/ FALLS	Falls of persons Dropping of equipment/ material	Personal injury, Equipment damage	Μ	1–14	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 Elsden
0011	ELECTRICAL Equipment and supplies	Electrocutio n Fire/explosi on Trips (over flex etc)	Damage to equipment	H	1–14	MOLA staff will not install electrical supplies or repair or alter electrical equipment. Do not use if no current PAT certificate Visually inspect of equipment before use for faults. Do not use If obviously defective. Report fault. Obey Manufacturers guidelines and instructions for use. Route leads and cables to minimise the likelihood of damage and trip hazards. Dry powder/ CO2 fire extinguishers to be available	L	MOLA SA and staff PM Nick Elsden
0013	SPACES- If applicable	Conapse of sides/ structure Flooding Free flowing solids Fire/ explosion Electrical Gas, fumes Toxic	Personal Injury, Disease, Equipment damage	Η	1-14	Permit to work will operate. Supervisor to brief staff on task prior to commencement. Only physically fit/suitable staff will be deployed. Visually monitor staff health. Report all ill health immediately. No smoking or naked flames/lights. Fire extinguisher to available. Only equipment specified in the permit will be used. Ventilate adequately. A top-person (lookout) will be in place. An escape plan for an unconscious/immobile casualty will be in place and the rescue	L .	MOLA SA and staff PM Nick Elsden

0014	BREAKING OUT Breaker attached to plant or jack hammers?	atmospher es, oxygen deprivation Bacteria Falling/flyin g objects Striking undergroun d utilities Fire/explosi on Collapse of structure	Personal Injury, Equipment damage	H	1–14	party trained regularly. The following safety equipment will be used : gas monitoring equipment, breathing apparatus/escape sets, harnesses, winch/tripod, lanyards/life lines, life line, floatation vests, radio MOLA staff will not undertake demolition or breaking out Maintain safe distance from breaking out. Wear eye protection. Wear P3 dust mask if applicable. Wear correctly rated ear protection.	L	MOLA SA and staff PM Nick Elsden
		Dust Noise						
0015	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	1-14	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 Elsden
0016	COSHH (SPRAY PAINT)	inhalation, ingestion, absorption dermal contact	Personal injury, illness.	L	1–14	Material Safety Data Sheet and COSHH assessment to be present on site. Brief staff on instructions for product Follow safety instructions for use, transport, storage and disposal.	Insi g	MOLA SA and staff PM Nick Elsden
0018	WEILS DISEASE (leptospirosis) RATS Identify and deal with any significant rat presence on site prior to commencemen t of works where possible.	Rat (and Cattle) faeces and urine	Personal injury Iliness	L	1–14	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 secure. Keep food covered and secure. Basic surveillance of staff for flu like symptoms. Report ill health.	g	MOLA SA and staff PM Nick Elsden
0019	PSITTACOSIS (Ornithosis) Is there are large roosting Pigeon population on site (usually in derelict/empty standing buildings) or significant	Inhalation of bacteria in dry conditions From Pigeon faeces/urin e/ discharges	Illness	L	1–14	Do not disturb droppings if possible. Wear gloves: do not touch pigeon droppings or pigeons (alive or dead) with unprotected hands. Wash hands before eating or smoking. Do not eat, drink or smoke in the contaminated area. Simple visual health surveillance Report ill health.	Insi g	MOLA SA and staff PM Nick Elsden

	deposits of					Wear P3 dust masks and		
	pigeon faeces					disposable overalls		
0025			Personal	М	1_14	General		ΜΟΙΑ
0025	on site MANUAL HANDLING	Too heavy, big, awkward load, Too prolonged Dropping load	Personal injury, Equipment damage	M	1–14	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		MOLA SA and staff PM Nick Elsden
0026	FUMES AND GAS Petrol/diesel exhaust fumes from plant and machinery in trench	Toxic fumes/gas (CO etc) Fire/explosi on	Personal injury, uncon- sciousness, Illness	М	1–14	Inspect work areas before each shift. Vacate area where fumes or gas are known or suspected. Do not return until told safe. Report unwell symptoms immediately. No smoking or other naked flame in specified areas. Use face fitted respirators/BA when required.	L	MOLA SA and staff PM Nick Elsden
0027	DUST Breaking out Plant and vehicle movements Prolonged dry conditions Wind	Breathing problems Reduced visibility Dirty office/cante en	Personal injury	М	1–14	Vacate area where there is excessive airborne dust. Do not return until it is safe Wear eye protection Wear P3 rated dust masks. Report all unwell symptoms immediately Keep facilities dust free, close doors, regular cleaning	L	MOLA SA and staff PM Nick Elsden
0028	NOISE Breaking out of concrete/pilin g mat? machine operation/ Traffic	Excessive, prolonged noise levels, Nuisance to public	Personal injury – temporary or permanent damage to hearing, loss of hearing Headache/	М	1–14	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 Elsden

Moorgate Shaft, Method Statement for Excavation and Watching Brief © MOLA 2013

			nausea					
0029	DEEP EXCAVATION S	Collapse of sides Fall of persons Falls of Plant, equipment, material Flooding Hazardous atmospher e	nausea Personal injury Equipment damage	H	1–14	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.	L	MOLA SA and staff PM Nick Elsden
						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.		
0032	LIFTING EQUIPMENT (HOISTS)	Collapse Falling bucket, material Moving parts Electric	Personal Injury, equipment or property damage	M	1–14	MOLA statt will not Install lifting equipment Only trained operatives will operate the hoist. Hoist must display the date of its last thorough inspection– if it is uncertificated it will not be used. Hoist will be inspected weekly by person competent, the inspection recorded and checked by MOLA. The hoist will be visually checked by the operative each shift. Obviously faulty equipment will not be used, report any defects and cease using until repaired. Safe Working Load (SWL) of the hoist will be displayed. Skip/bucket will display its SWL and will not exceed that of the hoist. Do not over load the skip/bucket. The skip/ bucket will be appropriate (size and shape) for the task and area it is to be used in. A topman/operator will be present for hoist operations Exclusion zone below the hoist while the skip/bucket is being raised or lowered or in the interval between if hoist operations are		MOLA SA and staff PM Nick Elsden C501 BFK mgr Crossrail site mgr

						ongoing.		
						MOLA employees are not		
						manoeuvre it during		
						lifting/lowering.		
0033	LIFTING EQUIPMENT	falling bucket,	Personal Injury,	м	1–14	MOLA staff will not operate plant	L	MOLA SA and
	(PLANT)	material, collapse	equipment			Only trained plant operatives will		staff PM Nick
	Use hoist if	Striking	damage			operate plant. Plant used as		Elsden
		obstruction				do so. All loads/skips/buckets		C501
						load of the machine. A banksman		BFK mgr Crossrail
						will be present for all operations. Loads will not be slewed over		site mgr
						staff below Exclusion zone below		
						is being raised or lowered or in		
						are ongoing.		
42	ADVERSE	Slips trips	Personal	м	Staff	Monitor weather forecasts.	L	MOLA
	WEATHER	and falls Snow,	Injury, equipment		Cont	Ensure staff can get to and from work safely in reasonable time –		SA and staff
		rain, -	damage, lost time		ract ors	Cancel work in advance if		PM Nick Elsden
		ground			Visit	poor transport links.		C501
		ponds			ors	welfare facilities.		BFK mgr
		freezing				commencement.		site mgr
		es, high winds				route clear of ice and snow, mud. Check barriers/warning signs in		
		0				place around all deep holes. Rotate staff tasks.		
						Do not use hand tools on heavily frozen ground or in heavy rain.		
						Report unwell symptoms. Wear warm clothing.		
0043	SPOIL MOUNDING	Plant and materials	Personal injury,	М	1–14	Robust barriers around deep excavations.	L	MOLA SA and
		falling into trench	equipment damage			Mound spoil and materials at safe distance from trench, welfare		staff PM Nick
		Dust				facilities, occupied premises and site perimeter.		Elsden
		Mudslides				Supervisor to determine safe distance.		
		Slippery				manholes, water courses, with		
		runs				Spoil to be mounded - c45 degree		
		Overloaded				Keep excavation edges clear of		
		Dallows				Clear and secure barrow runs,		
						possible, fitted with toe boards		
						Cover or damp down in dry dusty		
						Large heaps to be closed in heavy rain or snow and monitored		
						for slippages.		

54	TASK LIGHTING (Stand alone, Laniro etc)	Fire Electrocutio n Trip hazard Light falling on person	Personal injury, equipment damage	М	1–14	Current PAT test Visual inspection before use, do not use if defective, switch off and report immediately. Repair only by competent person. Use only for minimum amount of time to complete task. Position to minimise falling on operatives. Leads and extension cables routed to minimise trip hazards.	L	MOLA SA and staff PM Nick Elsden
	SHIFT WORK Two 8-hour shifts, 7am to 3pm & 3pm to 11pm for core team, over period of approx. 3 weeks	Drowsiness at start of early shift and end of late shift; Fatigue when changing to/from normal and late shifts.	Increased risk of accidents. Late shift: increased risk of exposure to anti-social behaviour when leaving work	M	1–12	Staff Supervisor to monitor staff alertness and fatigue. Staff to report symptoms of drowsiness/fatigue (lack of concentration, alertness to potential hazards, mistakes in procedures, etc) to Supervisor. Staff to ensure that they get a normal night's sleep in each 24- hour period. If staff are not safe to work, supervisor to instruct them to take rest as per current MOLA H&S policy. Additional caution to be taken if shift work coincides with adverse weather (See RA 42). Extra care taken during night work due to reduced visibility (See RA 54). Extra vigilance regarding anti- social members of the public.		MOLA SA and staff PM Nick Elsden
An persons anected by these hazards must be made aware of the contents of this Risk Assessment								

Annex 1: Figures

23 Registers

	HEALTH & SAFE	TY METHOD STATEMEN	IT 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
	MOL	A INDUCTION REGISTER	8
Date of	Name of Inductee	Signature of inductee	Confirmation Signature of
Induction		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	MOLA inductor
		<u> </u>	

For further names append more pages

