C263 ARCHAEOLOGY LATE EAST
Method Statement
Watching Briefs, Non Listed Building recording and Geoarchaeological Borehole Survey
Victoria Dock Portal and North Woolwich Portal

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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
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1 Introduction

This document sets out the methodology for the archaeological investigations to be undertaken at Victoria Dock Portal (VDP) and North Woolwich Portal (NWP) by the Museum of London Archaeology (MOLA). The investigations involve carrying out general watching briefs on a number of enabling works and service diversions as well as a programme of NLBH recording on a late 19th century footbridge. A geoarchaeological borehole survey also forms part of the scope of works at North Woolwich Portal. The requirements are set out in the Crossrail Site-specific Written Scheme of Investigations (SS-WSI – *Victoria Dock Portal and DLR Realignment*, Crossrail, March 2011, Document No C154-HYD-T1-JLT-CR144_PT003–00001, Revision 7.0 and SS-WSI – North Woolwich Portal, Crossrail, January 2011, Document No C156-CSY-T-RGN-CR146PT004–00019, Revision 8.0).

The tasks covered by this method statement are as follows:

Task	FDC Notification	Principal Contractor	Programme
• **General Watching Brief VDP** (Sewer, and EDF diversions on Seagull Lane)	N/A	C233 J Murphy & Sons	Late June (c 27th June)
• **General Watching Brief VDP,** (Sewer, water and gas mains, EDF and ICT diversions on Victoria Dock Road)	N/A	C233 J Murphy & Sons	Late June (c 27th June)
• **General Watching Brief NWP** (Sewer, water and gas main, EDF, ICT, CCTV diversions on Albert Road)	N/A	C233 J Murphy & Sons	Late June (c 27th June)
• **General Watching Brief NWP** (Sewer, water and gas main, BT, Virgin, EDF and interoute diversions on Factory Road**)**	N/A	C233 J Murphy & Sons	Late June (c 27th June)
• **NLBH recording** on the late 19th century foot bridge prior to its dismantling, removal and storage.	N/A	C233 J Murphy & Sons	TBC
• **Geoarchaeological borehole survey** at NWP	N/A	C233 J Murphy & Sons	TBC

Table 1 Task information.

This Method Statement has been developed in conjunction with the Principal Contractors currently appointed who will be responsible for ensuring that the archaeological works may be carried out as specified. The purpose of the Watching Brief is to mitigate the impact of the development works upon archaeological remains; by making an adequate record of them in advance of and during the specified construction ground works.

If the project design or scope/method of working is subject to changes during the works, the Method Statement will be updated and re-issued to the Project Archaeologist and CDM Advisor for approval, in accordance with the specified document control procedures (see 11).

1.1 Site Description

The Victoria Dock Portal site is situated on National Grid reference (NGR) 540460 180910. It lies approximately 100m east of Royal Victoria DLR station, adjacent to Victoria Dock road. The North Woolwich Portal site is located within the existing railway corridor of the former North London Line (NLL), between Factory Road and Albert Road, National Grid reference 542700 180000. Both sites are in the London Borough of Newham (Fig 1).

Associated utility diversion and enabling works will be undertaken at the following locations in the area:

- Victoria Dock Road
- Seagull Lane
- Albert Road
- Factory Road

The NLB recording and geoarchaeological borehole survey will be undertaken at North Woolwich Portal.

1.2 Geological and Topographical setting

The geological and topographical setting for Victoria Dock Portal and North Woolwich Portal was covered in detail in the SS-WSI – *Victoria Dock Portal and DLR Realignment*, Crossrail, March 2011, Document No C154-HYD-T1-JLT-CR144_PT003–00001, Revision 7.0 and SS-WSI – North Woolwich Portal, Crossrail, January 2011, Document No C156-CSY-T-RGN-CR146PT004–00019, Revision 8.0). This information is summarised below for the two sites.

Both sites lie within the Holocene alluvial floodplain of the Thames and therefore consist of similar depositional sequences. The Tertiary London Clay deposits are overlain by Pleistocene sands and gravels deposited during the closing stages of the last glacial episode between 18,000 to10, 000 years ago. During this time the Thames existed as a wide extensive braidplain, consisting of elevated gravel bars separated by multiple low lying channel threads. As the climate ameliorated at the beginning of the Holocene, c 10 000 years ago, the river system contracted to the lower lying channel threads, leaving the surface of the elevated gravel bars as dry land. This gravel surface topography created the ‘Early Holocene’ template that influenced later sedimentation and areas of dryland occupation from the Mesolithic onwards.

From the Late Mesolithic/ Early Neolithic channel capacity exceed the discharge rate, resulting in many former channel threads of the braided river becoming abandoned and infilling with peat and organic sediment. An overall increase in river levels, due to ponding back and relative sea level rise further down the estuary, caused the waterlogging of previously dry terrestrial land surfaces across the elevated gravel surface topography. The impeded drainage gave rise to the extensive peat beds present within the Thames alluvial floodplain. The peats formed within semi terrestrial alder carr floodplain woodland, and formed an important resource to the prehistoric populations.

From the Early Iron Age, the increase in river levels outstripped the rate of peat formation. The alder carr woodlands were inundated by intertidal muds and salt marsh environments, which is represented in the depositional record by a transition from peats and organic deposits to minerogenic silts and clays. This tidal inundation continued into the medieval period, gradually raising and levelling off the surface of the floodplain. The raised surface of the floodplain in conjunction with the construction of drainage ditches and bankside revetments protected the floodplain from regular tidal inundation. The intertidal environments consequently transformed from salt marsh and mud flats to floodplain accretionary soils.

Geoarchaeological deposit models were undertaken for both sites to characterise the gravel topography and the overlying floodplain sequences. The models identified a number of landscape zones (LZs) representative of different depositional sequences, landforms and possible chronology. These are summarised for both sites below:

Victoria Dock Portal

- LZ1 consisting of high ground to the north beyond the extent of the Crossrail works;

- LZ2 defining a channel area, consisting of minerogenic silts and clays with no evidence of semi terrestrial peat formation

- LZ3 defines a number of possible gravel islands with the potential for dry land occupation from the Mesolithic to early Neolithic period. One such island lies within the site on the extended alignment of Bridgland Road. Another lies *c* 50m to the west of the site and another immediately to the south east of the site.

- LZ4 consists of a thick sequence of peats overlain by intertidal muds. Possible channels of a Mesolithic date were identified at the base of the sequence. This LZ covers the majority of the site.

The surface of the modern made ground lies at 101.5 to 101.6m ATD. The alluvial sequence was found to extend to a maximum of 4.5m below ground level.

North Woolwich Portal

- LZ1 defines low lying areas of gravel topography overlain by channel sediments of a possible Mesolithic date. Within this zone the gravel surface occurs at *c* 94 to 96m ATD. By the Neolithic extensive wetland peats began to accumulate within these former channel threads.

- LZ2 defines areas of raised gravel topography with a surface elevation of *c* 96 to 98m ATD. These areas created islands within the floodplain landscape that probably remained as dry terrestrial ground into the Early Neolithic. One such island is centred on the western end of Factory Road, with another lying across the junction of Fernhill Street with Factory Road.

- LZ3 forms areas of transitional marshland between the high ground of LZ1 and low lying channel areas of LZ2.

The surface of the modern made ground lies at 101.5 to 102.5m ATD, rising to 105 m ATD on the southern periphery of the site. The alluvial sequence measures up to 5m in thickness.

1.3 Archaeological and Historic Background

The archaeological potential of the Victoria Dock Portal and North Woolwich Portal sites was covered in detail in the SS-WSI – *Victoria Dock Portal and DLR Realignment*, Crossrail, March 2011, Document No C154-HYD-T1-JLT-CR144_PT003–00001, Revision 7.0 and SS-WSI – North Woolwich Portal, Crossrail, January 2011, Document No C156-CSY-T-RGN-CR146PT004–00019, Revision 8.0). This information is summarised below for the two sites.

1.3.1 Victoria Dock Portal

The alluvial sequence across all areas of the site has a high potential for prehistoric palaeoenvironmental evidence, such as molluscs, insects, pollen and plant macro fossils, especially within the deeper sediments across LZ2 and LZ4. The deeper channels within LZ2 may contain prehistoric artefactual evidence of river exploitation such as fish traps, jetties and boats.

The gravel islands of LZ3 could preserve evidence of dry land activity of a Mesolithic to Early Neolithic date. Such evidence may take the form of lithic and bone scatters representing tool manufacture and a range of subsistence activities. The activity horizons could be expected to occur on the surface of the floodplain gravels or within ephemeral soils that subsequently developed above it. The surface elevation of these gravel islands is between 98m and 99m ATD. Negative prehistoric features such as pits or ephemeral structural remains could be found cutting into the Pleistocene gravels.

The peat of the marginal marshlands within LZ4 has the potential to preserve timber structures such as trackways or jetties of a Neolithic to Bronze Age date, constructed to access and traverse the wetland landscape. Other organic features such as weirs, fishtraps, revetments and boats may also occur.

By the Roman period peat formation across the site had ceased and the landscape had transformed to an estuarine environment dominated by the formation of intertidal mud flats and slat marsh environments. However, a sea level regression event during the Roman period may have resulted in areas of this estuarine landscape becoming suitably dry enough for occupation to occur. The upper alluvial deposits could therefore contain evidence of semi–terrestrial minerogenic soils.

During the early medieval period a rise in river levels returned the landscape to estuarine marshland. During the later medieval period the land became usable again through the construction of drainage channels and revetments to protect the floodplain surface from regular tidal inundation. It is likely that during this time accretionary floodplain grassland soils developed across the area, only seasonally inundated by high tides and major flood events. These grassland floodplains were most likely used as pasture. The medieval manor of Sudbury may have been located towards the east of the site. The ditches of field systems and land boundaries associated with this manor could occur within the upper part of the alluvial sequence.

Land reclamation continued into the 19th century, until in 1847 the North Woolwich Railway line was constructed across the undeveloped marshland. The area rapidly developed then onwards with the construction of the Royal Victoria Docks in 1850 to 1855. Residential areas and structures associated with the industrial and railway usage of the area developed throughout the latter part of 19th century. Evidence of this industrial heritage could occur within the upper made ground deposits.

1.3.2 North Woolwich Portal

During the Mesolithic period the elevated gravel islands of LZ2 would have provided suitable locations to establish makeshift camps and carry out a range of subsistence activities. By the Neolithic, the increase in river levels caused waterlogging of previously dry terrestrial surfaces, leading to wide spread peat formation into the Bronze Age period.

The peat and alluvial deposits will preserve a wide range of proxy palaeoenvironmental indicators including plant macro fossils, pollen and molluscs. The peat deposits may also preserve evidence of trackways and other timber structures constructed to traverse and exploit the rich wetland resources. By the Iron Age, the increase in relative sea level caused a switch to estuarine conditions, resulting in a transition from peat formation to the accumulation of minerogenic sediments within tidal mudflat and saltmarsh conditions.

During the Roman period a regression event caused the lowering of the river levels. As a consequence stable terrestrial soil developed within the alluvium, and evidence from past investigations in the area suggests the landscape was dry enough for occupation and activity. A possible Roman road has been suggested to run north south across the area, linking the higher ground of the north down towards the ferry crossing at north Woolwich.

A transgression event in the medieval period once again caused the landscape to revert to salt marsh and intertidal mudflats, although some areas were still habitable. The Sites and Monuments record notes the existence of the medieval settlement of North Woolwich immediately to the west of North Woolwich station. The settlement is mentioned in documentary sources from 1086, but flooding destroyed the settlement probably during the 14th and 15th centuries. The medieval manor of Hammarsh is also thought to be located approximately 0.5km to the east of the site.

By the Post-Medieval period the construction of drainage ditches and dykes reclaimed much of the marsh land. This process of land reclamation continued until the 19th century until industrialisation significantly changed the character of the area. The construction of the North Woolwich Railway, along with associated warehouses and other buildings urbanised this formerly open landscape.

A significant feature of this modem landscape was a channel known as Ham Creek, illustrated on late 19th century OS maps. This mapping indicates that the channel lies within the western 40m of the portal footprint, oriented approximately along the line of Tate Road.

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 and Crossrail Safety/CDM Advisor 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 C263 Contract Administrator

MOLA shall submit documentation in accordance with the C263 Contract to the Contract Administrator.

2.3 Interface with the Principal Contractor C233

MOLA has liaised with the appointed Principal Contractors (J Murphy & Sons, C233) to prepare the Method Statement (see Appendix). The archaeological investigations will take place under the auspices and supervision of the Principal Contractors. This interface extends to joint Health and Safety planning under CDM requirements. MOLA will provide the Principal Contractors with all necessary information to support site start-up (e.g. 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 Principal Archaeologist

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

2.5 Interface with External consultees

Principal Archaeologist shall liaise with the London Borough of Newham and the GLAAS regional advisor to inform them of the archaeological works. In particular, the C263 archaeological contractor will inform the Project Archaeologist if significant archaeological and/or palaeoenvironmental remains are exposed within the watching briefs works, so that the design archaeologist can invite GLAAS regional advisor to visit the site.

3 Scope of Works

3.1 Planned Fieldwork Events

This Method Statement sets out the methodology and health and safety requirements for archaeological work on the site of Victoria Dock Portal and North Woolwich Portal during the enabling works, NLBH recording and Geoarchaeological borehole survey. This currently comprises a watching brief exercise as described in section 1.The mitigation strategy for the site will be 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:

- SS-WSI – *Victoria Dock Portal and DLR Realignment*, Crossrail, March 2011, Document No C154-HYD-T1-JLT-CR144_PT003–00001, Revision 7.0
- SS-WSI – North Woolwich Portal, Crossrail, January 2011, Document No C156-CSY-T-RGN-CR146PT004–00019, Revision 8.0
- Crossrail Code of Construction Practice
- GLAAS Standards for Archaeological Work, London Region, External Consultation Draft (2009)
- English Heritage Centre for Archaeology Guidelines, Environmental archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation (2002)
- English Heritage, 2004, Geoarchaeology: using earth sciences to understand the archaeological record
- English heritage 2006. Understanding Historic Buildings: A guide to good recording practice.
- Institute for Archaeologists (IFA) Standards and guidance for watching briefs and field evaluation (IFA 2001a and 2001b)
- 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)
- United Kingdom Institute for Conservation's Conservation Guidelines No. 2
- English Heritage, 2006, Understanding Historic Buildings – A guide to good recording practice

3.3 Aims and Objectives

The overall objectives of the various watching briefs are to preserve by record any surviving archaeological and/or palaeoenvironmental remains that will be impacted upon by the enabling works.

Specifically, the archaeological investigations have the potential to recover:

- Peat and alluvial deposits preserving a wide range of proxy palaeoenvironmental indicators (i.e. pollen, diatoms, plant macro fossils) that can be utilised to reconstruct past landscape, palaeoecology, hydrology, geomorphology and past landforms.
- Prehistoric structural timber remains such as trackways, fish traps and revetments possibly occurring within the thick peat deposits
- Mesolithic to Neolithic dryland activity horizons above gravel high points, consisting of ephemeral scatters of animal bone and lithic material.
- Prehistoric negative features such as pits and postholes cutting through the Pleistocene floodplain gravels and overlying terrestrial palaeosols.
- Evidence of floodplain stabilisation and soil formation of a Roman to Medieval date within the upper minerogenic alluvium, and associated archaeology consisting of pits, ditches etc.
- Post-medieval structural remains and features associated with the industrial heritage of the area, with particular reference to features associated with the docks and the former North Woolwich Railway. Such material may be encountered within the made ground.

With regard to the NLBH recording the overall objective is to secure preservation by record of the late 19th century cast iron foot bridge prior to its dismantling and removal from site. This will be done to a level 3 in accordance with the specification set out in the English Heritage Guidelines (EH 2006).

The geoarchaeological borehole survey aims to revise the landscapes zones determined by the previous geoarchaeological deposit model, and recover core samples suitable for off site palaeoenvironmental work.

3.4 Event Codes

The event code for the works at Victoria Dock Portal is **XSX 11**. For North Woolwich Portal it is **XSV 11**.

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 Section Appendix 1, section 9.2 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. The General and Targeted Watching Briefs will be undertaken by a MOLA Supervisor (Grade 5)/Senior Archaeologist (Grade 4) and supervised by a MOLA Field Director (Grade 3) or Contracts Manager/Assistant Contracts Manager via regular site visits, advice and mentoring.

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, Chainsaw use, Confined Spaces and Power Auger use. It is anticipated that only Confined Spaces will be required on this site.

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

All staff will have their MOLA ID cards with them (see Appendix 1, section 7.1).

4.3 Site Monitoring

The site will be monitored by the MOLA Field Director (Craig Halsey, BSc), Assistant Contracts Manager (Louise Davies, BA, MSc) and Contracts Manager (David Divers, MSc, MA) via site visits, as and when required, in order to provide advice and support to the MOLA Supervisor. MOLA H & S Advisor (Hascom) will also regularly monitor the site, see 18.4.

The results of the H & S advisor's monitoring, and the monthly HS&E incident summary form, along with monthly environmental audits will be submitted to Crossrail.

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.

4.5 Resource Plan

General/Targeted Watching Briefs, NLBH recordinng:

- The general watching briefs and NLBH recording will be supervised by a MOLA Supervisor (Grade 4 or 5) assisted by members of the MOLA field team (Grade 6) with support from MOLA Geomatics and Photographic team members when required. Other archaeological specialists (Grade 8, e.g. geoarchaeologists or osteologists), may be called in if necessary.
- The named Supervisor(s) will be confirmed with the client/contractor before the start of the works. Other staff to be assigned when required.

Geoarchaeological Borehole Survey

- The geoarchaeological borehole survey will be undertaken by a geotechnical investigation sub-contractor under the direct supervision of a MOLA Senior Geoarchaeologist (Grade 4).

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

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

4.6 Programme

4.6.1 Victoria Dock Portal

The general watching brief on the Victoria Dock Portal Utility Diversions and enabling works is currently expected to start late June 2011 and to continue for approximately 4 months. The anticipated programme of excavation work associated with the diversions is as follows:

Area	**Start**	**Finish**
Seagull Road – Sewer 225mm diversions. Construction of manholes, and reception/drive pits for microtunneling	Late June	tbc
Seagull Road – EDF 2 x 178mm ducts diversion	tbc	tbc
Victoria Dock Road – Sewer	Late June	tbc

1400mm diversion and associated manhole construction		
Victoria Dock Road – Water main 180mm diversion	Late June	tbc
Victoria Dock Road – Water main 450mm diversion	Late June	tbc
Victoria Dock Road – Ducts for EDF and ICT diversion	Late June	tbc
Victoria Dock Road – Gas main 600mm diversion	Late June	tbc

4.6.2 North Woolwich Portal

The general watching brief on the North Woolwich Portal Utility Diversions and enabling works is currently expected to start late June 2011 and continue for approximately 4 months. The anticipated programme of excavation work associated with the diversions and the NLBH recording is as follows:

Area	**Start**	**Finish**
Albert Road – Water main 250mm diversion	late June	tbc
Albert Road – EDF ducts diversion	late June	tbc
Albert Road – Water main 125mm diversion	late June	tbc
Albert Road – Sewer 1200mm diversion with associated manhole construction	late June	tbc
Albert Road – Gas main 355mm diversion	late June	tbc
Albert Road – EDF, ICT and CCTV diversions	late June	tbc
Factory Road – Twin water mains 250/360 mm diversions	late June	tbc
Factory Road – BT, Virgin, EDF and Interoute diversions	late June	tbc
Factory Road – Gas main 150mm diversion	late June	tbc
Factory Road – Sewer 225mm diversion	late June	tbc
Factory Road – Water Main 560mm diversion	late June	tbc

19th century footbridge	tbc	tbc
Geoarchaeological borehole survey	tbc	tbc

4.7 Working Hours

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

MOLA will provide a site attendance when required during these specified periods, so that all the relevant Principal Contractor's ground works defined in this MS are monitored and recorded.

4.8 Timesheets

During General Watching Briefs and Targeted Watching Briefs, MOLA will supply timesheets included in the weekly progress reports to Crossrail.

4.9 Access

Access to work areas to be determined as they become available. See Appendix 1, section 7.1. MOLA staff will comply with the Principal Contractor's site rules on security, access, safe walking routes, etc.

4.10 Requirements from Principal Contractor

These are listed in Appendix 1, section 9.1. They include welfare facilities, currently predicted to be for up 1–3 MOLA staff for the watching brief.

5 Fieldwork Methodology

5.1 General Watching Brief Methodology

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

It is likely that the watching brief will require recording of natural floodplain deposits. Therefore, if possible, profiles through the alluvium will be examined in section. If access into the trenches is not feasible, the alluvial deposits will be recorded by examining spoil brought up from the excavation by machine bucket. Depths of the sequences will be recorded by measuring down from the side of the excavation if safe to do so.

Generally monitoring will only be undertaken when areas or trenches have been dug down to 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) and the archaeological results. For example, any areas where the Principal Contractor's works prove to be of insufficient depth to affect significant archaeological deposits will be scoped out of the Watching Brief. 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.

The MOLA monitoring archaeologist will maintain regular contact with a nominated member of the Principal Contractor's team on site regarding the overall work programme and progress, including any changes to the proposed depths of excavation. The frequency of visits will be adjusted as necessary as work progresses to take into account areas where it can be shown that existing disturbance has already removed archaeological deposits, or where there are areas of unexpected archaeological survival.

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 (see 5.3). This redefinition, if authorised by the Project Archaeologist, would permit additional resources in terms of staff and attendance to allow for more intensive recording.

5.2 General watching brief tasks

5.2.1 Victoria Dock Portal

Within the Victoria Dock Portal site the majority of the C233 works will involve the diversion of the existing services along Victoria Dock Road into a multi utility trench. At Seagull Lane a small diameter 5m deep sewer will also be diverted, along with some electric diversions. The diverted route runs adjacent to the present DLR line. The depths of the excavations are likely to vary depending on the utility. The diversions requiring a watching brief attendance and the likely depth of excavation are outlined below:

- diversion of 225mm sewer on Seagull Lane with the construction f drive and reception pits for microtunneling and associated manholes; open cut trenches c 4m in depth
- diversion of electrics (EDF) on Seagull Lane; open cut trenches c 1.0m deep
- diversion of 225mm and 1400mm sewer with associated manhole construction on Victoria Dock Road; open cut trenches to a depth of *c* 3.0–4.0m
- diversion of 180mm and 450mm water main on Victoria Dock Road; open cut trenches to a depth of *c* 1.0–1.5m
- diversion of telecoms and electrics (EDF and ICT) on Victoria Dock Road; open cut trenches to a depth of *c* 1.0m
- diversion of 600mm gas main on Victoria Dock Road; open cut trenches to a depth *c* 1.0–2.0m

Previous geotechnical investigations have indicated that the modern made ground across the site measures between *c* 1.0–2.0m in thickness. Therefore, all the excavations for the utility diversions are likley to impact on the underlying alluvial stratigraphy. The overlying made ground itself may have the potential to contain material and structures related to the past industrial heritage of the area, especially features associated with the docks.

As the majority of the excavations are in the order of 1.0 to 2.0m in depth, only the upper minerogenic part of the alluvial sequence is likely to be impacted upon. These sediments may preserve evidence of activity of a Late Iron Age to Medieval date. Any of the utility diversions in excess of 4m in depth may impact on the Bronze Age/Late Neolithic peat deposits, and possibly the interface of the peats with the Late Pleistocene sands and gravels. Evidence of Mesolithic dryland activity could occur across the surface of the sand and gravel deposits. The overlying peats may preserve timber structures associated with the exploitation of the wetland environments.

5.2.2 North Woolwich Portal

During the C233 enabling works within the North Woolwich Portal site the existing services will be diverted into a multi utility trench. The existing services currently run along Albert Road and Factory road. The roads are seperated by; and run parallel to the former North London railway line. The depths of the excavations are likely to vary depending on the utility. The diversions requiring a watching brief attendance and the likely depth of excavation are outlined below:

- diversion of the 125mm and 250mm water main on Albert Road; open cut trench to a depth of *c* 1.0–1.5m
- diversion of the 1220mm sewer on Albert Road, with the construction of associated manholes; open cut trench to a depth of *c* 3.0–4.0m
- diversion of 355mm gas main on Albert Road; open cut trench to a depth of *c* 1.0–2.0m
- diversion of telecoms and electrics (i.e. EDF, ICT and CCTV) on Albert Road; open cut trench *c* 1.0m deep
- diversion of 250mm and 560mm water mains on Factory Road; open cut trench to a depth of *c* 1.0–1.5m
- diversion of 225mm sewer on Factory Road; open cut trench to a depth of c 3.0–4.0m
- diversion of telecoms and electrics (i.e. BT, Virgin, EDF and Interoute) on Factory road; open cut trench to a depth of *c* 1.0m
- diversion of 150mm gas main on Factory Road; open cut trench to a depth of *c* 1.0–2.0m

Previous geotechnical investigations have demonstrated that the modern overburden is likely to be in the order of 0.5–1.6m in thickness. Therefore all the excavations for the utility diversions are likely to impact on the alluvial floodplain sequence. Excavations of 1.0–1.5m death are only likely to impact on the upper minerogenic alluvial deposits. These upper alluvial deposits may contain archaeological material of a Late Iron Age to Medieval date. The deeper excavations, which extend to *c* 4m below ground level, may impact on the Bronze Age peat deposits. These peats are likely to have high palaeoenvironmental potential, and possibly preserve timber structures such as trackways.

In addition to the floodplain deposits, the upper made ground could contain evidence of post-medieval archaeology. The diversions may impact on any surviving rails associated with the former NLL railway. Where these have not already been recorded as part of the NLBH recording, they will be recorded during the watching brief.

5.3 Targeted Watching Brief Methodology

A targeted watching brief comprises the observation and recording of the Principal Contractor's or their sub-contractor's works with specific operations carried out under the supervision of a MOLA Senior Archaeologist. Targeted watching briefs are carried either out in areas where the density of archaeological features or deposits are not considered of sufficient significance to warrant investigation in advance of construction, or they may be carried out in areas where access prior to construction has been impossible and where, as a result, there is a possibility of unexpected discoveries (Crossrail 2009 Archaeology Specification for Evaluation & Mitigation (including Watching Brief) CR-PN-LWS-EN-SP-0001, version 3).

It should be noted that during a targeted watching brief, the Archaeological Contractor may impose constraints on, or require changes to, the Principal Contractor's or his sub-contractor's method of working to enable the archaeological investigation to take place alongside construction works. These constraints may include restrictions on the type of equipment used, the methodology employed, stopping excavation works to allow time for recording and the installation of temporary works or other attendances such as pumping out, in order that the archaeologists may enter the works excavations safely.

In addition to anthropogenic deposits, some assessment and basic recording of any naturally deposited levels will be necessary, e.g. alluvial deposits. This may require the attendance of a MOLA Geoarchaeological specialist to record and sample the deposits (section 6). Normally if the remains are localised the Principal Contractor's works may continue in other areas (subject to a safe method of working and monitoring. It is expected that the Principal Contractor will make allowance in their work programme to take account of the delays that a targeted watching brief may cause.

During a targeted watching brief MOLA staff will compile a basic record consisting of notes, measurements, drawings and photographs consistent with an observation role; e.g. depth, character, date and survival/truncation of deposit sequence, height of natural geology.

If potentially very significant (but localised) remains are exposed, such that they cannot be recorded adequately under the scope of the targeted watching brief, then subject to the Project Archaeologist's approval, additional archaeological resources and time may be required at that location (to allow for more detailed follow-up recording and perhaps limited excavation). Such work would be considered separately to the procedure for unexpected archaeological discoveries that fall outside the scope of the SS-WSI (Crossrail 2009, section 7.A2 and section 17.2 of this document).

In the event that significant archaeological remains are uncovered and a targeted watching brief is required, the works are likely to require controlled machine excavation under MOLA supervision. This will need to be undertaken by a large 360 degree excavator fitted with a wide bladed bucket (ditching or similar) with no teeth. Once levels of archaeological significance are exposed hand cleaning will be undertaken in order to carry out recording as outlined in section 5.4.

5.4 General/Targeted Watching Brief Recording Methods

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

The recording will include as a minimum:

- The Event Code and chainage/location of the area observed
- The date(s) of the observations
- Personnel employed on site
- A description of the works observed
- The works (sub) contractor and personnel undertaking and supervising the construction activity
- Depths and extents of excavation works observed
- Measure of confidence that any archaeological remains would have been observed and reasons
- Reasons why any particular area of works was not observed, noting those areas not subject to disturbance from construction
- Location and description of any archaeological remains
- Location and description of any modern remains
- The written record of individual context descriptions on appropriate pro-forma.
- The drawn record: including, plans and section drawings of appropriate features, structures and individual contexts (1:50 1:20 or 1:10). Isolated archaeological remains (artefacts) may be spot located in plan and a height provided where possible. Deposits which are regular in plan (pits and ditches) may be located through co-ordinates, annotated with dimensions, and may be recorded digitally.
- Other appropriate drawn and written records will be produced (for environmental/geoarchaeological sampling etc.).
- The photographic record: photographs taken with a digital camera of resolution of 12 megapixels 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.

5.5 Survey

The watching brief observations will be located manually by MOLA staff on a suitable hardcopy site plan. Observations can be related to features included on the OS mapping (e.g. adjacent structures or property boundaries), or chainage events located on the contractors CAD drawings. In event of significant features being uncovered, MOLA Geomatics staff will be called upon to carry out the survey using GPS/GNSS.

It is unlikely that the principle contractor will be carrying out measurements to ordnance survey datum during the excavation of the utility trenches. However, spot heights are available from the CAD drawings indicating the service diversions (ref: CRL1-XRL-U-DDA-CR146_PT004-00006 and CRL1-XRL-U-DDA-CR144_PT003-00001)

6 Geoarchaeological methodology

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 (i.e. the Pleistocene/Lower Palaeolithic and later). It can include techniques of landscape reconstruction such as palaeobotany, palynology and soil micromorphology.

Given the likely impact on the floodplain deposits, a geoarchaeological approach shall be adopted in recording any floodplain soils and/or sediments uncovered during the watching brief works. Deposits will be recorded according to standard sedimentological criteria in order to ascertain the depositional environment and site formation processes. This will involve characterising the visible properties of each deposit, in particular relating to its colour, compaction, texture, structure, bedding, inclusions, clast-size and dip. Geoarchaeological recording will be undertaken by and/or under advice of a MOLA Senior geoarchaeologist.

As the floodplain sequences are likely to be fairly uniform and laterally extensive, the geoarchaeological recording of the floodplain sequence can be selective, focusing on the most representative part of an exposed deposit sequence. Any major unconformities within the sequence will be recorded as these may indicate distinct landforms and features; for example tidal creeks/channels dissecting the wetlands, or terrestrial soils within the alluvium.

Significant features and/or layers of alluvial stratigraphy revealed during the investigations may require sampling if deemed necessary by the Project Archaeologist and/or the GLAAS Regional Scientific advisor. The sampling methodology is set out in section 8 below. This work will be conducted under the geoarchaeological and palaeoenvironmental sampling strategy (archaeological science strategy) as set out in WSI's for the Victoria Dock Portal and North Woolwich portal sites.

7 Built heritage methodology

7.1 Introduction

A key feature of PPS5, the Historic Environment Planning Practice Guide produced by English Heritage and the Departure for Culture, Media and Sport (EH, 2010), is a holistic approach to the historic environment. Elements of the historic environment worthy of consideration are termed heritage assets and this term embraces all manner of features including buildings, parks, gardens, landscapes, standing, buried and submerged remains, whether designated or not. Above ground heritage assets may be affected by either direct physical change or by change in their setting. Being able to properly assess the significance of a heritage asset and the contribution of their setting is an important task and informs an understanding of the implications of the proposal on the asset's significance.

7.2 EH specifications for standing building recording

The purpose of a programme of Standing Building Recording is to secure an understanding of a building or structure and to document its presence, form, fabric and history prior to its permanent alteration or loss by demolition. This in turn informs current and future academic research across a range of disciplines, through the deposition of the final report in a permanent established archive. The record builds upon existing knowledge through an appropriate level of documentary archive research, and its level of detail is based upon the nature and significance of the building or heritage asset. There are four main recording levels as prescribed by English heritage (EH 2006). These are as follows:

- **Level 1:** Basic visual record**.** The simplest of the levels
- **Level 2**: A descriptive record. The interior and the exterior are viewed, described and photographed. Plans and sometimes elevation drawings may be produced but the drawn record will not be comprehensive.
- **Level 3:** An analytical record. A higher level of detail where an introductory description is followed by a systematic account of the building's origins, use and development, with an account of the documentary archive evidence upon which the analysis has been based. Drawn and photographic records are made to illustrate the buildings appearance, structure and to support the analysis of any changes to the building.
- **Level 4.** Comprehensive analytical record. This level is appropriate for buildings of special importance, drawing on the full range of available resources to present a written and illustrated account of the building's architectural, social, regional or economic history. It is often considered that a Level 4 record represents the equivalent in terms of research as an academic publication or article.

7.3 General NLBH survey and reporting methodology

The NLBH on the North Woolwich Portal site has been assessed and the overall mitigation strategy for the site's built heritage is to be preservation by record. The majority of this recording work has been achieved to the required level. However the late 19th century footbridge, as a heritage asset of moderate importance requires a level 3 record. As a further mitigation measure the footbridge is likely to be

dismantled, rather than demolished, in order for its reassembly and reuse either on its original site or elsewhere. The level 3 record will be carried out prior to the footbridge being dismantled.

The level 3 survey will make use of any existing plan, section and elevation drawings available, either supplied by the developer or accessed through archive resource centres, libraries, etc. Annotated and measured sketches will be made on site and digital colour photographs will be taken. Interventions into the fabric of the structure or the removal of samples of fabric are unlikely to be necessary. The fabric of the structure will undergo visual analysis on site, with the analysis continuing after the fieldwork, informed by an appropriate level of documentary archive research.

A report will be issued in due course giving a written and illustrated description of the structure, analysis of its fabric, its history and use with site photographs and drawings reproduced.

This report and the site drawings and photographs will be archived under the relevant site code (XSV 11), whilst a summary will appear in an appropriate publication such as the annual fieldwork roundup in the London Archaeologist.

8 Sampling strategy

It is unlikely that sampling will be required during the watching brief work, unless archaeological features or floodplain deposits of significance are encountered. In the event of required sampling, it will be targeted to establishing the palaeoenvironmental potential and significance of the deposits. The aim of this sampling is to evaluate the degree of preservation and range of environmental remains preserved within the archaeological/palaeoenvironmental deposits, assess their 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. However, a geoarchaeologist will be on call to visit the site, advise and where necessary record and take samples from selected deposits.

General Methodology

Where significant features and/or alluvial layers are encountered the Contract 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 the watching brief and recording.
- That the environmental procedures outlined in the *Archaeological Site Manual* (MoL 1994) and *Environmental archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation (*English Heritage 2002) are followed.
- That general bulk samples, 40 litres in size (20L if waterlogged) will be the standard samples taken and that the processing methods are designed to recover a wide a range of materials from the same deposit in a single sample. 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 (i.e. prehistoric soils and activity horizons), the sample size will depend on feature; column bulk samples (*c* 2-20L) to sample ditches, deep cut features and natural deposit profiles; spot samples for dating; monolith and micro morphology samples to recover *in-situ* blocks of sediments or complex strata.

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

Sample	Sampled by	Material	Processing
Column bulk (20 litre), at 0.1m intervals down deposit profiles	Archaeologist on advice of geoarchaeologist	Freshwater and terrestrial molluscs, ostracods,	Disaggregated and wet sieved
		Plant macrofossils	Flotation or wet sieving
		Insects	Paraffin flotation
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 for external specialists

- The sampling strategy will be monitored throughout the works and adapted in light of the preservation and the type of features encountered. A MOLA Environmental Archaeologist/Geoarchaeologist will undertake site visits to provide advice and additional advice will be sought from the EH Regional Archaeological Science Advisor when necessary. A MOLA Environmental Archaeologist/Geoarchaeologist will be on site during any visit made by the EH Regional Archaeological Science Advisor.
- As a general policy, uncontaminated negative features will be bulk sampled and bone collected by hand. Horizontal stratigraphy if it survives will be sampled on a spatial basis where appropriate. Unstratified contexts, make-up layers and contexts thought to have a high degree of residual or intrusive material will not be sampled. Bulk samples may also be taken to recover artefacts such as evidence for metalworking and/or other industrial activity.
- If encountered, human burials will be recovered individually, with separate parts of the body (i.e. right arm, torso, left leg etc.) bagged separately on site. Samples will be taken for analysis of the abdominal area if the soil conditions are wet or moist. Control samples will also be taken by consultation with the appropriate Specialist. Cremations will be excavated in consultation with specialists.

9 Geoarchaeological borehole investigation

Up to three geoarchaeological boreholes will be drilled across the site by a sub-contracted drilling crew, supervised by a MOLA geoarchaeologist, through the Quaternary sequence down to the surface of the Pleistocene river gravels (c 5m depth). The location of the boreholes will be set out by MOLA surveyors, related to Ordnance Survey Grid and the ground level adjacent to the boreholes tied into Ordnance Survey Datum. The location of the boreholes is set out in Fig 4.

The boreholes will be undertaken by a Dando Terrier Rig. Continuous cores will be collected through the made ground and alluvial deposits. The cores recovered will be undisturbed 1m long Perspex tubes, roughly 100mm diameter. The cores will be slit open and the sequence of sediments drilled in each borehole will be described on site, with the nature (where possible) and depths of the interfaces between the different sedimentary units noted. A preliminary interpretation of the soil and sediment characteristics of the cores will be made and an overview of the stratigraphy produced that will characterise the deposit sequence and identify soil / sediment processes. The borehole logs will be drawn on standard MOLA borehole proforma sheets and / or polyester based drawing film.

Borehole cores, which are thought suitable for any future off-site analyses for palaeoenvironmental remains, will be retained and taken to MOLA geoarchaeology laboratories to be kept in controlled storage until such a time as they might be needed. Temporary storage of the core samples on site may be required, until they can be collected.

During drilling UXO testing may need to be undertaken by sub-contracted specialists if deemed necessary. The holes will be backfilled with gravel, and capped with bentonite.

The stratigraphic data will be added to an Access / Excel compatible database (RockWorks 2006). This data will be used to update and revise the previous geoarchaeological deposit model. The borehole sequences will be examined in site-wide working transects and the deposits ascribed to a stratigraphic sequence. This semi-interpreted data will be transferred to ARC GIS for modelling of the buried topography (top of sands and gravels – the 'pre-Holocene template') and deposit distribution, as appropriate.

A Geoarchaeological evaluation report will be prepared. The report will summarise the results of the survey, illustrate the sub-surface topography and characteristics of the sediments present on the site and indicate the potential of the core samples taken from the site for past environmental reconstruction.

All elements of the borehole investigation will be carried out to an acceptable archaeological standard in accordance with the relevant Institute of Field Archaeologists Standards and Guidance. The work will also be guided by the recommendations outlined in the English Heritage Guidelines for Environmental Archaeology and Geoarchaeology (EH 2002; 2004 respectively). The sub-contractor and terrier rig details are outlined below.

9.1 Terrier rig

- The Terrier rig is to be supplied by P J Drilling Ltd, 25 Barnfield Wood Road, Beckenham, Kent BR3 6SR and is operated by a two-man crew. The operatives are protected with hard hats, safety boots, gloves and protective glasses/goggles. The relevant sub-contractor Crossrail form will be submitted to the C263 Contract Administrator.
- The Drive Sampling Rig is a Dando Terrier 2002. The Rig is transported between sites in a fully enclosed long wheel-base transit type van. The rig is crawler mounted and is off loaded using a set of specially designed steel ramps.
- Overall length mast down: 2.70m, overall height mast assembled 2.4m – 2.85m, the whole mast and wheels can be detached from the main super structure for operation remotely in restricted access locations.
- The rig is tracked to each borehole position by the operative using a set of gearbox controls. To set up the rig ready for drilling, two front legs are slotted into the base of the mast and secured with locking pins. The mast is then mechanically raised into a vertical position.
- Boring is advanced by a drop hammer, which is completely enclosed within a steel cage.
- 1 metre long rods are extended with each metre until the required depth has been achieved.

10 Deliverables and Submission Programme

MOLA shall provide the following reports to the Project Archaeologist in accordance with the Crossrail, 2009 Archaeology Specification for Evaluation & Mitigation including Watching Brief CR-PN-LWS-EN-SP-0001, version 3 and the WSI (see section 1) or as otherwise instructed by the Project Archaeologist:

- Organisation of site monitoring visits, as and when requested by the Project Archaeologist.
- A weekly illustrated progress report to the Project Archaeologist containing the information required at part 5.10 of the C233 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. This will include the results of the Geoarchaeological investigation and an assessment of the deposits sampled. All levels cited in these reports should be Above Tunnel Datum (ATD = OD +100m). All Co-ordinates cited in these reports should be based on the London 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 C263 contract (see 17.3).
- 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 10) 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 Artefact Recovery and Conservation

All finds recovered during the watching brief work will be dealt with under the following professional standards:

- 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.

12.1 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 14.1).

13 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.

14 Archaeological Science Strategy

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

If necessary, samples for absolute dating such as C14 or timber samples for dendrochronology will be submitted to nominated MOLA external laboratories. This will only be done with the prior approval of the Project Archaeologist where there are particular research objectives to be addressed by such dating. See section 8 for the site-specific sampling strategies.

14.1 Specialist Strategy

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

14.2 Excavation and Recording of Human Remains

Human remains are unlikely to be present on the North Woolwich Portal or Victoria Dock Portal sites. If any human remains were to be found, they will be treated in accordance with the procedures in section 7.A.6 to 7.A.15 of Archaeology, Specification for Evaluation & Mitigation (including the WSI's for North Woolwich ,Document Number C156-CSY-T-RGN-CR146PT004–00019, Revision 8, and Victoria Dock Portal and DLR Realignment, Document No C154-HYD-T1-JLT-CR144_PT003–00001, Revision 7.0)

Crossrail procedures for dealing with discoveries of human remains shall identify any specific individual roles or actions that are relevant to the works. If removal of human remains were to be required, an Exhumation Licence would be required from the Coroner's Office of the Ministry of Justice, under the terms of the 1857 Burial Act. This would be obtained by the archaeological contractor, unless otherwise required by the Project Archaeologist.

15 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's and is not repeated here.

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

16 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 C263 Contract and project standard survey requirements.

16.1 Survey

- For dispersed Watching Briefs occurring on large sites the Principal Contractor's survey controls may not yet have been installed (e.g. for service diversions etc. at the early enabling works stage). Here the primary aim will be to use digital techniques (such as direct survey capture of works locations and archaeological features) to speed recording and data handling and so minimise any risk of delay to the Principal Contractor.
- For Targeted Watching Briefs it is proposed that Principal Contractor's surveys assist with the location of temporary base lines and the plotting of significant archaeological features where appropriate.
- Upon completion of the fieldwork a Site Survey Report will be compiled.

17 Additional Details

17.1 Standards and Guidance

See Section 3.2.

17.2 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.

17.3 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 C263 contract.

17.4 Management of Consents

In the event of the unexpected discovery of human remains on site, MOLA will obtain a Burial Licence from the Ministry of Justice.

18 Health and Safety

18.1 CDM Responsibilities and Reporting

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

MOLA will provide:

- A current health and safety policy, including defined operational procedures and managerial responsibilities, risk assessment/control, and measures to ensure that a safe method of working is implemented by the archaeological team on site, including appropriate advice and support from office-based managers.
- Adequate safety information in the MOLA site accommodation including the WSI, current Health and Safety Policy, Health and Safety at Law Poster, Data Protection Compliant Accident Book, and copies of Public and Employers Liability Insurance. The Supervisory Archaeologist is responsible for ensuring that this information is made available.
- Compliance with current legislation and HSE guidance; including the Construction Design and Management Regulations (CDM) 2007 (not as a Designer); and the Principal Contractor's Health and Safety Policy, safety inductions and fire and emergency procedures.
- Field staff qualified to operative level (or higher) of the CITB Health and Safety test and therefore eligible to carry a Construction Related Organisation (CRO) White Card for Archaeological Technician (Code 5363).
- Services of a Contract Manager, Project Officer 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 a professional health and safety consultant to attend site when required; reporting to the Supervisory Archaeologist and Project Officer, with any concerns or recommendations copied to the Principal Contractor's site manager
- A safety monitoring/reporting procedure. This should include accident reporting by the Supervisory Archaeologist to non RIDDOR and RIDDOR standard and any necessary liaison and follow-up of agreed safety actions with the Principal Contractor's site manager
- All necessary staff supervision, training and personal protective equipment (PPE) including tool box talks and safety inductions for new staff.
- Review and compliance with the Principal Contractor's Construction Phase Plan under the CDM Regulations 2007.
- Trained First Aiders, 'Where to get First Aid' poster and a First Aid kit (to be located in the MOLA site accommodation). The Principal Contractor will also have first aid facilities on site.

The Principal Contractor will provide:

- Overall control and supervision of the site and a safe working environment. The archaeological organisation will be unable to complete the specified works in any area where this is not provided.
- Technical services and attendances to the archaeologists as required. These services may include providing, site accommodation, plant for the excavation of trenches and other equipment such as lighting, handrails, shoring and ladders. These requirements are listed in detail in Appendix 1 section 9.1.

The CDM Co-ordinator will provide:

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

18.2 Rail Sites

The works at the Victoria Dock Portal site will be undertaken near to live rail lines. MOLA staff will comply with the procedures for working in such areas as set out in the principal contractors Health and Safety Management Plan (ref: C233-JMS-01-STP-CR146-5001)

18.3 Highway Sites

The combined utility diversion works are on a highway and therefore MOLA will comply with the Principal Contractor's regulations.

18.4 Health and Safety Reporting

Adherence to health and safety procedures will be monitored by the MOLA Health and Safety Consultant, Contract Manager, Project Officer and Site Supervisor. The consultant 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.

18.5 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 Fieldwork Director and project management team as needed.

18.5.1 C263 MOLA Project Management team contact details

- David Divers, Contracts Manager

  ddivers@museumoflondon.org.uk
  Direct Line: 020 7410 2253
  Mobile: 07867 783310

- Louise Davies, Assistant Contracts Manager

  ldavies@museumoflondon.org.uk
  Direct Line: 020 7410 2221
  Mobile: 07872 127299

- Craig Halsey, Fieldwork Director Contracts Manager

  chalsey@museumoflondon.org.uk
  Direct Line: 020 7410 2232

- Site Supervisor (Senior Archaeologist) tbc

18.6 Behavioural Safety BMOS

Mobile phones, personal CD players, iPods, and similar will not be used by MOLA staff in archaeological trenches or areas of work. Smoking and naked flames are/is 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 Advisor (see 4.3).

19 Emergency Response

19.1 Emergency Preparedness & Response Plan

A General Emergency Preparedness Plan (EPP) is currently being prepared within the MOLA Health and Safety Plan for C263. This should be referred to for generic emergency and accident issues.

Site-specific issues are as follows:

- For the Watching Brief MOLA staff will comply with the Principal Contractor's (J Murphy & Sons) Emergency Plan (ref: LPL0031-PLA-00006)

Employers Incident Response Contact	Crossrail helpdesk 0345 602 3813
Principal Contractor (J Murphy & Sons) Incident Response Contact	Michael Dalton michaeldalton@murphygroup.co.uk Mobile: 07841727158
MOLA Incident Response Contact	David Divers, Contracts Manager ddivers@museumoflondon.org.uk Direct Line: 020 7410 2253 Mobile: 07867 783310
Local A&E location	*Full A & E at:* Newham General Hospital Glen Road E13 8SL Tel: 02074764000 Head west on Factory Road, take 1st right to stay on Factory Road. Turn left at north Woolwich Road, at roundabout take 3rd exit onto Connaught Bridge/A1020 At Royal Albert Way, take 2nd exit onto Victoria Dock Road/A112. Turn right at Prince Regent Lane/A112. Turn right at Glen Road

19.2 Training

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

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

19.3 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 the evaluation 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.

19.4 Monitoring & Testing

MOLA staff will comply with Crossrail requirements.

19.5 Emergency & Accident Incident Reporting

All accidents and emergencies must be reported to the Principal Contractor's project manager (Leonard Gray, J Murphy's & Sons) who will call the emergency services, if required. They will also be reported to the Crossrail Helpdesk (24 hour helpline) Call: 0345 602 3813 or helpdesk@crossrail.co.uk

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

- Nick Dyball, CDM Advisor, Crossrail Central, Crossrail Ltd, 25 Canada Square, London E14 5LQ

  Mobile 07718861942

- George Dennis, Senior Contracts Manager, Museum of London Archaeology, Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED

  DD 0207 410 2200 Int 2256

- Ian Grainger, Field Manager, Museum of London Archaeology, Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED

  DD 0207 410 2200 Int 2271

20 Environmental Management

The archaeological works will be carried out whilst the Principal Contractor is in possession of the site. MOLA has received a copy of the Principal Contractors Environmental Management Plan (document no: LPL0031/EPL/0001 Rev. AB). 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 18 and Appendix section 9.1). In addition an updated MOLA corporate Environmental Management Plan is currently being prepared for submission to Crossrail.

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

20.1 Contamination

MOLA staff will not disturb or damage asbestos, or undertake asbestos removal from a building, structure, or buried material. If asbestos is found the Principal Contractor will be responsible for having it dealt with by a licensed contractor.

20.2 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.

20.3 Site Waste Management Plan

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

20.4 Vehicles/Motorised Equipment

MOLA staff will liaise with the Principal Contractor to provide safe access and parking for MOLA vehicles if required to attend site:

- Ford Silver Transit (Medium Wheelbase) – EA55 NBJ – Harry Matthews, Equipment Officer, 07730 646063.
- 1.7 Turbo Diesel Astra Estate – KC54 XTZ – Sarah Jones, Geomatics Manager, 0207 410 2200 Int 2287.
- The terrier rig sub-contractors vehicle. Details to be confirmed

20.5 Other Requirements

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

21 Quality Assurance Plan

An updated Quality Assurance Plan has been submitted to Crossrail in accordance with the format specified at part 5.4 of the C263 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's.

22 Community Relations

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.

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

23 Responsible Procurement

A draft Responsible Procurement Plan document was submitted to Kelly Hussey, Crossrail on 28th April 2011. The MOLA responsible procurement representative is Dawn Jackson, who is a member of the Senior Management Group.

24 Appendix 1: Health and Safety Method Statement

1. Introduction and Purpose

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 a Crossrail Site-specific Written Scheme of Investigation (SS-WSI – *Victoria Dock Portal and DLR Realignment*, Crossrail, March 2011, Document No C154-HYD-T1-JLT-CR144_PT003–00001, Revision 7.0 and SS-WSI – North Woolwich Portal, Crossrail, January 2011, Document No C156-CSY-T-RGN-CR146PT004–00019, Revision 8.0).

2. Scope of Document

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

- GWB (general watching brief) for the North Woolwich and Victoria Dock Portal utility diversions.
- NLBH at North Woolwich Portal
- Geoarchaeological Borehole Survey at North Woolwich Portal

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

3. Responsible Persons and Site Management

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 appropriate 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, Crossrail H & S Advisor, MOLA Senior Contract Manager and MOLA Field Manager.

4. Scope of Works

The scope of archaeological works is set out in section 2 of the appendix and in section 1 of the method statement, above.

5. Methodology, Programme and Sequence

The provisional programme is set out in section 4.6 of the method statement, above.

The timetable, length of programme and sequence of tasks are to be confirmed by the Principal Contractors.

5.1. General Watching Brief (utilities diversions)

The first task is currently expected to be the monitoring of excavations for the EDF service diversions on Seagull Lane,Victoria Dock. The starting date is to be confirmed by the Principal Contractor.

5.2. NLBH recording

The starting date is to be confirmed by the Principal Contractor.

5.3. Geoarchaeological Borehole Survey

The starting date is to be confirmed by the Principal Contractor.

6. Risk Assessments

Overall and site specific risk assessments for the General Watching Brief on the VDP and NWP utilities diversions, the NLBH recording and Geoarchaeological Borehole Survey are included in the following section.

6.1. MOLA Risk Assessment – General Watching Brief

Site – VDP and NWP utilities diversions			**Type of Work**		**General Watching Brief**
	Persons Affected	**No**	**Classification**	**No**	
	Employees	1-3	Experienced	Up to 3	
	Other workers		Inexperienced		
	Public		Disabled		

Known and Suspected Hazards on site (tick as appropriate)

Mobile Plant	x	Power Auger		Ionising radiation	
Moving Machine Parts		Access equipment		Lasers	
Moving objects		Hazardous Substances		Ultraviolet	
Falls from height	x	Contamination	x	Temperature	
Falls on level	x	Micro organisms		Noise	x
Manual Handling	x	Vermin/Weil's Disease	x	Vibration	
Buried services	x	Fumes/Gas		Weather	x
Electrical		Lone working		Hot/cold objects	
LPG etc		Welfare		Physical attack etc	
Fire/Explosion		Confined spaces	x	Vehicles	
Chainsaw		Hand Tools	x	Human Remains	
UXO	x			On/Near Water	

Control Measures Required

Compliance with H&S at Work Act 1974, Construction(Design and Management) Regulations 2007 and MOLA H&S Policy
Compliance with MOLA Generic or Site Specific Risk Assessment(s) for the Hazards marked above
Compliance with Principal Contractor's safety policy, site specific method statement, permits to work, instructions.
Attendance of Principal Contractor's induction on first day at work
Implementation and attendance of tool box talks by Principal Contractor and MOLA
MOLA supervisors to be trained and competent.
Certified First Aider on site.

Assessment of *Remaining* risk (Low, Medium, High) (see notes on reverse)

	L	**M**	**H**		**L**	**M**	**H**		**L**	**M**	**H**
Mobile Plant		x		Power Auger				Ionising radiation			
Machine Parts				Access equipment				Lasers			
Moving objects				Hazardous Substances				Ultraviolet			
Falls from height	x			Contamination		x		Temperature			
Falls on level	x			Micro organisms				Noise	x		
Manual Handling				Vermin/Weil's Disease	x			Vibration			
Buried services		x		Fumes/Gas				Weather	x		
Electrical				Lone working				Hot/cold objects			
LPG etc				Welfare				Physical attack etc			
Fire/Explosion				Confined spaces		x		Vehicles			
Chainsaw				Hand Tools	x			Human Remains			
UXO	x							On/Near Water			

Emergency action/additional assessment required for remaining medium/high risk

See Site Specific Risk Assessments for Mobile Plant, Buried Services, Confined Spaces

Competent Person(s) appointed to take action:	**Report seen by (initials)**	
	PM GD	**Archaeologists**

MOLA Supervisor	**SA(s) TBC**	
	Client JC/RD	
	Contractor	
	Other	

6.2. MOLA Site Specific Risk Assessment – Mechanical Excavators

MOLA RISK ASSESSMENT		**MECHANICAL EXCAVATORS**			
Significant Hazards		**Assessment of Risk**			
		Insignif	**Low**	**Medium**	**High**
1	Shovel or load dropping inadvertently			●	
2	Overturning of machine		●		
3	Materials dropping from shovel or bucket			●	
4	Persons struck by machine			●	
5	Restriction of driver's vision.			●	
6	Hydraulic fluid spray		●		

ACTIONS ALREADY TAKEN TO REDUCE RISKS

Compliance with:

MOLA Health and Safety Policy Operational Procedures (September 2010)
Construction(Design and Management) Regulations 2007
Control of noise at Work regulations 2005
Control of Vibrations at Work Regulations 2005
British or European Standards including:
5228: Noise on construction sites.
6912: Safety in earthmoving machinery
6913: Operation & maintenance of earthmoving machinery

Planning:

MOLA Staff will not operate Mechanical excavators.
Choice of hire equipment and requirements assessed with regards to ground conditions and local operational requirements.
Choice of Excavators and driver/operator to be from sub-contractors competent to provide the machinery and service required.

Physical:

180 degree machines - When using the backhoe the front bucket must be lowered to the ground
360 degree machines - At least 600mm clearance to be allowed for tail swing.
No persons are allowed to stand or work within operating radius without the operator's permission. Loads must not be slewed over personnel, vehicle cabins or huts.
Overhangs are not to be created on high workfaces. Wheels/tracks are to be at 90 degrees to the workface.
Travel and operations on a gradient must be controlled to ensure machine stability.
A banksman is to be used where driver's vision is impaired or operating in congested areas.

Management:

Certification of drivers must be checked.
Drivers must be over 18 years old.
MOLA Staff must not operate mechanical excavators
All trenching and deep excavation work must be supervised to ensure the stability of machine and excavation, and that persons do not work within the swinging radius of a backhoe.
Vehicles must be checked by drivers before use and secured afterwards.
Management must ensure speed restrictions are enforced, and monitor use on sloping ground.
Noise levels are to be monitored and assessed as may be necessary.

Training:

Driver training to CITB/CSCS (or equivalent) standard is required; also to comply with BS 6264: Operator training for earthmoving machinery. Excavator driving by uncertificated operatives is not permitted; this also applies to our subcontractors and the self-employed.

MOLA SITE/TASK SPECIFIC RISK ASSESSMENT

For each site, location, and task the appropriate generic assessment should be reviewed to ensure that all significant hazards and their risks are identified and controlled. Completion of this Risk Assessment will ensure that your assessment is both appropriate and complete

Site/Location/Task:	**Site - VDP and NWP General Watching Brief (utilities diversions)**		
Frequency and Duration of Task:	**Daily, up to 6 mths**	**Number of Staff Involved:**	**Up to 3**

Specific Hazards Identified?
Persons struck by machine
Fall of material from bucket

Control Measures Required?

All mini excavators and similar plant to be operated and controlled by trained and CPCS certified Principal Contractors' operatives under the overall supervision of the J Murphy and Sons Site Manager or designated deputy
No MOLA staff to operate any plant
No MOLA staff to supervise or direct machine operations except for archaeological work as specified in the MS
Compliance with Principal Contractor's permit to work
Archaeological supervision to be by MOLA Supervisor only
No staff to stand/move within operating circle of active plant
All staff to attend induction and toolbox talks
All staff to wear required PPE
First Aider and First Aid Box present
Machine to operate within Principal Contractor's Method Statement and Risk Assessments

Assessment of Remaining Risks:	High	**Medium**	Low
Serious and Imminent Danger Identified:	Yes	**No**	

What Emergency Action Required?

MOLA Supervisor to report all accidents/incidents to Principal Contractor's Site Manager or specified deputy in his absence
Ensure all serious non-emergency casualties not treatable by first aid are accompanied to the nearest A&E at:

Full Accident and Emergency
Newham General Hospital
Glen Road
E13 8SL

Tel: 02074764000

Head west on Factory Road, take 1st right to stay on Factory Road. Turn left at north Woolwich Road, at roundabout take 3rd exit onto Connaught Bridge/A1020

At Royal Albert Way, take 2nd exit onto Victoria Dock Road/A112. Turn right at Prince Regent Lane/A112. Turn right at Glen Road

Emergencies: MOLA supervisor to 999 in absence of PC Site Manager or specified deputy.

Circumstances Requiring Additional Assessment?

Competent Persons Appointed to Take Action
Principal Contractor Site Manager: TBC
MOLA Site Supervisor: TBC

Circulation of Risk Assessment			
Employees and Volunteers	**x**		
Principal Contractor	**x**		
Client	**x**		
Sub Contractor			
Public/Visitors			
Other Occupier			
Risk Assessment Prepared by	**Signed: CJH**	**Name: Craig Halsey**	**Date: 28/4/11**

6.3. MOLA Site Specific Risk Assessment - Underground Services

MOLA RISK ASSESSMENT		**UNDERGROUND SERVICES**			
Significant Hazards		**Assessment of Risk**			
		Insignif	**Low**	**Medium**	**High**
1	Contact with electricity or gas supplies			●	
2	Contact with sewage			●	
3	Flooding from water services			●	
4	Explosion or asphyxia from gas leaks			●	
5					

Compliance with:
MOLA Health and Safety Policy Operational Procedures (September 2010)
Electricity at Work Regs.1989
Construction(Design and Management) Regulations 2007
DSEAR 2002
Regulatory Reform (Fire Safety) Order 2005
HSE Guidance Booklet HS(G)47 - Avoiding danger from underground services.
Highways Act 1980,
New Roads and Streetworks Act 1991
DoT ACOP - Safety at Street Works & Roadworks
Traffic Signs Manual, Chapter 8
National Joint Utilities Group publications :
No.3 - Cable locating devices
No.42 - Identification of small buried mains and services.

Planning:
All work to be planned in advance, taking account of the above.
Full details of underground services must be obtained in advance from the relevant authority, including Television Cable Companies, BT and other telephone companies, and private property owners.

Physical:
Plans and cable location equipment to be available before work starts. Plans must not be assumed to be accurate, and location devices to be used in addition. Trial holes to be dug, using hand digging to confirm locations, taking account of physical indications such as junction boxes and manholes. The lines of services to be marked, using paint, wooden pegs, etc. All services to be assumed to be live until proven otherwise.
Services crossing excavations to be supported.
Services in concrete to be isolated before breaking operations begin.

Management:
Site supervisors or the person in charge to ensure that services are located and marked before further work begins.
Full consultation to be held with relevant authorities to agree precautions to be carried out before work begins.
All personnel, machine operators and subcontractors to be fully briefed before they begin work.
All temporary services to be properly marked.

Training:
The person in charge must be trained in operation of cable locating equipment, and the requirements of HS(G)47.Personnel locating services must be similarly trained

MOLA SITE/TASK SPECIFIC RISK ASSESSMENT			
For each site, location, and task the appropriate generic assessment should be reviewed to ensure that all significant hazards and their risks are identified and controlled. Completion of this Risk Assessment will ensure that your assessment is both appropriate and complete			
Site/Location/Task:	**General/Targeted Watching Brief (utilities diversions)**		
Frequency and Duration of Task:	**Daily – up to 6 mths**	**Number of Staff Involved:**	**Up to 3**

Specific Hazards Identified?
Contact with existing services –during initial breaking out and/or machine clearance of trenches during archaeological monitoring, but also risk of encounter during any subsequent hand digging.
Electrocution
Explosion, fire
Sewage and Flooding
Asphyxiation

Control Measures Required?
Compliance with Principal Contractor's permits to work system.
Principal Contractor operative to check trench location with CAT scanner for live electrical services before commencement of breaking out operations and again before each new level of machining thereafter.
Discovery of buried service (live or otherwise) will be reported to the Principal Contractor's Manager immediately and work shall cease on the trench until the Principal Contractor Manager or designated deputy declares it safe to resume.
All staff to attend induction and toolbox talks
All staff to wear required PPE (including flame retardant overalls)
First Aider and First Aid box present

Assessment of Remaining Risks:	High	**Medium**	Low
Serious and Imminent Danger Identified:	Yes	**No**	

What Emergency Action Required?
MOLA supervisor to report all accidents/incidents to Principal Contractor's Manager of specified deputy in his absence
Ensure all serious none emergency casualties not treatable by first aid are accompanied to the nearest A&E:

Full Accident and Emergency:
Newham General Hoisptal
Glen Road
E13 8SL

Tel: 02074764000

Head west on Factory Road, take 1st right to stay on Factory Road. Turn left at north Woolwich Road, at roundabout take 3rd exit onto Connaught Bridge/A1020

At Royal Albert Way, take 2nd exit onto Victoria Dock Road/A112. Turn right at Prince Regent Lane/A112. Turn right at Glen Road
Emergencies: MOLA supervisor to call 999 in absence of PC Site Manager or specified deputy.

Circumstances Requiring Additional Assessment?			
Competent Persons Appointed to Take Action **Principal Contractor Manager** **MOLA Site Supervisor**			
Circulation of Risk Assessment			
Employees and Volunteers	**x**		
Principal Contractor	**x**		
Client	**x**		
Sub Contractor			
Public/Visitors			
Other Occupier			
Risk Assessment Prepared by	**Signed: CJH**	**Name: Craig Halsey**	**Date: 28/04/11**

6.4. MOLA Site Specific Risk Assessment - Confined Spaces

MOLA RISK ASSESSMENT		**CONFINED SPACES**			
Significant Hazards		**Assessment of Risk**			
		Insignif	**Low**	**Medium**	**High**
1	Toxic gases				●
2	Asphyxiation - lack of oxygen				●
3	Explosion				●
4	Fire				●
5	Excessive heat			●	
6	Drowning				●
7					

ACTIONS ALREADY TAKEN TO REDUCE RISKS

Compliance with:
MOLA Safety Policy, Confined Spaces Regulations 1997
Construction (Design and Management) Regulations 2007
HSE Guidance Note GS5 - Entry into confined spaces.
Local Authority/ client safety standards, e.g. on sewer entry.

Planning:
The confined space should be formally identified as such by a competent person. Note: what constitutes a confined space is open to interpretation and may vary from project to project. Eliminate need for entry where possible. Eliminate use of hazardous materials by selection of alternative methods of work or materials.
Assessment of: ventilation available and possible local exhaust ventilation requirements, potential presence of hazardous gases/atmosphere, process by-products, need for improved hygiene/welfare facility.

Physical:
Documented entry system must apply, preferably Permit to Work.
Adequate ventilation must be present or arranged.
Detection equipment must be present before entry to check on levels of oxygen and presence of toxic or explosive substances. The area must be tested before entry and continually during the presence of persons in the confined space.
Breathing apparatus or airlines must be provided if local ventilation is not possible. Where no breathing apparatus is assessed as being required, emergency BA and rescue harnesses must be provided.
Rescue equipment including lifting equipment, resuscitation facilities, safety lines and harnesses must be provided.
A communication system with those in the confined space must be established.
Air must not be sweetened with pure oxygen. Precautions for safe use of any plant or heavier-than-air gases in the confined space must be established before entry.
Necessary PPE and hygiene facilities must be provided for those entering sewers

Management:
The management role is to decide on the nature of the confined space and to put a safe system into operation, including checking the above. Flood potential and isolations must be checked.

Training:
Full training is required for all entering and managing confined spaces. Rescue surface party must be trained, including in first-aid and operation of testing and rescue equipment. All personnel must be certificated as trained, and supervisory staff trained to the same standard

MOLA SITE/TASK SPECIFIC RISK ASSESSMENT

For each site, location, and task the appropriate generic assessment should be reviewed to ensure that all significant hazards and their risks are identified and controlled. Completion of this Risk Assessment will ensure that your assessment is both appropriate and complete

Site/Location/Task:	**VDP and NWP General/Targeted Watching Brief (Utilities Diversions)**		
Frequency and Duration of Task:	**Daily, Up to 6 mths**	**Number of Staff Involved:**	**1-3**

Specific Hazards Identified?
Deeper areas of excavation may be designated a confined space, if sufficient depth is reached.
Access/egress
Evacuation of injured operative

Control Measures Required?

The Principal Contractor or appointed specialist sub-contractor is responsible for the formal identification, monitoring and control of Confined Spaces, and for provision of gas monitoring, rescue equipment, and other equipment or procedures required. The appointed Principal Contractor (or specialist sub-contractor) 'top man' will carry out an initial assessment of the confined space atmosphere and continually monitor at regular intervals, recording this as excavation progresses.

Access/egress point to be identified and kept clear at all times.

Only trained, certificated MOLA operatives to work in areas designated as confined spaces. During the General Watching Brief, shaft and heading excavations should not be entered by MOLA operatives without prior agreement with the Principal Contractor or their sub-contractor.

All personnel entering the excavation will be required to wear a harness and be trained in the use of escape sets. The number of personnel entering the excavation at any one time is to be kept to an absolute minimum, sufficient only to carry out the task in hand.

Permit to enter/permit to work system to be used.

Assessment of Remaining Risks:	High	**Medium**	Low	
Serious and Imminent Danger Identified:	Yes		**No**	

What Emergency Action Required?

MOLA Supervisor to report all accidents/incidents to J Murphy & Sons Site Manager or specified deputy in his absence
Ensure all serious non- emergency casualties not treatable by first aid are accompanied to the nearest A&E at:

Full Accident and Emergency:
Newham General Hospital
Glen Road
E13 8SL

Tel: 02074764000

Head west on Factory Road, take 1st right to stay on Factory Road. Turn left at north Woolwich Road, at roundabout take 3rd exit onto Connaught Bridge/A1020

At Royal Albert Way, take 2nd exit onto Victoria Dock Road/A112. Turn right at Prince Regent Lane/A112. Turn right at Glen Road
Emergencies: MOLA supervisor to call 999 in absence of PC Site Manager or specified deputy.

Circumstances Requiring Additional Assessment?

Air monitor indicates poor air quality/presence of gas
Accident within the confined space

Competent Persons Appointed to Take Action
Principal Contractor Site Manager: TBC
MOLA Supervisor: TBC

Circulation of Risk Assessment			
Employees and Volunteers	**X**		
Principal Contractor	**X**		
Client	**X**		
Sub Contractor			
Public/Visitors			
Other Occupier			
Risk Assessment Prepared by	**Signed: CJH**	**Name: Craig Halsey**	**Date: 28/04/11**

6.5. MOLA Site Specific Risk Assessment - Deep Excavations

MOLA RISK ASSESSMENT		**DEEP EXCAVATIONS (less than 4x4m)**			
Significant Hazards		**Assessment of Risk**			
		Insignif	**Low**	**Medium**	**High**
1	Collapse of sides			●	
2	Striking existing services				●
3	Persons falling in			●	
4	Plant, bucket, and materials falling in				●
5	Flooding			●	
6	hazardous atmosphere				●
7	contaminated soil				●

ACTIONS ALREADY TAKEN TO REDUCE RISKS

Compliance with:
MOLA Safety Policy, COSHH Regs 2002. Management of Health & Safety at Work Regulations 1999 Construction (Design and Management) Regulations 2007, Confined Spaces Regulations 1997 Standards including: 6031: Earthworks

Planning:
See Confined Spaces Risk Assessment. Project Managers to negotiate wherever possible that excavation shafts are wider than four metres. Where this is not possible ensure that spoil removal is by a beam hoist rather than a crane - smaller buckets should be used as these are more controllable. Electric hoists are preferred as they would reduce fume hazard.
Sufficient numbers of trained operatives and competent supervision must be available before work starts. Sufficient and suitable plant must be available for trench support before work starts. Suitable monitoring equipment and personnel trained in its use will be required where known exposure to toxic substances or lack of oxygen may occur. Location of existing services must be complete before work starts, also information obtained on ground conditions.

Physical:
Substantial barriers must be erected around excavation shafts greater than 2m deep.
Where poor ventilation is identified, the atmosphere must be continually monitored. Stop barriers must be used to prevent vehicle entry. Spoil and materials must be stacked at least 1.5m from the edge of excavation shafts. Ladders must be provided for safe access/egress and secured at all times. Suitable signs and barriers must be provided to warn of the work

Management:
Ensure safe system of work provided, taking account of prevailing conditions including weather, traffic and ensure all parts of structures placed over shafts for weather protection is secure.
Personnel working in deep shafts to stand well clear of the hoisting in a protected area when the bucket is hoisted and lowered into shaft. If this is not possible then personnel must leave the shaft before hoisting and NOT re-enter UNTIL after the bucket has been lowered into place.
Provide suitable PPE as required and ensure its correct use. Inspect excavations daily, and record thorough examination weekly in F91

Training:
Supervisors must have received training in general site safety, theory and practice of excavation work. Where necessary operatives must be instructed to leave excavation shaft before the bucket is hoisted and not to re-enter until bucket is lowered back into shaft (This applies to contractors as well as Company employees.)

MOLA SITE/TASK SPECIFIC RISK ASSESSMENT

For each site, location, and task the appropriate generic assessment should be reviewed to ensure that all significant hazards and their risks are identified and controlled. Completion of this Risk Assessment will ensure that your assessment is both appropriate and complete

Site/Location/Task:	**VDP and NWP General Watching Brief (Utilities Diversions)**		
Frequency and Duration of Task:	**Daily, up to 6 mths**	**Number of Staff Involved:**	**Up to 3**

Specific Hazards Identified?
Monitoring of deep excavations:
-Mechanical hoist bucket or contents striking person in trench
-Persons falling in
-Flooding
-Hazardous atmosphere

Control Measures Required?
Principal Contractor/appointed specialist sub-contractor to:
-provide shoring and safe trench access
-scan for services
-provide barriers around deep excavations
-measures from separate Confined Spaces risk assessment

During the General Watching Brief, MOLA staff only to enter excavations with prior agreement with the Principal Contractor or their sub-contractor

If work is being undertaken within the areas of deep excavation, MOLA staff to leave the shaft before hoisting of bucket takes place and not under normal operations re-enter until bucket is lowered back into position unless:

- suitable space or protection is afforded within the shaft so that staff will not be at risk should the bucket fall;
- a banksman or topman is constantly present to ensure that the bucket is not re-lowered or suspended over the trench while staff are working in the trench;
- there is clear agreement that the hoist or machine operating as a hoist will not be in operation for a specified time period at that location and will not in any case recommence operations without the agreement of the MOLA supervisor or suitable deputy.

Assessment of Remaining Risks:	High	**Medium**	Low
Serious and Imminent Danger Identified:	Yes	**No**	

What Emergency Action Required?
MOLA Supervisor to report all accidents/incidents to Principal Contractor's Site Manager or specified deputy in his absence
Ensure all serious non- emergency casualties not treatable by first aid are accompanied to the nearest A&E at:

Full Accident and Emergency:
Newham General Hospital
Glen Road
E13 8SL

Tel: 02074764000

Head west on Factory Road, take 1st right to stay on Factory Road. Turn left at north Woolwich Road, at roundabout take 3rd exit onto Connaught Bridge/A1020

At Royal Albert Way, take 2nd exit onto Victoria Dock Road/A112. Turn right at Prince Regent Lane/A112. Turn right at Glen Road
Emergencies: MOLA supervisor to call 999 in absence of PC Site Manager or specified deputy.

Circumstances Requiring Additional Assessment?

Competent Persons Appointed to Take Action
Principal Contractor Site Manager: TBC
MOLA Supervisor: TBC

Circulation of Risk Assessment			
Employees and Volunteers	**X**		
Principal Contractor	**X**		
Client	**X**		
Sub Contractor			
Public/Visitors			
Other Occupier			
Risk Assessment Prepared by	**Signed: CJH**	**Name: Craig Halsey**	**Date: 28/04/11**

6.6. Risk Assessment - Geoarchaeological investigation

Site –NWP			**Type of Work**		**Terrier Rig drilling**
	Persons Affected	**No**	**Classification**	**No**	
	Employees	1-2	Experienced	1-2	
	Other workers		Inexperienced		
	Public		Disabled		

Known and Suspected Hazards on site (tick as appropriate)					
Mobile Plant	✓	Power Auger		Ionising radiation	
Moving Machine Parts	✓	Access equipment		Lasers	
Moving objects	✓	Giant hogweed		Ultraviolet	
Falls from height		Contamination	✓	Temperature	
Falls on level	✓	Micro organisms		Noise	✓
Manual Handling	✓	Vermin/Weil's Disease	✓	Vibration	
Buried services	✓	Fumes/Gas		Weather	
Electrical		Lone working	✓	Hot/cold objects	
LPG etc		Welfare		Physical attack etc	
Fire/Explosion		Confined spaces		Vehicles	✓
Chainsaw		Hand Tools	✓	Human remains	

Control Measures Required

Compliance with H&S at Work Act 1974, Management of H&S at Work Act 1999, Construction (HSW) Regulations 1996, and MOL Archaeology H&S Policy 2009

To avoid mobile plant, moving object, vehicles and moving machine part hazards: Wear PPE (hi-visibility clothing, boots and hard hat) at all times. Only stand in designated safe areas, do not step out of marked safety zone.. Ensure Principal Contractor monitors reversing of all vehicles on site by use of a banksman. No access to trench will take place until a Safe Plan of Action has been developed, agreed and signed off by Principal Contractor.

To avoid falls on a level: Walk on designated walking routes and footways, avoid walking on uneven surfaces and in poorly lit areas. Report housekeeping deficiencies to the Principal Contractor immediately. Wear suitable safety footwear, boots with toe and mid-sole protection and adequate ankle support.

To avoid manual handling hazards: Use vehicles, plant, wheelbarrows to move samples and equipment across the site wherever possible.

To avoid buried services (during the terrier rig probing): Ensure the Principal Contractor has examined service drawings and undertake a CAT / Genny scan of the probe locations; dig starter pits.

To avoid diseases and skin irritation spread by rats, polluted watercourses and giant hogweed: Wear gloves, wash hands prior to eating or drinking or smoking. Cover open wounds and broken skin with waterproof plasters. Avoid dealing with contaminated material. Wash hands after handling contaminated material or clothing

Avoid contact with rats. Take antibacterial hand wipes to site. Wear latex gloves when examining soil.

To avoid noise (breaking / cutting concrete; terrier rig drilling) Ear defenders to be worn at all times when in the vicinity of noisy operations.

<u>Personnel Injuries preventive measures to be adopted during use of Terrier Rig</u>

- Full PPE will be worn at all times comprising shoes or boots, overalls, glasses or goggles, hard hats and PVC gloves. These will protect the operators from flying particles and exposure to contaminated materials.
- To prevent hand injury during changing of the rods, the lead operator will ensure that the drop hammer has been disengaged and the brake is on.
- Starter pits can be completed by hand digging prior to boring to clear underground services if necessary to a depth of 1.2m.
- When refuelling the engine spill kits and drip trays will be used.

Assessment of *Remaining* risk (Low, Medium, High)

	L	M	H		L	M	H		L	M	H
Mobile Plant	✓			Power Auger				Ionising radiation			
Machine Parts	✓			Access equipment				Lasers			
Moving objects	✓			Giant Hogweed				Ultraviolet			
Falls from height				Contamination	✓			Temperature			
Falls on level	✓			Micro organisms				Noise	✓		
Manual Handling	✓			Vermin/Weil's Disease	✓			Vibration			
Buried services	✓			Fumes/Gas				Weather			
Electrical				Lone working	✓			Hot/cold objects			
LPG etc				Welfare				Physical attack etc			
Fire/Explosion				Confined spaces				Vehicles	✓		
Chainsaw				Hand Tools	✓			Human remains			

What Emergency Action Required?
MOLA Geoarchaeologist/Senior Archaeologist to report all accidents/incidents to the Principal Contractors Site Manager or specified deputy in his absence
Ensure all serious none emergency casualties not treatable by First Aid are accompanied to the nearest A & E:

Full Accident and Emergency:
Newham General Hospital
Glen Road
E13 8SL

Tel: 02074764000

Circumstances Requiring Additional Assessment?

Competent Persons Appointed to Take Action
Principal Contractor Site Manager: TBC
MOLA Supervisor: TBC

Circulation of Risk Assessment			
Employees and Volunteers	**x**		
Principal Contractor	**x**		
Client	**x**		
Sub Contractor			
Public/Visitors			
Other Occupier			
Risk Assessment Prepared by	**Signed: CJH**	**Name: Craig Halsey**	**Date: 21/06/11**

7. Health and Safety Control Measures

7.1. 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.

7.2. Services and Ground Hazards

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

8. Safety of Excavations

8.1. Entering the Trench during General Watching Briefs

- MOLA Staff will not enter the trench if it is declared unsafe by the Principal Contractor.

8.2. Confined Spaces

- Some of the deeper excavations (i.e. Sewer and Gas diversions) may be designated confined spaces if sufficient depth is reached. All MOLA staff working in such designated areas will be trained to work in Confined Spaces. See Appendix, section 6.7.
- The Principal Contractor or appointed specialist sub-contractor is responsible for monitoring and control of Confined Spaces, and for provision of gas monitoring, rescue equipment, and other equipment or procedures required. The appointed PC/sub-contractor 'top man' will carry out an initial assessment of the confined space atmosphere and continually monitor at regular intervals, recording this as excavation progresses. All personnel will be trained in confined space working and deemed to be competent.
- All personnel entering the excavation will be required to wear a harness and be trained in the use of escape sets. The number of personnel entering the excavation at any one time

is to be kept to an absolute minimum, sufficient only to carry out the task in hand.

- Given the proposed dimensions of the combined utilities trench, designation may change as excavation progresses. This will be kept under constant review.

8.3. Machine Excavation

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

8.4. Lone Working (watching briefs)

- 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, and 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.

8.5. Contamination

- Contaminated land may be encountered on the site. The results of ground investigations are currently being assessed by independent consultants. The results will determine working methods and PPE requirements. All MOLA staff shall comply with the site regulations regarding contaminated land.

8.6. Ordnance

- In the event of MOLA not having been issued with an Ordnance Report from the Principal Contractor all MOLA Staff shall comply with the PC's rules. If Ordnance is unexpectedly found the MOLA Supervisor shall inform the PC immediately and withdraw to a safe place outside the area designated by the PC.

8.7. 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).

9. Planning and Resources

9.1. Principal Contractor's Supply of Attendances

The site specific requirements for services, facilities and attendances to be provided by the Principal Contractor, to enable MOLA to undertake the defined archaeological works are set out below. Those items in **bold will be required** for this site – others may be required, depending on site conditions, which will be reviewed on site by the MOLA Supervisor in conjunction with the Principal Contractor's nominated Site Manager:

- ***general site security*** including hoardings, gateway, warning notices, etc; to create a secure site perimeter, sufficient to prevent unauthorised access. If the Principal Contractor has retained security guards, it is recommended that the archaeological investigation areas be added to their schedule for regular patrols, particularly out of hours.
- ***specific site security****:* it may be necessary to separately secure individual archaeological trenches via a physical barrier (such as Heras fencing) eg if there are public areas nearby or human remains are encountered.
- ***providing safe access*** to the site and the specified archaeological investigation areas via separately identified pedestrian routes, signing, safety guard-rails, secure ladders etc. This includes segregating these areas from any vehicles and plant operating nearby eg via a robust physical barrier.
- ***adequate ventilation*** and protection from noise, fumes and dust where plant is in use, especially within standing buildings
- ***managerial services*** – nominated points of contact for Principal Contractor and other key members of development team.
- ***technical advice*** to be available if required (eg via client or Principal Contractor's consulting engineer) ré protection of adjacent streets and buildings, removal of obstructions, depth of excavation, live services etc.
- ***site accommodation and welfare facilities with electricity and water.*** To include, at the North Woolwich Portal worksite furnished main base cabin as work space; separate male/female changing areas, toilets and washing facilities; plus additional steel cabin for secure storage of MOLA PPE, equipment, camera and paperwork and finds. For the basic monitoring component of a small watching brief, these facilities would normally be shared with the Principal Contractor's site establishment and separate work space is not normally required. For the general watching brief on utilities, shared desk space and lockable storage (eg small cabinet) for site paperwork will be required.
- *site preparation and clearance*. Removal of structures, vegetation, rubbish, spoil heaps, demolition materials, slab, modern obstructions, infill, made ground, etc. as required, prior to and during the archaeological investigation. The majority will be mechanical excavator, under archaeological

supervision, but occasional hand work by labourers may be needed (eg clearing individual obstructions or removing spoil from investigation areas if the machine cannot re-enter).

- transport/mounding/storage of spoil from archaeological investigation areas. This includes removal from site, if necessary.
- filling back and reinstatement upon completion (trenches are normally backfilled, for safety reasons, unless there are client instructions to the contrary).
- supply of plant and equipment; principally a mechanical excavator of appropriate size; supplied with driver, breaker, toothed digging bucket and toothless ditching blade. Other plant such as dumpers, compressor/breakers, hoist and pumps may also be needed.
- accreditation and supervision of operatives, plant and equipment, including supply of sufficient qualified banksmen/supervisors to control plant movements and adequate certification for plant and operatives.
- *temporary support:* design, installation and maintenance of appropriate temporary support to excavations, where deeper than *c* 1.2 m (or as required in unstable ground). This will be via benching/battering back and/or shoring, depending on depth and ground conditions.
- other safety measures in deep excavations*:* monitoring of air quality and provision of rescue facilities and equipment in any areas defined by the Principal Contractor as a confined space. Where hoists are used in shored shafts less than 4metres x 4metres area, MOLA staff shall leave the shaft before hoisting of bucket takes place and not under normal operations re-enter until bucket is lowered back into position: Unless:

- a banksman or topman is constantly present to ensure that the bucket is not re-lowered or suspended over the trench while staff are working in the trench;
- there is clear agreement that the hoist or machine operating as a hoist will not be in operation for a specified time period at that location and will not in any case recommence operations without the agreement of the MOLA supervisor or suitable deputy.
- Where mechanical or electrical hoists are in use in larger excavation trenches, the area in which the hoist is in use must be clearly demarcated and no staff will enter this area while the hoist is being raised or lowered or in the interval between these operations except under the circumstance specified above.

- pumping-out: a suitable method to keep the trenches dry, eg pumping into a previously investigated trench, to create a sump.
- temporary roofing (not required) to archaeological excavations (eg clear plastic sheets on scaffolding frame).

Needs to have adequate water drainage and ventilation. Local, portable frames would only be required if significant remains are present. There is no need for routine roofing of all excavation areas.

- *110v. site lighting and power supply* for access routes to excavations, plus individual task lighting within trenches (eg tripod-mounted spotlights) if required. The need for lighting depends on the depth, season and weather conditions or on ambient light level if working inside a standing building
- ***locating and making safe any live services or hazardous substances* (above or below ground)**: preliminary services searches should be carried out by the Principal Contractor via the statutory undertakers etc, plus on-site inspection and testing where required. Where there is reason to believe from previous uses that the ground or adjacent buildings may be contaminated the Principal Contractor should make arrangements for advance inspection, sampling, testing and where necessary specialist remediation. The results of such surveys should be forwarded to MOLA *prior to commencement on site*. Any identified hazards will be addressed in the health and safety planning. Any unexpected hazards encountered during the investigations will also need to be made safe by the Principal Contractor before archaeological fieldwork may continue. In the event of the accidental disruption of a live service by archaeologists or sub-contractors under archaeological supervision the MOLA supervisor will inform both their project manager and the Principal Contractor and, when appropriate, call the relevant emergency number.
- ***development of a safe method of working***: archaeologists will not be able to work within excavations whilst attendances (such as installing temporary support or removing spoil) are taking place, and when demolition, construction or heavy plant activity occurs adjacent or overhead.
- ***First Aid:*** provision of First Aid facilities, and an emergency plan. On evaluations or watching briefs with small numbers of staff, MOLA may not be able to supply a first aider. In that case, the services of the Principal Contractor's qualified first aider(s) may be required.

9.2. Equipment

Equipment will be supplied by the MOLA equipment central store:

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

9.3. PPE

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

Safety Helmets (EN397)
Ear Defenders (EN 352-3)
Safety spectacles (EN166)
Dust masks plain and valved (EN149 2001)
Hi-visibility vests (EN471)
Gloves Nitrile and latex disposable, PVC, EN374
Safety footwear - steel toecap and mid-sole boots and Wellingtons EN345-47 (No riggers are allowed)
Flame retardant overalls

9.4. Staff

The timing and overall duration of the evaluation and the various watching brief/evaluation tasks listed earlier will be determined by the contractor's programme and the nature and extent of any surviving remains. It is envisaged that General Watching Briefs will be initially carried out by one MOLA Supervisor, with a second archaeologist coming in to assist with any recording work if required. Other archaeological specialists may be called in if necessary.

10. Briefing Arrangements

10.1. 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 Contracts Manager/Assistant Contracts 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.

10.2. 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, e.g. those with more than 2-3 staff and of a week or longer duration, regular toolbox talks will be given by the MOLA Senior Archaeologist 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.

11. First Aid

11.1. Trained First-Aid Personnel

During the evaluation there will be at least one MOLA staff, who is a qualified First Aider (i.e. 3 day F.A. at work course) present on site.

11.2. 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:

- Accident Book compliant with the Data Protection Regulations.
- MOLA Public Liability Insurance & Employers Liability Insurance for display
- 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.

11.3. First Aid Equipment

A MOLA First Aid kit, of an appropriate size for the site, will be located in the site office/mess hut/canteen or in the case of a small watching brief a 'bum bag' will be carried by the MOLA Supervisor at all times.

12. Accident, Incident, Near Miss and Environmental Incident Reporting

12.1. 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 notifiable accidents will be reported immediately by the MOLA site supervisor as specified in Section 19.5 (main document).

12.2. 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 Section 9 (main document):

- Principal Contractor's Site Manager
- MOLA supervisor
- MOLA H & S officer
- MOLA Senior/Contracts Manager
- Crossrail Project Archaeologist
- Crossrail Helpdesk.
- Crossrail HS Manager

The site accident book for both the Principal Contractor and MOLA should be filled in giving details of the incident.

12.3. Investigation of Accidents and Dangerous Occurrences

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

MOLA will also initiate internal procedures as follows:

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

12.4. Key MOLA Project Personnel

- George Dennis, Senior Contracts Manager, MOLA
- David Divers, Contracts Manager, MOLA
- Louise Davies, Assistant Contracts Manager, MOLA
- Craig Halsey, Fieldwork Director, MOLA

13. Emergency Procedures – Site General

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

14. Emergency Services Contact Details

The Principal Contractor will confirm the hospital location:

Full Accident and Emergency:
Newham General Hospital
Glen Road
E13 8SL

Tel: 02074764000

Head west on Factory Road, take 1st right to stay on Factory Road. Turn left at north Woolwich Road, at roundabout take 3rd exit onto Connaught Bridge/A1020

At Royal Albert Way, take 2nd exit onto Victoria Dock Road/A112. Turn right at Prince Regent Lane/A112. Turn right at Glen Road.

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.

15. Route to Hospital

The Principal Contractor will advise on route to hospital at their site specific induction. The location and directions will also be displayed in the site offices and canteen.

25 Appendix 2: Principal Contractor approval

From: Dalton, Michael [mailto:michaeldalton@murphygroup.co.uk]
Sent: 08 July 2011 14:44
To: Halsey, Craig
Cc: Carroll, Joe
Subject: Method statement for the VDP and NWP works

Craig,

I can confirm JMS approval for the works to be carried out on VDP and NWP as stated in the MOLA method statement.

Please ensure your site representative is in possession of a signed copy.

Regards,

Michael Dalton
Project Health and Safety manager.
Murphy Pipelines . Process. Utilities.
North Woolwich & Victoria Dock Utility Diversion Works.
mob:07841 727158

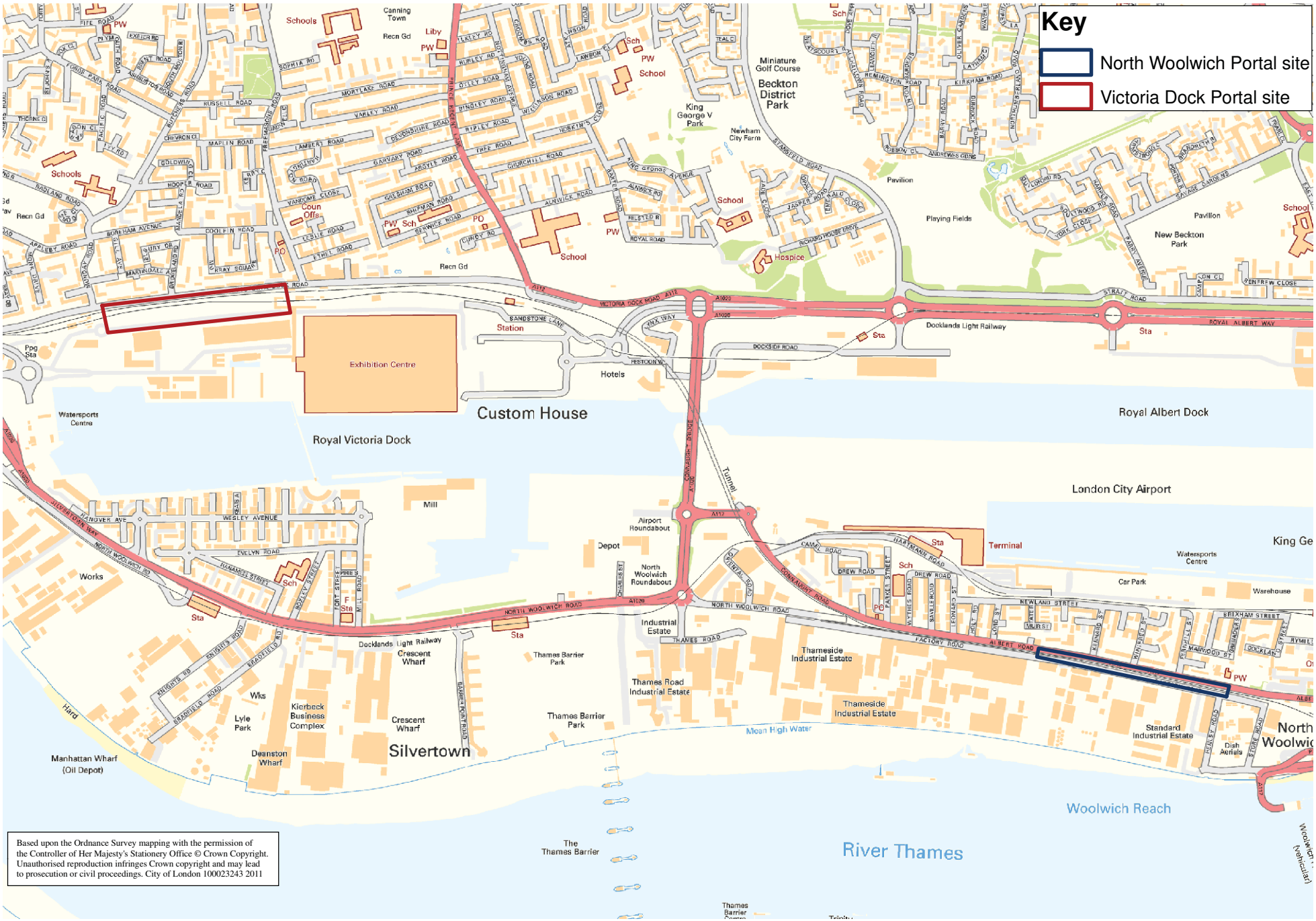


Fig 1: Site locations

Safety, Health and Environmental Information

Notes below are additional to hazards/risks normally associated with this type of work:

Construction:

Ci. Use of construction plant and equipment on highway and public areas.

Cii. Known/Unknown existing utilities causing gas leaks/flooding from water services/electrocution.

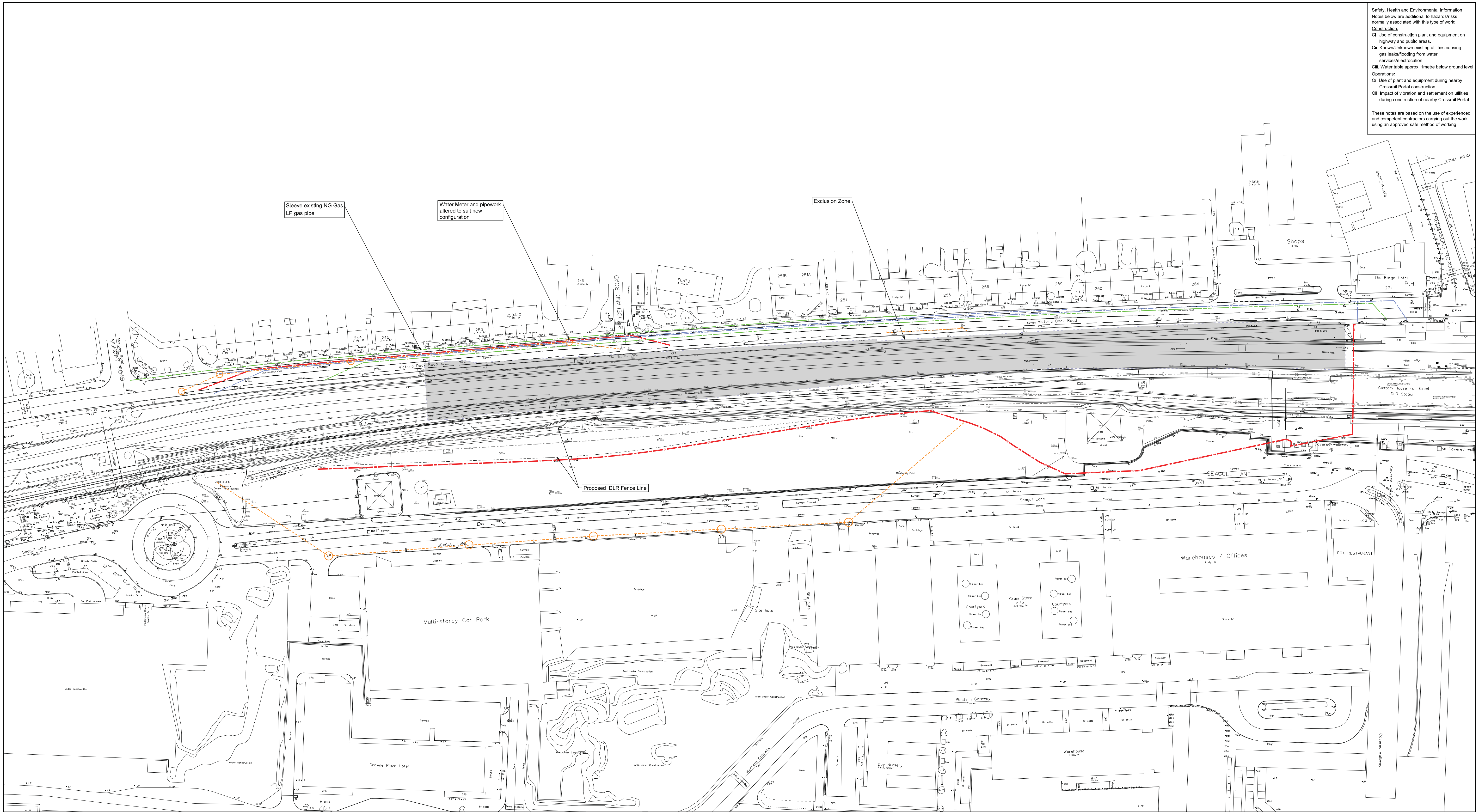
Ciii. Water table approx. 1metre below ground level

Operations:

Oi. Use of plant and equipment during nearby Crossrail Portal construction.

Oii. Impact of vibration and settlement on utilities during construction of nearby Crossrail Portal.

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



Plan	Utility
EDF	EDF - Proposed Diversion Route
G	National Grid Gas - Proposed Diversion Route
TW	Thames Water - Proposed Diversion Route
FW	Foul Water Drainage - Proposed Diversion Route
(orange circle)	Foul Water New Chamber

Exclusion Zone

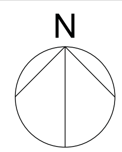
DLR Track Centreline

MOLA Method Statement: Fig 2: Victoria Dock Portal

Rev.	Date	Description	By	Chkd	App	Auth
P01.1		C - 15/1/2010	KB			
P02	21/05/2010	REVISED ABANDONED ROUTES	JM	HC	-	
P03	25/05/2010	REVISED DIVERSION ROUTES	JM	HC	CS	

Notes

1. Confirmation of all survey data must be obtained from the Crossrail survey team.
2. Coordinates to the London Survey Grid. All levels to Ordnance Datum Newlyn. See Crossrail standard CR-STD-010.
3. All dimensions are in metres unless specified otherwise.



Crossrail Limited
25 Canada Square
Canary Wharf
London
E14 5LQ

www.crossrail.co.uk

Contract : Crossrail Line 1 Programme

Originator : Crossrail Engineering

Location : Victoria Dock Portal

Title : VICTORIA DOCK PORTAL
ENABLING WORKS - UTILITIES
COMBINED PROPOSED UTILITY DIVERSIONS

By : J.MIKOLAJCZYK

Chk : H.CASEY

App :

Auth : C.STAPLES

Scale : 1:500@ A0

Drawing and CAD file No : CRL1-XRL-U-DDA-CR144_PT003-00001

Rev : P03

Suitability : S4

Fit for authorisation

RESTRICTED

Safety, Health and Environmental Information

Notes below are additional to hazards/risks normally associated with this type of work;

Construction:

CI. Use of construction plant and equipment on highway and public areas.

CIi. Known/Unknown existing utilities causing gas leaks/flooding from water services/electrocution.

CIii. Water table approximately 1m below ground level.

Operations:

OI. Use of plant and equipment during nearby Crossrail Portal construction.

OIi. Impact of vibration and settlement on utilities during construction of nearby Crossrail Portal.

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

Plan	Utility
EDF	EDF - Proposed Diversion Route
BT	BT - Proposed Diversion Route
TWC	Virgin Media - Proposed Diversion Route
T	Interoute - Proposed Diversion Route
G	National Grid Gas - Proposed Diversion Route
TW	Thames Water - Proposed Diversion Route
CS	Combined Water Drainage - Proposed Diversion Route

Exclusion Zone

New Chamber

Combined Utilities Trench Outline

MOLA Method Statement: Fig 3: North Woolwich Portal

Rev.	Date	Description	By	Chkd	App	Auth
P01.1		C – 26/1/2010	KB			
P03	03/06/2010	REVISED DIVERSION ROUTES	JM	HC	CS	
P04	04/06/2010	MINOR CHANGES	JM	HC	CS	
P05	16/09/2010	TWUL comments added	HC	GS	CS	

10m 0 10m 20m 30m 40m 50m

N

Crossrail Limited
25 Canada Square
Canary Wharf
London
E14 5LQ
© Crossrail
www.crossrail.co.uk

Contract: Crossrail Line 1 Programme

Originator: Crossrail Engineering

Location: North Woolwich Portal

Title: North Woolwich Portal
Enabling Works - Utility Diversions
Combined Proposed Utility Diversions

By: H.CASEY
Chk: G.SAGE
App: C.STAPLES
Auth:

Scale: 1:500 @ A0

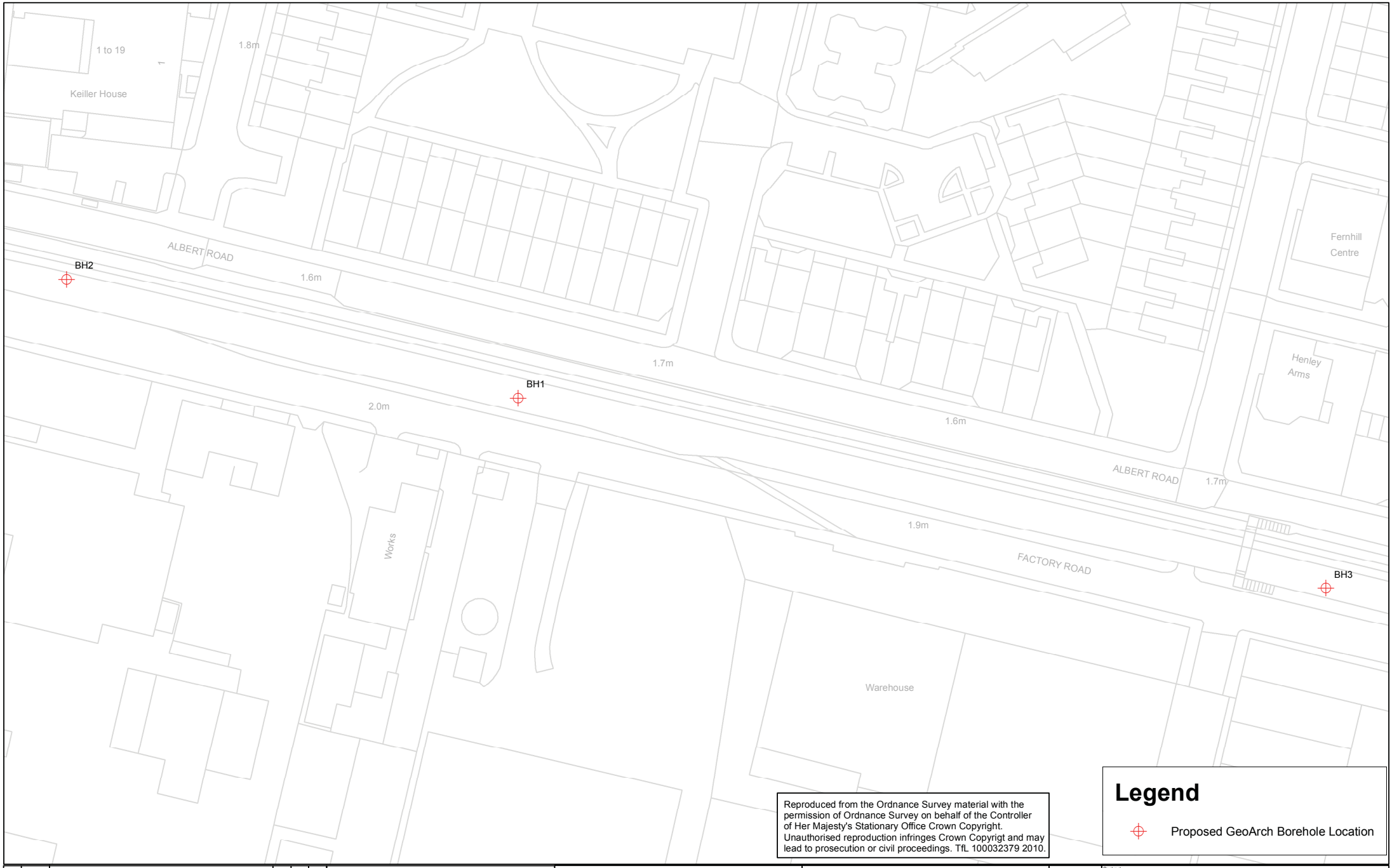
Drawing and CAD file No: CRL1-XRL-U-DDA-CR146_PT004-00006

Rev: P05

Submitt'g: S4

RESTRICTED

Fit for authorisation



Legend

Proposed GeoArch Borehole Location

Rev	Date	Description	By	Chkd	App

Notes

DRAFT FOR REVIEW ONLY

10 5 0 10 20 Meters

Crossrail Limited
25 Canada Square
Canary Wharf
London
E14 5LQ

www.crossrail.co.uk

Contract: Bored Tunnels (Alignment and Track)

Originator: Ove Arup & Partners Limited

Location: Crossrail General

Title: Geoarchaeological borehole locations

By: XXXXX

Chk: XXXXX

App: XXXXX

Scale: 1:0 @ A3

Sketch No: C122-OVE-XX-XSK-XXXX-XXXXX

Rev: XXX

Suitability: XXX