



C263 ARCHAEOLOGY LATE EAST

Method Statement: Geoarchaeological sampling at the Plumstead Depot

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

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

This document has been reviewed by Balfour Beatty in the capacity of Principal Contractor for coordination, compliance, integration, and acceptance as a safe system of work, output, control, sequence. This document is acceptable for transmittal to Crossrail for no objection to the works being executed as described.

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Date: 26-3-14

2b. Review by Stakeholder (if required):

Stakeholder Organisation	Job Title	Name	Signature	Date	Acceptance
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Note for Readers

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

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1 Introduction

The archaeological monitoring of ground investigations is required in advance of the proposed development of Crossrail sidings adjacent to the Plumstead Portal site in an area known as Tilfen Land. The scope of works includes undertaking 3 geoarchaeological boreholes. The requirements are set out in a Crossrail Site-specific Archaeological Written Scheme of Investigation (SS-WSI – *Addendum for Geoarchaeological Borehole Investigation at the Plumstead Depot Site*, February 2014, Document No C298-XRL-T1-TGN-CRG07-50001-V1.0. Details of the archaeological work at Plumstead depot and H&S risk assessments specific to this task are detailed in Appendix 3 of this document.

The tasks covered by this method statement are:

Task	Principal Contractor	Provisional Programme)
Geoarchaeological borehole SAMPLING (3 terrier rig boreholes)	Balfour Beatty (C298)	31st March – 1st April 2014

Table 1 Task information

This Method Statement has been developed in conjunction with the Principal Contractors currently appointed (Balfour Beatty, C298), who will be responsible for ensuring that the archaeological works may be carried out as specified. The purpose of the boreholes is to recover sleeved samples of deposits in the presumed two channel routes highlighted in the Plumstead Portal and Plumstead Depot deposit model (Crossrail 2013, Doc. No. C263-MLA-X-RGN-CRG07-50001 rev. 3.0)

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 7).

1.1 Site Description

The Plumstead site lies within the London Borough (LB) of Greenwich. The area of the portal works is comprised of two construction compounds to the north of the existing North Kent Line (NKL). To the west of White Hart Road lies the 'West Worksite', also known as the Plumstead/Old Goods Yard worksite, and to the east lies the 'East Worksite'. The Depot site falls within the 'West Worksite', situated between White Hart Road and Ridgeway. The depot site centres approximately on National Grid Reference (NGR) 545276 178949.

1.2 Geological and Topographical setting

The site is situated on the southern fringes of the Holocene alluvial floodplain of the Thames. Just to the south of the site, outcrops of the Tertiary Woolwich and Reading beds form an area of higher ground. The site therefore lies in what could be considered an ecotonal position between the high and dry ground towards the south, and the wetland landscape towards the north.

The alluvial deposit sequence across the site was characterised in a previous geoarchaeological deposit model (document no. C263-MLA-X-RGN-CRG07-5001), utilising geotechnical data gathered from ground investigate works. Within the study area three Landscape Zones (LZ's) were identified, two of which (LZ2 and 3) fall within footprint of the depot. The characteristics of these zones are summarised below.

LZ2

An area of prehistoric peats and wetland deposits that cover the western and far eastern end of the portal footprint. Across this zone the surface of the basal floodplain gravels lies at c 98–99m ATD. The eastern zone identified in the portal extends northwards on to the east side of the depot site. These gravels belong to the Shepperton Gravel formation and were deposited within a cold climate braided river regime between 18 000 to 15 000 years ago. These gravels mark the base line for deposits of archaeological interest.

The gravels are overlain by thin beds of fine sand and silts, that represent fluvial deposition within a multiple threaded freshwater channel system during the Late Glacial/Early Holocene period, approximately 15 000 to 10 000 years ago. Following climate amelioration, channel stabilisation and down cutting, terrestrial soils may have formed across the surface of these sand and gravels. By the Neolithic period, c 6000 years ago, the effects of relative sea level rise resulted in a rise in river levels and the ground waterlogging of these terrestrial landsurfaces. This gave rise to peat formation that continued in to the Bronze Age period c 4000 years ago. Previous palaeoenvironmental work carried out in the area on these peat deposits demonstrates that the peat formed within semi terrestrial alder carr wet woodland.

By the Iron Age the upstream migration of the tidal head, and the onset of fully estuarine conditions, resulted in a switch from biogenic peat formation, to minerogenic sedimentation. The peats are therefore found to be sealed by clays and silts deposited within intertidal salt marsh and mudflat conditions. This tidal inundation continued into the medieval period, gradually raising and levelling off the undulating topography of the floodplain surface. The upper part of the alluvial sequence displays evidence of soil formation indicative of seasonally inundated accretionary floodplain soils. The entire Holocene sequence measures up to 3m in thickness.

LZ3

This zone falls across the central section and the majority of the eastern end of the portal footprint. It crossed the western side of the depot site, with a possible

secondary channel identified to the north. It is not known how far south this possible secondary channel extends, and it is possible that it might cross the east end of the depot site. It characterises a major palaeoenvironmental feature orientated on a north south alignment. Across the zone the surface of the floodplain gravels occurs at c 96.5m ATD, and indicates a phase of possible channel incision into the relict gravel surface.

The gravels are overlain by a complex and variable set of channel fills that consist of sands, silts, organic deposits and thin peat lenses. The sand and silts represent fluvial deposition within active parts of the channel belt, while the organics and peats formed during episodes of channel cut off and abandonment, or in channel marginal areas colonised by aquatic vegetation. Overall the full depth of the channel fills measure up to c 3m in thickness.

Just to the south of the site a channel known as the Great Breach Dyke flows northwards off the high ground before turning to a north easterly direction to form a tributary of the River Thames. It is possible that the palaeochannel feature may represent a former course of this channel. Interestingly, recent excavations to the north of the site on Belmarsh prison also identified a similar channel in terms of depth, level and complexity, also running on a north to south alignment. Despite the uncertainty of the association of these two features with the palaeochannel within LZ3, the palaeochannel probably formed a dominant feature of the landscape from the Early Holocene through to the later prehistoric periods.

The channel sediments are sealed by thick peat deposits overlain by minerogenic clays and silts. These peats and minerogenic deposits are probably associated with the alder carr peats and intertidal muds and salt marsh deposits that accumulated within LZ2. The channel fills and overlying floodplain deposits form a sequence that measures up to 5m in thickness.

1.3 Archaeological and Historic Background

1.3.1 Prehistoric Period (c 500 000 BP to 50AD)

During the Mesolithic period dry land surfaces suitable for occupation may have developed across the surface of the Late Pleistocene sands and gravels within LZ2. Previous excavations in the Woolwich area have found evidence of Mesolithic activity in the form of a few flint tools but the evidence is generally sparse. Evidence of Mesolithic activity is likely to take the form of ephemeral scatters of lithics and animal bone representing a range of subsistence activities associated with make shift hunter gatherer campsites.

From the Neolithic to Bronze Age periods the increase in river levels resulted in the formation of a thick peat unit indicative of alder carr floodplain woodland. This landscape would have been unsuitable for any form of permanent settlement, although these wetland landscapes would have provided an important subsistence resource. Activity from the Neolithic to Bronze Age periods is therefore likely to consist of timber structures constructed to traverse access and exploit this wetland landscape. Evidence of jetties wharfs and platforms may also occur on the margins of channel features within LZ3. Recent excavations a few hundred metres to the north of the site on Belmarsh prison did uncover the remains of a Neolithic timber trackway. This structure is the earliest timber track way to be found within the Thames floodplain.

1.3.2 Roman (AAD 50 to 450)

Throughout the majority of the Roman period the area was dominated by estuarine environments leading to the deposition of fine muds and silts within saltmarsh and intertidal mudflats. The landscape would have been unsuitable for any form of occupation. However, limited evidence may exist of attempts to reclaim and manage parts of this estuarine landscape.

1.3.3 Medieval Period (AD 450 to 1540)

Medieval features associated with land reclamation and agricultural activity may occur within the upper alluvium. This evidence may take the form of drainage ditches, embankments and field systems, The Saxon and medieval village of Plumstead is known to have existed approximately 400m to the south of the site.

1.3.4 Post–Medieval (AD1540 to 1900)

Until the 19th century the area remained as open rural land. In 1849 the construction of the NKL significantly changed the characteristics of the landscape. Features associated with this rail line may occur within the made ground deposits as well as the industrial / railway related buildings and structures which also exist above ground along with structures thought to be from World War II.

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

MOLA has liaised with the appointed Principal Contractors (Balfour Beatty C298) 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.

2.4 Interface with Project Archaeologist

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

2.5 Interface with External consultees

The project archaeologist shall liaise with the GLAAS (Greater London Archaeology Advisory Service) Archaeological Advisor for the LB of Greenwich to inform them of the archaeological works.

3 Scope of Works

3.1 Planned Fieldwork Events

This Method Statement sets out the methodology and health and safety requirements for the sampling of 3 geoarchaeological boreholes on the Plumstead Depot site. The mitigation strategy for the site will be preservation by record.

The scope of the geoarchaeological works will be undertaken in two stages. The first stage will comprise the drilling of 3No. Cable Percussion (BH) as set out in Table 1 below and shown on Drawing No. CRL1-XRL-U-DDA-CR148_PT005-00003.

The second stage of the geoarchaeological works will comprise the review and collation of the results from the geoarchaeological samples to produce a fieldwork report. The results of the samples will be included in the assessment for the post-excavation programme for the C263 project.

Borehole No.	CRL Grid Co-ordinate	Type	Approximate depth (below Existing Ground Level)	Existing Ground Surface
BH 7	97071.96E 33383.03N	Windowless Sample	c. 4.50-5.50m BGL (to c. 97.00m ATD)	Rough Ground; Vegetation, spoil backfill
BH 8	96108.73E 33416.98N	Windowless Sample	c. 5.50-6.80m BGL (to c. 97.00m ATD)	Rough Ground; Vegetation, spoil backfill
BH 9	96192.11E 33569.95N	Windowless Sample	c. 6.50-8.00m BGL (to c. 96.500- 97.00m ATD)	Rough Ground; Vegetation, spoil backfill

Table 1 Boreholes and Window Samples requiring Geoarchaeological Monitoring

3.2 Confirmation of Methods and Standards

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

- Crossrail Environmental Minimum Requirements (Crossrail 2008)
- Crossrail Archaeology Generic Written Scheme of Investigation (draft July 2009)
- SS-WSI – *C156 Plumstead Portal*, Crossrail, December 2010, Document No C156-CSY-T-RGN-CR148_PT005-00028
- Crossrail Archaeology Specification for Evaluation & Mitigation (including Watching Brief) (CR-PN-LWS-EN-SP-00001)

- Crossrail Code of Construction Practice
- 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
- 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
- SS-WSI – Addendum for Geoarchaeological Borehole Investigation at the Plumstead Depot Site, February 2014, Document No C298-XRL-T1-TGN-CRG07-50001-V1.0

3.3 Aims and Objectives

The overall objectives of the geoarchaeological sampling is to assess the geoarchaeological potential of the site. The results of the investigation will be combined with previous work with the proposed C263 post-excavation programme.

The following site-specific research aims can be outlined for the proposed investigations at the Plumstead portal site:

- to confirm whether the deep low lying gravel feature identified by Fugro Borehole WS454 is channel meander or secondary course of the main Great Breach Dyke channel;
- to confirm whether the two deeper low lying gravel features identified between Fugro Boreholes WS458 and WS152 represent a channel meander or secondary course of the main Great Breach Dyke channel; and
- to recover samples from the two channel routes highlighted by the Plumstead Portal and Plumstead Depot deposit model (Crossrail 2013, Doc. No. C263-MLA-X-RGN-CRG07-50001 Rev. 3.0) in order to investigate their chronological, landscape and palaeoenvironmental setting in comparison with each other and that of the Plumstead Portal site.

3.4 Event Codes

A unique site code for the works is **XSW 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.

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.

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 (Michael Smith, BA) and Project Manager (Elaine Eastbury, BSc) via site visits, as and when required, in order to provide advice and support to the MOLA Supervisor. MOLA H & S Compliance Manager may also monitor the site, see 10.4.

The results of the H & S managers 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

The geoarchaeological monitoring will be supervised by a member of the MOLA Geoarchaeologist team (Grade 8). Other archaeological specialists (Grade 8, as above) may be called in if necessary.

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

The named Supervisor will be confirmed to Crossrail and the Principal Contractor in advance, once the firm start date has been notified to MOLA.

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

4.6 Programme

Geoarchaeological sampling of boreholes

- The site investigation is currently programmed to commence on 31st March 2014 with the full duration and detailed programme still to be confirmed.
- It is currently anticipated that the C263 geoarchaeologist will be required for 2 days during the site investigation works.

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 the fieldwork, MOLA will supply timesheets included in the weekly progress reports to Crossrail.

4.9 Access

Access to work areas and site compounds *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 to 3 people for the investigation.

5 Geoarchaeological borehole sampling

Three geoarchaeological boreholes will be drilled across the site by a sub-contracted drilling crew, supervised by a MOLA geoarchaeologist, through the Holocene sequence down to the surface of the Pleistocene river gravels (c 8m max. depth). The location of the boreholes will be set out by C298 surveyors, related to the London Survey Grid and the ground level adjacent to the boreholes tied into Tunnel Datum (m ATD). The boreholes will be set out to co-ordinates set out in Table 2 and illustrated in Fig 2.



Fig 1 Location of the Plumstead Siding Site (Image © 2012 Bluesky Digital Globe and © 2012 Google)

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. Because of the potential high levels of heavy metals and elevated levels of asbestos in the made ground (where possible) only the cores below the made ground will be slit open and the sequence of alluvial sediments recovered in each borehole be described on site, with the nature 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.

Up to c 2 sequences will be selected to be retained for further analysis off-site, if and when required (potentially at the post-excavation stages). They will be selected on the basis of length of sequence, representation of the overall site sequence(s), type of deposits present, and suitability of deposits for later analysis (if required). This further analysis will form part of the mitigation for the portal, and would be conducted as part of the post-excavation assessment process.

During drilling UXO testing may need to be undertaken by specialists to be provided by the Principal Contractor (C298) if deemed necessary. The holes will be backfilled with gravel, and capped with bentonite following instruction from Crossrail.

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 fieldwork 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.

5.1 Terrier rig

- The Terrier rig and supervising engineer will be supplied by Geotechnics Ltd, The Geotechnical Centre, 203 Torrington Avenue, Tile Hill, Coventry, CV4 9AP. The rig is operated by a two-man crew. The operatives are protected with hard hats, Crossrail compliant Hi-Viz, ear defenders, 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 that complies with Crossrail vehicle requirements. The rig is crawler mounted and is off loaded using a set of specially designed steel ramps. The vehicles will be booked in advance with C298.
- 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.
- Before any intrusive works begin a visual check on the up to date service plans is made to ensure there are no underground apparatus in the area. The area will then be CAT and Genny scanned by a trained operative. If the visual scan of the service diagrams and the CAT scan are negative a permit to dig form will be filled out signed by the Geotechnics Ltd engineer and passed to the Laing site agent for approval and signing. C298 Balfour Beatty will also provide a permit to dig for each window sample location.
- 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.
- A hand dug pit will then be excavated with care to a depth of 1.20m to clear service to that depth, if required. The pit will be excavated by the drilling crew and is likely to measure approximately 300-500mm square. A CAT scan will then be undertaken at the bottom of the pit.

- Boring is advanced by a drop hammer, which is completely enclosed within a steel cage. The plates produce a noise level of between 85 and 101db.
- 1 metre long rods are extended with each metre until the required depth has been achieved.
- On completion of the borehole the rods will be withdrawn and the hole backfilled with bentonite.

Our Safe working procedures and risk assessment for the works are attached in Appendix 3.

6 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 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 C263 Contract.
- 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 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 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 within 8 weeks of the completion of the fieldwork for submission to the Project Archaeologist for subsequent publication within the London Archaeologist Annual Fieldwork Round-up.

7 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) 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.

8 Archiving and Dissemination Method

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

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

9 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.

9.1 Survey

- The SS-WSI (C298-XRL-T1-RGN-CR148-50001-Revision 1.0) requires that the C298 Enabling Works contractor shall set out each geoarchaeological borehole location as defined in Table 1 above and Drawing No. CRL1-XRL-U-DDA-CR148_PT005-00
- The MOLA geomatics team may survey in the location of the boreholes once they have been taken if required.
- MOLA surveyors will normally survey to LSG grid MOLA's local baselines, or the features, as appropriate to the remains encountered. If Crossrail survey control is not available, then they will reference locations to OSGB36 co-ordinates, using GPS/GNSS, and these will then be converted to LSG.

10 Health and Safety

10.1 CDM Responsibilities and Reporting

- MOLA will be supporting and reporting to the Principal Contractor (Balfour Beatty) for the evaluation and to the Crossrail Project Archaeologist and CDM Co-ordinator.
- MOLA will be implementing archaeological designs in the SS-WSI prepared by Crossrail, 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 geoarchaeologists as required. These services may include providing, site accommodation, plant for the excavation of trenches and other equipment such as lighting, handrails, and shoring. These requirements are listed in detail in separate documents. Any attendances will be confirmed in advance.
- H&S site inductions to MOLA and Geotechnics staff

The CDM Co-ordinator will provide:

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

10.2 Rail Sites

The site is not a designated railway site.

10.3 Highway Sites

The site is not located on an active highway site.

10.4 Health and Safety Reporting

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

10.5 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.

C263 MOLA Project Management team contact details

- Elaine Eastbury, Project Manager
eeastbury@museumoflondon.org.uk
Direct Line: 020 7410 2237
Mobile: 07730 646063
- Mike Smith, Fieldwork Director
msmith@museumoflondon.org.uk
Direct Line: 020 7410 2283
Mobile: 07881 628288
- Graham Spurr, Site Supervisor (Head of Geoarchaeology)
gspurr@mola.org.uk
Direct Line: 020 7410 2262
Mobile: 07860 716334

10.6 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).

None of the above will be allowed on any work area on site, except emergency phone calls.

11 Emergency Response

11.1 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 geoarchaeological investigation MOLA and Geotechnics staff will comply with the Principal Contractor's (Balfour Beatty's) Emergency Plan (C298-BBP-C-STP-CRG07-50001 v2.0**

Employers Incident Response Contact	Crossrail Incident Response Desk – 020 3197 5000
Principal Contractor (Balfour Beatty) Incident Response Contact	Colin Warren, Site Manager Mobile: 07900 053617
MOLA Incident Response Contact	Elaine Eastbury, Contracts Manager eeastbury@museumoflondon.org.uk Direct Line: 020 7410 2237 Mobile: 07730 646063
Local A&E location	<i>Full A & E at:</i> Queen Elizabeth Hospital Stadium Road London SE18 4QH Tel: 0208 836 6000

11.2 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.

11.3 Emergency & Accident Equipment

MOLA Archaeologists when working singly on the watching brief tasks will carry a single person First Aid Kit and mobile phone.

It is expected that the Principal Contractor will also provide basic first aid facilities on site.

11.4 Monitoring & Testing

MOLA staff will comply with Crossrail requirements.

11.5 Emergency & Accident Incident Reporting

All accidents and emergencies must be reported to the Principal Contractor's project manager (Anton Roszynki, mobile: 0771 7867523) who will call the emergency services, if required.

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

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

- Jay Carver, Project Archaeologist, Crossrail Central, Crossrail Ltd, 25 Canada Square, London E14 5LQ
DD 0203 229 9258 Int 2258
Mobile 07870 191 705
- Projectwide CDM Co-ordinator, Crossrail Central, Crossrail Ltd, 25 Canada Square, London E14 5LQ
Mobile 07718 861941
- Elaine Eastbury, Contracts Manager, Museum of London Archaeology, Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED
DD 0207 410 2200 Int 2237
- Ian Grainger, Health & Safety Compliance Manager, Museum of London Archaeology, Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED
DD 0207 410 2200 Int 2271

12 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 0 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.

12.1 Contamination

A programme of ground investigation (see Crossrail 2013) undertaken in July 2013 has identified a number of constraints within the Plumstead Depot site including high levels of heavy metals present in the made ground covering the site and there are elevated levels of asbestos. The ground water on the site has also been found to contain elevated levels of hydrocarbons.

The Principal Contractor will implement the measures required to protect those affected by the works, including provision of suitable additional PPE and adequate welfare facilities for the changed situation (PPE in addition to that included in section 16.6.3**Error! Reference source not found.** will need to be provided by the PC, rather than MOLA).

MOLA shall be issued with all relevant contamination test results for above and below ground hazards by the Principal Contractor prior to commencement. Any necessary remedial action will then be agreed with the Principal Contractor as part of the H & S Plan and supplied as an attendance item (9.1 below). Wherever possible such action must be undertaken by the Principal Contractor prior to MOLA commencement on site. If this is not done there may be operational constraints on the MOLA safe method of working that could restrict achievement of the archaeological scope of works set out in the SS-WSI.

12.2 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.

12.3 Site Waste Management Plan

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

12.4 Vehicles/Motorised Equipment

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

NAME	VEHICLE REG NO
M Cox	KC54 XTZ & DY59 YWB
A Chopping	KC54 XTZ & DY59 YWB
G Spurr	KC54 XTZ & DY59 YWB
M Nicholls	YT60 UFS
S Jones	KC54 XTZ & DY59 YWB
C Drew	KC54 XTZ & DY59 YWB
M Burch	KC54 XTZ & DY59 YWB
V Yendell	KC54 XTZ & DY59 YWB
CONTACT (All)	020 7410 2200

12.5 Other Requirements

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

13 Quality Assurance Plan

An updated Quality Assurance Plan has been prepared for submission to Crossrail in accordance with the format specified at part 5.4 of the 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. The MOLA

responsible procurement representative is Dawn Jackson, who is a member of the Senior Management Group

14 Community Relations

MOLA will co-operate with the Project 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.

15 Responsible Procurement

A draft Responsible Procurement Plan document was submitted to Kelly Hussey, Crossrail on 28th April 2011.

16 Health and Safety Method Statement

16.1 Introduction and Purpose

16.1.1 *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 – *C156 Plumstead Portal*, Crossrail, July 2011, Document No C156-CSY-T-RGN-CR148_PT005-00028, Version 4), and the WSI addendum (C310-XRL-T1-RGN-CR148 -50001).

16.1.2 *Scope of Document*

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

- Geoarchaeological sampling of boreholes at the Plumstead Depot

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

16.2 Responsible Persons and Site Management

16.2.1 *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 be appended to the site master copy by the MOLA Senior Archaeologist/Site Supervisor.

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

16.3 Scope of Works

16.3.1 *Proposed archaeological works*

The scope of archaeological works is set out in section 3, and in section 16.1.2 of the method statement, above.

16.4 Methodology, Programme and Sequence

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

The geoarchaeological sampling of 3 boreholes is programmed to commence On 31st March 2014. It is currently anticipated that the C263 geoarchaeologist will be required for 2 days during the site investigation works.

16.5 Health and Safety Control Measures

16.5.1 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, morning site briefings 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.

16.5.2 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.

16.5.3 Lone Working

- MOLA Supervisor will not attend works or enter excavations when the Principal Contractor is not present. No lone working is permitted.

16.5.4 Contamination

- MOLA has been issued with the Contaminated Land Assessment report for Plumstead Portal (C156-CSY-T1-COM-CR148-PT005-0001). Any necessary remedial action will be agreed with the Principal Contractor as part of the H & S Plan and supplied as an attendance item (9.1 below). Wherever possible such action must be undertaken by the Principal Contractor prior to MOLA commencement on site. If this is not done there may be operational constraints on the MOLA safe method of working that could restrict achievement of the archaeological scope of works set out in the SS-WSI.

16.5.5 Asbestos

- There is a potential for asbestos to be present in the drilling arisings and dust containing asbestos fibres. Relevant PPE will be worn at all times, and if necessary dust suppression and air monitoring will be carried out by C298.

16.5.6 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.

16.5.7 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).

16.6 Planning and Resources

16.6.1 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 geoarchaeological borehole locations 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.
- **Provide disposable tyvek overalls, respirators/P3 rated dust masks, wellington boots, rubber gauntlets if necessary**

- **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) re 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 worksite furnished main base cabin as work space; separate male/female changing areas, toilets and washing facilities. For the basic monitoring component of a small project, these facilities would normally be shared with the Principal Contractor's site establishment and separate work space is not normally 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. To be agreed in advance.
- **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.
- **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.

16.6.2 Equipment

Equipment will be supplied by the MOLA equipment central store:

First Aid Kit

Hand tools, dumpy levels, stationary, grid pegs, digital camera, hand auger, etc.

Any specialised equipment such as power augers (not likely for this task) will have certification of maintenance kept at MOLA headquarters.

Dando Rig supplied by Geotechnics (see maintenance record at back of Method Statement)

16.6.3 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)

Crossrail compliant Hi-visibility vests and trousers (EN471)

Gloves Nitrile and latex disposable, PVC, EN374

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

Crossrail compliant flame retardant overalls

16.6.4 Staff

The timing and overall duration of the sampling listed earlier will be determined by the contractor's programme and the nature and extent of any surviving remains. It is

envisaged that sampling will be supervised by one MOLA Geoarchaeologist. The Terrier rig will be operated by sub-contractors working to Geotechnics Ltd.

16.7 Briefing Arrangements

16.7.1 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.

16.7.2 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.

16.8 First Aid

16.8.1 Trained First-Aid Personnel

During the geoarchaeological sampling 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.

16.8.2 First Aid Documents

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

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

16.8.3 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.

16.9 Accident, Incident, Near Miss and Environmental Incident Reporting

16.9.1 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 11.5 (main document).

16.9.2 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.

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

16.9.3 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 H&S Manager and action taken as appropriate.
- Non Riddors investigated by the Supervisor.
- Riddors investigated and reported on to Senior Management Consultant by MOLA H & S Manager.

16.9.4 Key MOLA Project Personnel

- Elaine Eastbury, Project Manager
- Mike Smith, Fieldwork Director

16.9.5 Emergency Procedures – Site General

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

16.9.6 Emergency Services Contact Details

Full Accident and Emergency:

Queen Elizabeth Hospital
Stadium Road
London SE18 4QH

Tel: 0208 836 6000

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.

16.9.7 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.

Risk Assessments

Overall and site specific risk assessments for the geoarchaeological sampling of boreholes are included in the following section.

17 Appendix 1: MOLA Risk Assessment – Geotechnical sampling



MOLA RISK ASSESSMENT REGISTER												
For Site/Task: Plumstead Depot						Type Borehole sampling						
Persons Affected			No 3			Classification			No			
Employees			1			Experienced			3			
Other workers			2			Inexperienced			0			
Public			0			Disabled			0			
Known and Suspected Hazards on site with Remaining Risk (mark as appropriate and include numbered risk assessment in WSI)												
	L	M	H		L	M	H		L	M	H	
1				26				50				
2				27	X			51				
3		x		28				52				
3a		x		29				53				
4				30				54				
5				31				55				
6				31a	X			56				
7				31b				56a				
7a				32				56b				
8	x			33				56c				
9	x			34				56d				
10				35				56e				
11				36				57				
12				37				58				
13				38				59				
14				38a				60				
15	x			38b				61				
16				39				62				

17 Contaminated Land	x		40 Foreshore/water						
18 Weil's Disease	x		41 Adverse Weather						
19 Psittacosis			42 Spoil Mounding						
20 UXO			43 LPG(Butane)						
21 Asbestos	X		44 Waste						
22 Welfare			45 Storage						
23 Lone working			46 Animals						
23a Empty Premises			47 Non-ionising radiation						
24 Manual Handling	X		48 COSHH: Petrol						
25 Fumes/Gas			49 Spot Dating						

General Controls

Contracts Manager in over all charge of project is: Elaine Eastbury
 Supervisor(s) in daily charge of project is: Jason Stewart
 Number, training and experience of supervisors will be sufficient for the project
 All staff will comply with the: MOLA H&S policy, Principal Contractors site rules, all WSIs, Risk assessments, safe systems of work Permits to work.
 All staff will have sufficient training and experience for the tasks they undertake or be under close supervision
 All staff will be CITB H&S tested and hold a CSCS card appropriate to their profession or be in the process of obtaining one where appropriate
 All staff will be fit to undertake their work
 All staff will be inducted on first day of work, briefed on the WSI and the specific hazards and control measures attendant on their work on site.
The full site induction will be undertaken by the MOLA supervisor if no Principal Contractor present.
All staff will sign the induction and WSI register to confirm that they have received, understood and will comply with both.
 Tool box talks/staff briefing will be conducted on the hazards and control measures on a regular basis (at least weekly or more frequently if circumstances dictate)
 Appropriate PPE to be worn for each task.
Minimum site PPE (unless otherwise stated by supervisor): Steel Toe-cap/midsole boots, Safety helmet, high visibility vest or jacket, gloves and relevant PPE for possible asbestos hazard.
 First Aid kit on site, First aider/appointed person on site. Nearest accident and emergency unit located and contact numbers obtained

Competent Person(s) appointed to take action: H&S Manager Contract Manager Senior Geoarchaeologist	All Risk Assessments seen by (initials)	
	PM	Archaeologists
	SA(s)	
	Client	
	Contractor	
	Other	

MOLA RISK ASSESSMENTS					SITE: Plumstead Depot			
APPROVAL (Name and Title)					SIGNATURE			DATE
Prepared by:		Michael Smith						17.02.14
Approved by:		Ian Grainger						26.02.14
RA N°	ACTIVITY	Hazards	RISK	Risk Class L/M/H	N° at Risk	Control Measures	Final Risk L/M/H	Action by
0003	PLANT Specify the plant to be used.	Persons Struck by Machine Shovel or load dropping Hydraulic fluid spray Overturning of machine Fire/explosion	Personal Injury, Equipment Damage	H	3	<p>MOLA staff will not operate plant.</p> <p>For sites where we sub-contract plant (delete if not relevant)</p> <p>Check operator trained and certificated and not permit uncertified operators to start work.</p> <p>Operator must inspect plant before work commences and before each shift.</p> <p>Defective plant must not be used.</p> <p>Service and repair by qualified contractor only.</p> <p>Operations supervised by MOLA staff (supervisor or deputy).</p> <p>Plant to be switched off and secured when not in use.</p> <p>Possibly also:</p> <p>Speed restrictions for JCBs.</p> <p>Separate routes and work areas for plant and pedestrians, warning signs to be displayed where practicable.</p> <p>For all sites</p> <p>No work with or near plant operator under influence of drugs/alcohol or behaving erratically.</p> <p>Operations to be under supervision of MOLA supervisor or deputy and trained banks person also where applicable.</p> <p>Staff working near machine to ensure that the operator has seen them and that they are at a safe</p>	M	Supervisor and staff

						distance. Staff briefed on plant operations and changes to them. High visibility clothing.		
0003 a	PLANT (loading and unloading)	Collision Over turning/ Collapse	Personal injury, Equipment and property Damage	H	3	Operation to be authorised by supervisor. Task briefing. Operation to be supervised. Segregate from public and other site works - Lookouts and physical barriers and warning signs. Minimum of two banksmen/lookouts. Protect Highway and other surfaces from track damage as necessary (timber barks, planking etc) Secure load properly. Any lifting to be covered by a specific lift plan	M	Drivers, supervisor and staff
0008	SLIPS/TRIPS/ FALLS	Falls of persons Dropping of equipment/material	Personal injury, Equipment damage	M	3	Assess work in adverse weather and suspend if appropriate. Keep all surfaces level and dry where practicable. Maintain general good housekeeping to remove trip hazards. Keep all areas free of unnecessary obstruction and debris. Keep all areas well lit. All safe pedestrian routes to be sign posted. Staff to be physically fit for the conditions on site. No running or horseplay. Be cautious moving about site.	L	Supervisor and staff
0009	UNDERGROUND SERVICES (UTILITIES) Electricity, Water, Sewage/foul water Gas.	Electrocution Flooding Asphyxiation Fire/explosion	Personal injury, Equipment and environmental damage, Annoyance to public	M	3	Briefing on live utilities to be given to all staff All excavations to be carried out only after issue of Balfour Beatty Permit to Dig. Competent person will use a cable location scanner calibrated within last 12 months to scan for live electrical services: before initial breaking out; before machine clearance of first level; and each machining level thereafter. Any utilities remaining live in excavation areas will be clearly demarcated and segregated. - 1m	L	PC

	Fibre optic etc	ion Bacterial infection				either side zone. Work will stop on discovery of unidentified service and not resume until confirmed/made safe. Inform utilities company or principal contractor of discovery of any unrecorded service. Inform utilities company or principal contractor immediately of any contact with live utility.		
0015	HAND TOOLS Covers use of: Mattock, Shovel, spade, pick axe, trowel, draw hoe, garden fork, hand shovel, brush, lump hammer, sledge hammer, chisel, bolster and similar simple non mechanical tools	Manual handling Impact from tool Impact from flying debris	Personal injury, property damage	M	3	All hand tools to be to industry safety standard. Inspect tools on delivery. Discard tool if not fit for purpose. Assess staff fitness to use tools. Task briefing where applicable. Training and supervision for inexperienced staff. Adequate breaks/rest periods	L	Supervis or and staff
0017	CONTAMINATED LAND	solid/liquid contamina nts Gas/fumes /airborne particles Ingestion, inhalation, dermal contact Pollution of water table, drains, water supply Pollution of atmospher e	Personal injury, illness damage to the environ- ment	M	3	Provide disposable tyvek overalls, respirators/P3 rated dust masks, wellington boots, rubber gauntlets if necessary High standard personal hygiene: wash hands before eating drinking smoking. No eating, drinking, smoking, in contaminated areas. Wear gloves in the contaminated areas. Conduct basic health surveillance. Report all ill health. Report all suspected contaminants – strange smells, strange looking deposits. Cease work area until contaminant is identified and safe system of work in place.	L	C298
0018	WIELS DESEASE (leptospirosis) RATS	Rat (and Cattle) faeces and urine	Personal injury illness	M	3	Brief staff on hazard. Carry HSE G 406 instruction card Wear gloves. Clean and cover any cuts or abrasions promptly with a waterproof plaster. Wash hands before eating, drinking, smoking.	L	Supervis or and staff

						<p>No eating drinking and smoking outside designated areas.</p> <p>Keep Welfare facilities dry, tidy and secure.</p> <p>Keep food covered and secure.</p> <p>Basic surveillance of staff for flu like symptoms.</p> <p>Report ill health.</p>		
0021	<p>ASBESTOS</p> <p>What is the asbestos risk on this site? say:</p> <p>Work in standing building - survey, excavation, site accommodation?</p> <p>(Need Asbestos survey)</p> <p>Or</p> <p>asbestos as ground contamination highlighted in contamination report?</p>	<p>Inhalation of asbestos fibres</p>	<p>Chronic Illness, death asbestosis</p>	M	3	<p>MOLA not licensed asbestos contractor.</p> <p>MOLA staff will not remove or disturb known or suspected asbestos.</p> <p>Asbestos survey report will be obtained where applicable.</p> <p>MOLA only sites (delete if not applicable)</p> <p>Brief on locations of known asbestos and condition, PPE requirements, exclusion zones.</p> <p>Restrict entry by barriers and warning signs.</p> <p>Damp down machine and other work operations in dry weather, wind direction work restrictions where applicable.</p> <p>All sites</p> <p>Do not work in areas where asbestos removal is undertaken until Air Certificates indicate 0.1 fibres per cm² over 4 hrs or less.</p> <p>Comply with existing exclusion zones.</p> <p>Report suspected asbestos.</p> <p>Vacate area.</p> <p>Establish exclusion zone –barriers and warning signs.</p> <p>Do not return until the nature and condition of the asbestos has been determined and a safe system of work is in place.</p> <p>Wear Impervious hooded overalls and approved respirators where applicable.</p>	L	<p>Supervisor and staff</p>
0027	<p>NOISE</p> <p>What is the specific noise risk?</p> <p>Breaking out operations?</p> <p>Other machine operation?</p> <p>Traffic?</p>	<p>Excessive, prolonged noise levels,</p> <p>Nuisance to public</p>	<p>Personal injury – temporary or permanent damage to hearing, loss of hearing Headache/ nausea</p>	M	3	<p>MOLA only sites (delete if not applicable)</p> <p>Use less noisy equipment or process where practical, contain noise levels where possible, ensure equipment is inspected and well maintained to reduce noise levels.</p> <p>Ensure that all mufflers and baffles are fitted correctly and working.</p> <p>Liaise with neighbours: Restrict hours, Minimise duration and frequency of excessively noisy operations where possible and</p>	L	<p>Supervisor and staff</p>

						necessary All sites Minimise exposure– rotate staff, plan work to avoid noisy times/work areas if possible. Wear appropriate ear protection. Report unwell symptoms immediately. Vacate area if headaches/nausea etc.		
0031 a	VEHICLES – Site	Collision Overturning Fire/Explosion Loose loads		H	3	Instruct drivers on site requirements Brief staff on vehicle routes and movements. Keep to dedicated pedestrian routes Obey traffic Marshals and signs. Be aware of and keep away from moving vehicles. Fit vehicle reversing alarm where necessary Wear high visibility clothing	M	Driver, supervisor and staff
All persons affected by these hazards must be made aware of the contents of this Risk Assessment								

18 Appendix 2: Geotechnics Ltd safe working procedures and risk assessments

SAFE WORKING PROCEDURES – SWP 04 – Window Sampling / Dynamic Sampling

This SWP is based on the Company's interpretation of the BDA Guidance for the Safe Operation of Dynamic Sampling Rigs and Equipment, and experience in carrying out this activity. Quotes are taken from the guidance and utilised throughout this document.

Dynamic sampling is a method of driving equipment into the ground and can provide a sample for both geotechnical and Geoenvironmental testing.

The dynamic sampling rig generally utilised by Geotechnics Limited is the Feed Frame Mounted – Drop Weight Type; the **Dando Terrier**.

Feed Frame Mounted – Drop Weight Type:

The main principle of this type of machine is that a drop weight is attached to a sliding carriage, which in turn is mounted onto a feed frame.

The sliding carriage is lifted to its highest position using an integral hydraulic cylinder. The sampling device is then placed under the carriage and connected to a drive collar or drive ring. Before sampling the hydraulic cylinder is fully retracted to allow free movement of the sliding carriage.

The drop weight is moved by a moving chain with an integral latch that allows the weight to be picked up. When the weight reaches the top of its travel it is released allowing it to fall on to an anvil, which in turn drives the tooling into the ground. The drop weight can normally be changed, to allow for the completion of Standard Penetration Testing (SPT), Heavy Dynamic Probing (DPH) or Super Heavy Dynamic Probing (DPSH).

The drop height or free fall height of the weight may also be changed from the standard 760mm to 500mm allowing the different tests indicated above, to be carried out.

The sampling equipment is mounted on a self propelled rubber-tracked chassis. The hydraulics are powered by a diesel engine.

Where the equipment is required to operate in a potentially explosive atmosphere / location; it will be equipped with an overrun valve and spark arrestor.

Regardless of the type of dynamic rig used, the following information applies in respect to the site set up, site operation and demobilisation.

1. The site will be inspected prior to starting work on site (likely to be on the first day of attendance), to ensure that the site entrance/exit is suitable for the equipment to be used, a safe route to the work position is available and that the borehole positions are suitable for the rig and equipment.
2. Before commencing to set up the Window Sampling Rig, a review of the Site Specific Risk Assessment, Method Statement and Buried Services information will be carried out. It is imperative that any significant site specific factors are briefed, understood and followed by all personnel on the site.
3. Where possible to do so, an adequate underground Buried Service search should be / have been carried out. Where available, the service drawings will be / have been inspected before mobilising to site and before any intrusive techniques are employed. An "in-date" calibrated Cable Avoidance Tool (CAT) shall be readily available on site for use at all times as required.
 - 3.1 Borehole positions will be located at a safe distance from any known underground services, discussed and agreed with the Engineer/Client prior to works commencing.
 - 3.2 Following the Buried Service search and review of all available Service Plans of the area or in the absence of Buried Service information being available, a minimum of a Cable Avoidance Tool (CAT) Scan and Inspection pit will be carried out. The borehole location will be scanned with a CAT, by a Competent and appropriately trained person.
4. An Inspection pit will be excavated by hand to a depth of 1.2 metres, and where possible, the base of the inspection pit CAT scanned.
 - 4.1 Generally, mechanical breakers shall be used for surface concrete / tarmac hard standing, and never knowingly over any known Buried Services.
 - 4.2 An inspection pit should always be excavated for the protection of the drill crew.
 - 4.3 Drilling Operatives should also be aware of Buried Service indications, e.g. manhole or inspection covers, hydrants or evidence of prior excavation etc.

SAFE WORKING PROCEDURES – SWP 04 – Window Sampling / Dynamic Sampling

- 4.3.1 Exclusion zones exist around oil and gas pipelines, and no work will be undertaken without prior consent from the appropriate Pipeline Authority.
- 4.3.2 Any excavation will be carried out in such a manner as to aim to comply with the requirements of SWP 15 Underground Services and Health and Safety Guidance (HSG) 47, Avoiding Danger from Underground Services.
- 5. Operational Safety Requirements**
- 5.1 **Rig and Equipment Unloading** – Before commencing to set up the rig, a dynamic risk assessment should be carried out, especially if the rig is to be set up on a slope.
The working area should be prepared to provide a safe and suitable location for the dynamic sampling rig, associated equipment and personnel.
- 5.2 Care must be taken when unloading the dynamic sampling rig from road vehicles or trailers. Any ramps must be suitable for the purpose and secured. Personnel must be trained in the unloading procedures.
- 5.3 Unloading of sampling tools and equipment must be carried out in a safe manner taking into consideration the implications of Manual Handling. Further guidance can be found in SWP 29 – Manual Handling and Lifting.
- 6. Rig Setting Up on Site**
- 6.1 Prior to lowering the jacks, suitably strong supports should be placed under the jacks in order to support the rig and spread the weight. The supports should be substantial and fit for purpose in order to level the rig.
- 6.2 The Mast should then be adjusted to the vertical position and locked into position in accordance with the Manufacturer's Operating instructions.
- 6.3 Sampling tools and equipment should be stored appropriately and safely, e.g. horizontally on trestles as opposed to left lying on the floor presenting a tripping hazard.
- 6.4 Where possible, the engine should be positioned 'downwind' of the borehole in order that the rig crew are not subject to any exhaust fumes.
- 7. Operating the Rig**
- The Dynamic Sampling Rig must always be operated in a safe manner in accordance with the Manufacturers Instructions, and never outside the scope of its designed use.
The Working area should be kept clean and clear underfoot, cuttings should always be placed well to one side in a plastic bag or moved to a skip.
- 7.1 The operation of the rig requires two persons at all times. Regardless of who is working as the crew, both personnel shall be appropriately trained and deemed competent by the Company.
- 7.2 The Lead Driller must ensure that all safety guards and protective devices are fitted and in sound condition and comply with the requirements of the Provision and Use of Work Equipment Regulations. (PUWER)
- 7.2.1 Protective devices and emergency stops must be tested before the operation commences.
- 7.3 In line with the Manufacturers Operation Manual, all aspects of the rig must be checked before drilling commences.
- 7.3.1 In addition and where relevant, elements of the rig must be thoroughly examined and Certificated by a Competent Person in accordance with the Lifting Operations and Lifting Equipment Regulations (LOLER)(minimum of annually).
- 7.4 The Lead Driller must ensure the Drillers hands and feet are clear when lowering tools or casings to the ground. All personnel should keep hands clear of potential entrapment, entanglement or crushing hazards.
- 7.5 Casing tubes and drill thread joints should always be fully screwed home before use in order to minimise any damage to the threads.
- 7.6 Tools should not be left suspended in the mast when the rig is left unattended.
- 7.7 Hand tools should be stored in a safe place when not being used.
- 7.8 Personnel must never look down the borehole whilst tools are suspended overhead. To view the borehole, any

SAFE WORKING PROCEDURES – SWP 04 – Window Sampling / Dynamic Sampling

suspended equipment must be grounded. Prior to looking into the borehole, check that there is no upward flow of air or gases.

7.9 If casings or tools become stuck in the borehole and cannot be released by the action of the rig alone, supplementary and suitable extraction systems can be employed. See 8 Extraction Methods.

7.10 Before moving the rig on to any public highway all loose mud and dirt should be removed and any components of the rig including items of drilling equipment must be secure.

8. Extraction Methods

8.1 On certain feed frame mounted machines, there are integral rams or systems for the extraction of tooling.

8.1.1 For hand held or machines without integral extraction systems, the equipment is normally extracted from the ground by the use of either:

- Powered jacks – Pneumatic or hydraulic that may consist of single or double cylinder or hollow cylinder rams;
- Hand jacking systems.

9. Sampling and In Situ testing Hazards

The process, nature and equipment used in dynamic sampling can give rise to various hazards. To enable consideration to be given to each particular process, foreseeable hazards associated with each process is identified below. The list of hazards is not exhaustive and the drilling crew should be vigilant at all times and report any issues identified during the use or operation of the rig that has not been previously considered to their immediate Line Manager.

9.1 Tool and Equipment Handling

Dynamic sampling tools and equipment are heavy and awkward to handle. It is essential that care must be taken at all times when manually handling these items. Correct lifting procedures should be deployed at all times in accordance with training and SWP 29 – Manual Handling and Lifting.

- Care must be taken to prevent entrapment of fingers, clothing and hair;
- Items of jewellery should not be worn;
- When making up threaded joints operatives shall be vigilant at all times for burrs and sharp edges;
- Appropriate Personal Protective Equipment and Clothing (PPE) should be worn at all times and as appropriate to the element of the process being undertaken at the material time.

9.2 Care of Dynamic Drill / Probe Rods and Tubular Components

Drill / Probe rods and other tubular products used in sampling and in situ testing are designed to last and give trouble free service providing that they are used and maintained in a safe and clean manner. Damage incurred by careless handling, making up and disconnecting threaded joints can severely reduce the working life of the equipment and increase the hazards identified in 9.1.

- Always use drill / probe rods and other tubular products manufactured to the dimensions and physical properties of the rig and their intended use;
- Always clean each pin and box thread before use and ensure that threads are free from burrs and lubricated before connecting together;
- Always use appropriate lubricant;
- If engaging threads under power, avoid excess thrust and Revolutions per Minute (RPM). (Always low torque and low revolutions);
- Check drill / probe rod and casing Outside Diameter (OD) for wear at appropriate intervals, and discard when the OD wears down to the discard limit specified by the Manufacturer.
- Check the straightness of the rods, casings and other components periodically. Any bent or damaged components should be returned back to the Coventry Stores and disposed of appropriately.

9.3 Tooling Recovery

- When jacking equipment from the ground, ensure that the jacks selected are of the correct load capacity and fit for purpose;
- The jacks must be securely positioned on a firm and secure base;

SAFE WORKING PROCEDURES – SWP 04 – Window Sampling / Dynamic Sampling

- Personnel must be kept clear whilst jacking operations are being carried out;
- When jacking, always be aware of the danger of sudden movement or the release of the equipment;
- Recovery jacks must be marked with their load capacity and carry a current test certificate;
- When rod breaking, always use the appropriate laykey, rod spanner or wrap round wrenches;
- When using laykeys, spanners or wrap round wrenches care should be taken to avoid become entrapped.

9.4 Sampler Handling and Emptying

- When handling or emptying all types of samples vigilance should be maintained for any sharp edges on the leading end of the sampler tube, window slots, drive shoes and basket lifters;
- When removing liners from the samples consideration should be given to the potential for split or broken liners;
- Before removing the liner and sample, the sampler should be held securely within the vice mounted on the rig or at a height that enables the liner to be removed safely;
- When using the pliers to initially extract the liner, consideration should be given to 'nipping' the skin or the pliers slipping off the liner as physical 'pulling' is applied;
- If the liner has to be cut, a 'hooked' blade should be used in preference to a straight blade. The cutting process should always be undertaken in the direction away from the body;
- Caution should be taken when handling empty liners in respect to any sharp edges of potential contamination from the ground. Consideration should be given to SWP 10, 11 or 12 in respect to Safe Intrusion into Contaminated or Potentially Contaminated Land.

9.5 SPT Operations

- Care must be taken when lifting the heavy hammer into position;
- Before use, ensure the hammer is free from burrs as impact by the hammer may cause fragments to fly off risking eye injury;
- Always use the correct PPE when using a SPT hammer and keep fingers away from the impact area;
- If using a trip hammer avoid contact with the latches

9.6 Working on Slopes

Where dynamic sampling operations have to be carried out whilst working on slopes, special care has to be taken to ensure the stability of the rig and the safety of the drilling crew.

Prior to work being undertaken on slopes, the drilling crew shall undertake a risk assessment in order to assess the hazards with the site and access and determine the appropriate control measures to be deployed.

The control measures deployed shall consist of, but not be restricted to the following:

- Where possible, the preparation of a flat bench of the appropriate size to accommodate the dynamic sampling rig and a safe operating area of the crew;
- Ensure that the rig is securely chocked in place before commencing operations;
- If it is necessary to erect a temporary working platform which includes the use of a scaffold, the scaffolding must be designed and erected by a competent scaffold company.
Working platforms must be firmly secured and attached to the slope before work commences and be strong enough to carry the weight of the rig, its associated equipment and tools, and the pulling force of the rig itself.
- When tracking the rig on slopes, care must be taken to ensure the slope angle does not exceed that recommended by the Manufacturer.

10. Reinstatement and Site Abandonment

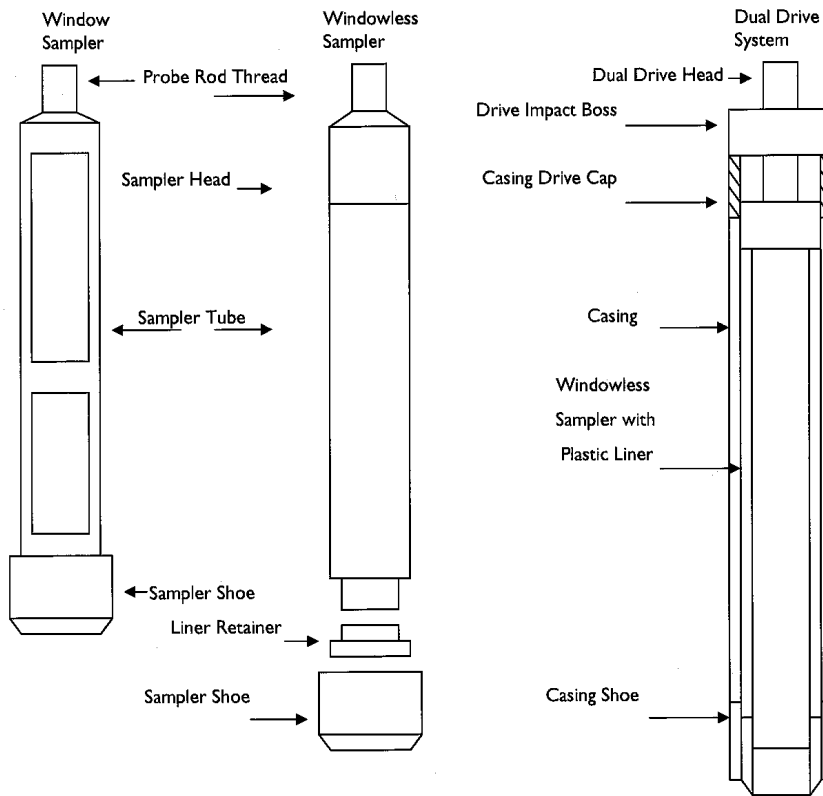
When the dynamic sampling activity is completed, it is important that the site is restored to a safe and satisfactory condition with no hazards left that as a result of the undertakings would have the potential to harm human health, animals or the environment.

Clients should provide the necessary information regarding the extent required for sealing and reinstatement of the borehole.

SAFE WORKING PROCEDURES – SWP 04 – Window Sampling / Dynamic Sampling

Dynamic Sampling Tools and Equipment

Below is a simple guide to the most frequently and universally used tools and equipment when dynamic sampling processes are carried out with a dynamic sampling rig.



HEALTH & SAFETY - Risk Assessment - Window Sampling/ Dynamic Probing										Form RA015 Rev 2		gatedechnics				
Project					Crossrail Custom House					Project No.						
Client					Museum of London					Date		30th May 2013				
										Compiled by						
										Activity		Window Sampling				
Risk (R) = Likelihood x Severity										Likelihood (L)		Severity (S)				
1 to 6	Low	Ensure control measures are maintained.								Remote=1	Negligible=1	Minor=2	Absence=3	Major=4	Fatal=5	
8 to 10	Medium	Review operations & control measures. Adapt as necessary.								Unlikely=2	2	4	6	8	10	
12 to 25	High	Unacceptable risk, change control measures or abandon task.								Possible=3	3	6	9	12	15	
										Probable=4	4	8	12	16	20	
										Certain=5	5	10	15	20	25	
Activity	Hazard	Effect	L	S	R	Mitigating Action	L	S	R	Comments / Further Actions						
Drilling Activities	Buried Services	Fire / explosion / Personal injury - electric shock, flooding	3	5	15	A check for buried services must be made prior to commencing hole. Reference must be made to SWP 03-Trial Pitting - Hand and Machine Excavation, SWP 08-Underground Services and SWP 09-Use of Cable Avoidance Tool and Signal Generator.	1	5	5	A Permit to dig / drill shall be issued prior to breaking ground and excavating to a minimum depth of 1.2 metres.						
Transporting on site and setting up / bringing down the rig.	Overturning, uneven ground, slopes, soft ground.	Entrapment beneath rig	3	5	15	Rig to be ideally tracked over firm level ground if practicable.	1	5	5	Route must be walked ahead of the rig to prove route.						
Drilling locations are likely to be in busy trafficked area.	Frequent vehicle movements	Collision with vehicles using site	3	5	15	Locations to be in safe areas. Working areas to be delineated where necessary. All personnel to wear high visibility clothing.	1	5	5	Risks to be continually assessed. Care to be taken within car park. Watch for traffic.						
Moving Parts	Entrapment in the drop weight mechanism	Personal injury	3	3	9	The drop weight guards shall be securely bolted into position.	1	3	3	All Guards shall be securely fitted in place at all times during drilling activities.						
Drilling Activities	It is known that the rig can sometimes exceed the action level requiring hearing protection.	Personal injury – noise induced hearing loss	4	2	8	In order to minimise noise exposure, adequate hearing protection shall be readily available and worn as required.	1	2	2	The lead driller should monitor the noise levels from the rig and shall wear, and instruct the second man to wear, hearing protection as required. As a general guide – if normal speech cannot be heard at 2 metres, hearing protection should be worn.						
Drilling Activities	Vibration	Personal injury	2	3	6	It is not envisaged that any vibration generated by the drilling operation will exceed the permitted exposure level.	2	3	6	The lead driller to continually monitor for any changes.						
Drilling Activities	Exhaust Fumes	Personal injury – respiratory / eye nuisance and irritation	3	2	6	Consideration should be given to the direction of the prevailing wind during the set up of the rig. Where possible, the rig should be set up so as to allow the fumes being emitted from the exhaust to blow downwind from the driller.	2	2	4	In the event that wind direction changes, or it is not possible to position the rig appropriately, the driller should try to take steps to minimise the fumes from being emitted into the breathing zone of the drilling crew. Regular maintenance may minimise the amount of fumes created by the exhaust.						

Dando Terner



Hammer Energy Test Report

In accordance with BSEN ISO 22476-3:2005

Dynamic sampling uk ltd
 Unit 8,
 Victory park way,
 Victory road,
 Derby,
 DE24 8ZF

Hammer Ref: 0773
 Test Date: 30/11/2012
 Report Date:
 File Name: 0773.spt
 Test Operator: TP

Instrumented Rod Data

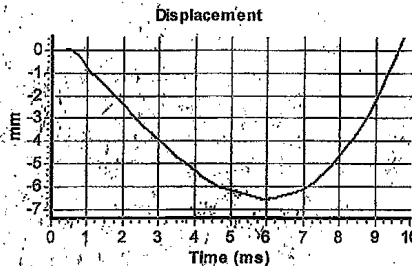
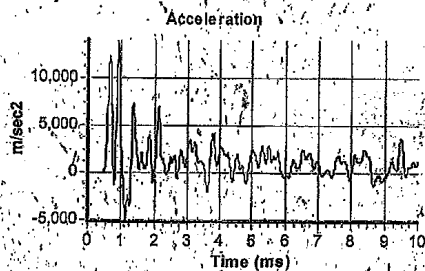
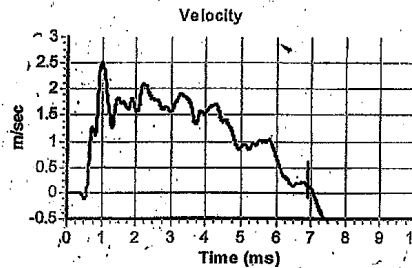
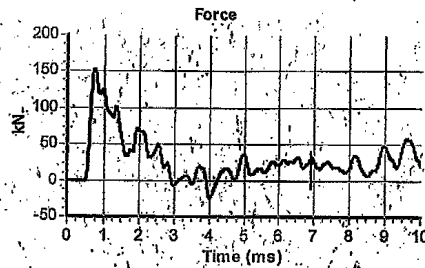
Diameter d_r (mm): 54
 Wall Thickness t_r (mm): 6.9
 Assumed Modulus E_a (GPa): 208
 Accelerometer No.1: 6455
 Accelerometer No.2: 6457

Hammer Information

Hammer Mass m (kg): 63.5
 Falling Height h (mm): 750
 String Length L (m): 15.0

Comments / Location

Geotechnics dando hammer tested at
 Dynamic sampling yard.



Calculations

Area of Rod A (mm²): 1021
 Theoretical Energy E_{theor} (J): 467
 Measured Energy E_{meas} (J): 350

Energy Ratio E_r (%): 75

Signed: T.parker
 Title: operations manager

The recommended calibration interval is 12 months



DANDO DRILLING INTERNATIONAL LTD

Old Customs House, Wharf Road, Littlehampton, West Sussex, BN17 5DD, United Kingdom
Tel: +44 (0) 1903 731312 Fax: + 44 (0) 1903 730305 email: info@dando.co.uk
www.dando.co.uk

CERTIFICATE OF RIG APPROVAL

Customer Name and Address

Geotechnics Ltd
The Geotechnical Centre,
203 Torrington Avenue
Tile Hill
Coventry
CV4 9AP
Contact: Any Suominen

DANDO Terrier Rig Serial No: DT/0773.
(D13855)

“Dando can confirm that the rig has been fully checked and repaired in accordance with the owner’s manual, and has been approved for operation following our inspection and basic function test”.

Dated the 28th February 2012

Dando Drilling International Ltd. Registered in the UK No. 1770124 VAT No. GB537665182
Registered Office: Old Customs House, Wharf Road, Littlehampton, West Sussex, BN17 5DD



DANDO TERRIER 2002.	Date	15/3/13
Daily Check List	Initial	PW
Serial No. DT/0773	O.K.	Fault
Engine Oil Level	✓	
Coolant Level	✓	
Hydraulic Oil Level	✓	
Hydraulic Hose Condition	✓	
Track Condition and Tension	✓	
Guards Fitted and Condition	✓	
Anvil Condition	✓	
Emergency Stop	✓	
Additional Comment		

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 The Geotechnical Centre,
 203 Torrington Avenue,
 Tile Hill, Coventry. CV4 9AP



activity	background noise level	noise level	distance from activity	duration of activity
window sampling	high background noise (rail) 53dB	85-90dB		60-120secs
dynamic probe	55dB	engine 60dB peak 90-92dB	10m 10m	5 mins in 15mins(Lepd=75dB)
JCB	65dB	85dB 78dB 80-85dB	5.00m 10.00m	constant drone working level
Rotary rig	70-75dB	90dB 90-92 90-92 80-85	central 2.5m from rig, pump operators 2.5m from rig engine 10m radius	constant noise level
Cable Percussion Pilcon 150		106 96 <90	full throttle 1.0m depth	
Cable Percussion Dando		81dB	at full rev 7.00m distance	
		84 (amax) 88 (laeq), 99 (peak)	shelling	
		84, 73, 111	SPT	

Guidance Noise levels for Window Sampling, Dynamic Probe, Rotary and Cable Percussion

19 Registers

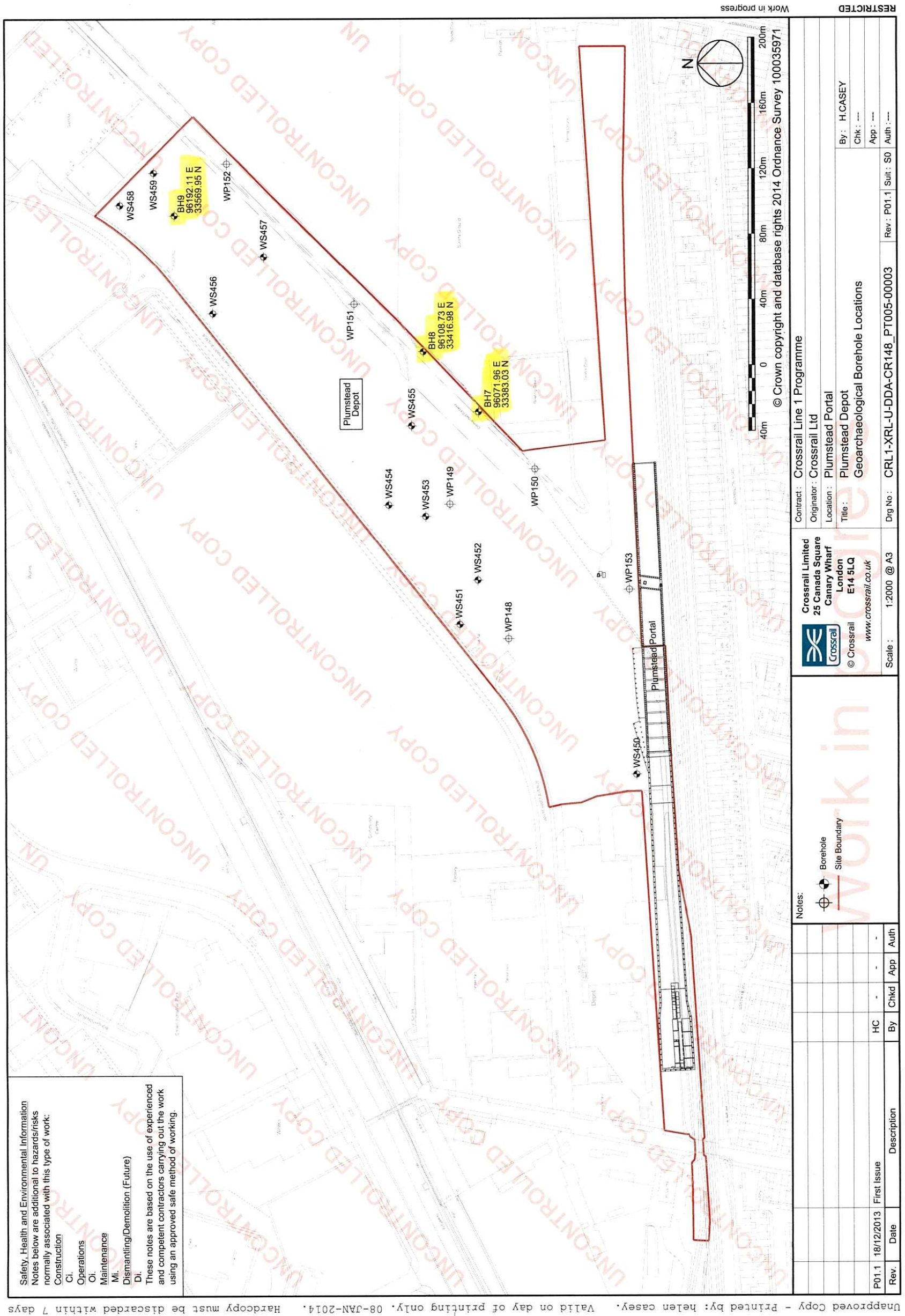
Method Statement © Crossrail 2013



Fig 1 Location of the Plumstead Siding Site (Image © 2012 Bluesky Digital Globe and © 2012 Google)

Fig 1

Figure 1 Location of the Plumstead Siding site (Image (C) Bluesky Digital globe and (C) Google)



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Figure 2 Borehole location plan