DESIGN PACKAGE C122
BORED TUNNELS

ADDENDUM TO WSI: PLUMSTEAD ARCHAEOLOGICAL EVALUATION TRENCHES

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Contents

1 Introduction

This document provides details of the archaeological trenching required to evaluate archaeological potential at the Crossrail Plumstead Portal site. It sets out the location and recording activities required at Plumstead following d-wall installation in two 3 x 25m trench locations.

The results of geoarchaeological evaluation on the site identified two major landscape zones of archaeological and geoarchaeological interest. LZ2 covers the majority of the Portal, defined as a typical Thames Holocene floodplain characterised by Late Pleistocene/Early Holocene basal sands and gravels, overlain by prehistoric wetland peats, sealed by late prehistoric to historic estuarine deposits. There is potential for Neolithic, Mesolithic and Bronze Age archaeology. LZ3 covers the centre of the portal and is characterised as a complex set of deposits infilling a large palaeochannel features of Early to Mid Holocene in date.

Under supervision by *Archaeological Contractor* C263 a mechanical excavator will reduce the made ground level to the top of the alluvium. Reduction of the alluvium by the mechanical excavator will be carried out at between 100mm and 300mm spits as directed by *Archaeological Contractor* C263. Reduction will continue to between 98.0 and 96.0m depth to the top of the gravels or until directed to stop by C263.

Results of this evaluation will inform watching brief details required across the remainder of the Plumstead Portal site during the bulk excavation for main works by the *Main Contractor* (C310).

Further works will include geoarchaeological borehole investigation to mitigate construction effects across the site. These will provide greater resolution of the buried landscape sequences for future analysis.

This document is an addendum to the Written Scheme of Investigation for Plumstead Portal (*C156-CSY-T-RGN-CR148_PT005-00028*) and should be read in conjunction with that document.

This document outlines the requirements of the *Main Contractor* (Section 3) and the requirements of the *Archaeological Contractor* (Section 4).

2 Aim and Scope of Works

2.1 Aims of the proposed works

The two trench evaluation areas have been chosen for their relationship to potential sites in LZ2 (Trench 1) and for potential sites located in the interface between LZ2 and LZ3 (Trench 2). The geoarchaeological areas have been chosen for their relationship to LZ3 (see WSI Section 2.10 for further details).

The archaeological potential is summarised as a moderate potential for prehistoric activity:

- for Mesolithic activity in areas of the floodplain adjacent to stream channels or lakes, and for remains such as fish traps and possibly boats within the alluvium deposited at the base of the channels;
- for Mesolithic and early Neolithic activity on high gravel ‘islands’; and
- for Neolithic/Bronze Age wetland remains such as timber trackways or platforms preserved within peat deposits,for locations where such deposits are expected.

There is a high potential for supporting palaeo-environmental sequences across the site and this work aims to record and better understand these sequences.

2.2 Site Specific Objectives

The following site-specific objectives will be relevant for the Plumstead Portal site.

1. Trial Trench Evaluation will refine the extent and significance of the archaeological resource and inform further mitigation measures.

2. Goearchaeological borehole investigation to mitigate impacts of construction works across the site and to inform further post-excavation analysis.

3. Mitigation in the form of archaeological excavation and/or watching brief to excavate and record archaeological deposits for analysis and dissemination, if required post evaluation.

2.3 Scope of the proposed Trench Evaluation

The overall aim of the archaeological works is to understand the nature of potential buried archaeological landscapes, features and artefacts which may survive, and the geoarchaeological environment of the palaeo-channel as defined on Figure 1.

Modern overburden will be removed by the *Main Contractor* by machine in horizontal spits using a flat bladed ditching bucket under archaeological supervision by the *Archaeological Contractor* (C263) to expose any surviving natural geology or Prehistoric period layers. The top of the gravel layers are expected at c.98.00m across the site, with a possible localised dip to 96.00 at Trench 1. The archaeological focus of interest is expected to be roughly between 98.0 and 96.0m. Trench 2 will be dug to roughly 96.0 m with a focus of archaeological interest on layers between 99.0 to 96.0m (see Figure 1). These layers will be recorded and sampled by the *Archaeological Contractor* with provision for more detailed sample investigation and recording of any features of particular interest identified during this stage.

2.4 Scope of the proposed Geoarchaeological Evaluation

A further process of geoarchaeological analysis will be undertaken in the area east of Trench 2, covering the deeper palaeo-channel. This will take the form of a number of geoarchaeological boreholes placed to augment the existing deposit model.

6No. windowless samples will be located, across a 50m transect centred on the palaeo-channel. The windowless samples (metre-long Perspex tubes, 100mm diameter) will be obtained with a Terrier Rig. They are to be recorded and assessed on-site by the geoarchaeologist with further analysis allowed for off-site.

Core samples will be retained by the *Archaeological Contractor*. This will allow further analysis and will form part of mitigation for the portal. It would be conducted as part of the post-excavation assessment process.

Following the evaluation and archaeological trench evaluation, the deposit model will be updated by the C263 archaeological contractor to inform analysis.

3 Specific Requirements for the Main Principal Contractor

3.1 Archaeological Evaluation

The *Main Contractor* (C310) shall undertake to excavate two areas measuring 3 x 25 metres (see Figure 1 for location). This investigation area is required to evaluate the impact of Crossrail's Plumstead portal construction on archaeological features as identified in the WSI.

If significant or extensive archaeological remains are uncovered, the archaeological contractor will notify the Principal Contractor and Project Archaeologist, and mobilise their on-call archaeological support team, and any specialists required (eg geoarchaeologists or surveyors), to rapidly excavate and record the remains.

3.1.1 Archaeological Excavation Procedure

The *Main Contractor* shall:

- Ensure no live underground services exist in the area identified for excavation;
- Remove, under supervision of *Archaeological Contractor*, modern overburden to the predicted level of potential archaeological horizon (as predicted on Drawing No C122-OVE-C2-DDA-CR001_Z-21702). Reduction of the alluvium to the gravels by the mechanical excavator using a flat bladed ditching bucket will be carried out at between 100mm and 300mm spits as directed by *Archaeological Contractor* C263.
- Place excavated material in spoil heaps at an agreed safe distance from the site of the trench, as agreed with the *Archaeological Contractor*;
- Provide temporary works to support excavations to allow suitable access from ground level to bottom of excavated area for the archaeologists to work;
- Use of excavators or other plant within the excavation area shall only be undertaken with the agreement of and under the supervision of, the *Archaeological Contractor*;
- Allow for up to 6 archaeologists to be on site at any one time; and
- Provide further technical advice to the *Archaeological Contractor* as maybe required to safely complete the works.

3.2 Geoarchaeological Boreholes

The *Main Contractor* shall make safe an area where the work can be conducted and ensure Permit to Dig approval applies (see figure C122-OVE-C2-DDA-CR001_Z-21702). A clear operating area will be defined, which takes into account, potential buried services, vehicular and pedestrian movement.

The *Archaeological Contractor* will provide all equipment and personal to undertake the works.

3.3 Site Accommodation and Facilities

The *Main Contractor* shall provide the following site accommodation facilities for the use of archaeological operatives, inclusive of any hardstanding and services required

- Toilets, with drying and washing facilities;
- First Aid;
- Temporary office for the use of archaeologists complete with furniture; and,
- Secure storage facilities for tools, finds etc.

3.4 Healthy by Design

Additional considerations for provision of a safe working environment are given in Appendix B – Designer's Risk Control Log Summary, in accordance with the Crossrail Standards:

- *Healthy By Design: A guide for Crossrail Design Teams* (Document reference: CR-XRL-Z7-XCS-CR001-0001)

4 Instructions to *Archaeological Contractor* C263 and Specification

4.1 Archaeological Evaluation

The archaeological excavation will be carried out at Plumstead Portal (see Figure 1). Further background information on the general scope of work and requirements on the *Archaeological Contractor* are to be found in the Site Specific Written Scheme of Investigation for Plumstead Portal, document reference number: *C156-CSY-T-RGN-CR148_PT005-00028*.

In summary the *Archaeological Contractor* shall:

- Provide a suitably qualified archaeologist, experienced in archaeological site evaluation and the nature of archaeological deposits which are expected on this site;
- Provide a method statement inclusive of risk assessment and safe method of working;
- Following the initial overall strip and clean, individual features are to be hand cleaned and defined: sufficient to determine type, plan form and relationships (e.g. for structures and rebuilds); and recorded. Sufficient archaeological features/structures are to be sample excavated (see guidance in SS-WSI) either using a smaller machine with graded digging bucket (by the *Main Contractor* under archaeological supervision) or hand cleaned if appropriate;
- If significant archaeological material is located the CRL Project Archaeologist and C310 Site Manager are to be contacted. In discussion with the Statutory Consultee a process of archaeological investigation shall be undertaken;
- The Project Archaeologist may instruct further works as set out in a revised WSI or addendum if required.

4.2 GeoArchaeological boreholes

The geoarchaeological mitigation will be carried out at Plumstead Portal covering the area of deeper palaeo-channel.

The Archaeological Contractor shall as above:

- supply a suitably qualified Geoarchaeologist;
- provide a borehole rig and personal to undertake the boreholes
- Co-ordinate the geoarchaeological recording and sampling between the sample excavation areas and the evaluation elsewhere in the portal (also the previous borehole evaluation results/cores), in order to produce a geoarchaeological record which covers the extent of the portal site.

4.3 Deliverables

Within 7 days of completion of a fieldwork event the Archaeology Contractor shall submit an Interim Statement to the Project Archaeologist.

The required deliverables, including *Archaeological Contractor*'s Method Statement, Site Monitoring and Progress Reports, Site Archives, Interim Statement, Survey Report, Fieldwork Report, SMR Report, Summary Report and Post-Excavation Assessment are set out in Sections 8 and 9 of the Written Scheme of Investigation for Plumstead Portal (*C156-CSY-T-RGN-CR148_PT005-00028*) and in the C263 contract requirements.

Reporting will also require the updating of the Deposit Model to inform the analysis and understanding of the site.

5 Programme

A start date for archaeological evaluation has yet to be agreed with the CRL Site Manager but will likely be the 1st QTR 2012.

Geoarchaeological borehole investigation will be able to be undertaken at any time from January 2012, in agreement with the Principal Contractor.

The timetable involved in the archaeological evaluation is set out as:

- Archaeological Evaluation activities: Machine stripping by *Main Contractor* under archaeological supervision to depth as instructed by the supervising archaeologist. Evaluation of archaeological potential is expected to take up to two weeks.
- Archaeological monitoring will be required of subsequent bulk excavation of the portal to depths of interest identified in the trench evaluation stage (general and/or targeted) across the portal site;
- Post evaluation activities: This will involve interim reporting after seven days and post-excavation reporting and analysis as required.

The maximum duration for archaeological evaluation by trenching is two to three weeks.

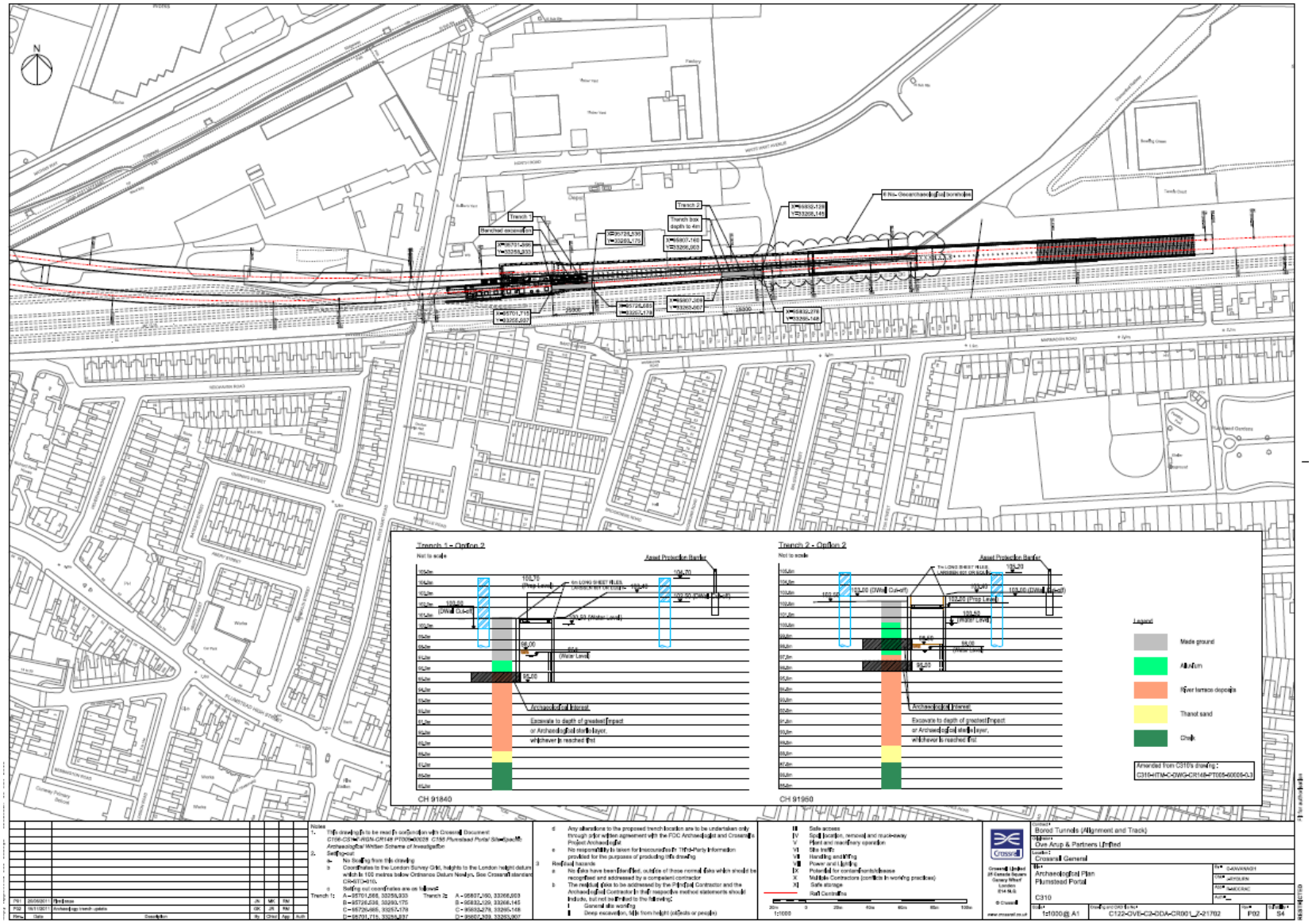
Duration for any subsequent detailed excavation, should significant finds be located, cannot be defined at this stage. Archaeological monitoring by Watching Brief will continue for the duration of the bulk dig and as defined in the WSI.

6 References

2011 C156 Plumstead Portal Site Specific Archaeological Written Scheme of Investigation, Document Number: *C156-CSY-T-RGN-CR148_PT005-00028*

Appendix A – Archaeological Mapping Information

Drawing C122-OVE-C2-DDA-CR001_Z-21702 Site plan including trench evaluation locations across the Portal site.



Appendix B – Designer's Risk Control Log Summary

Significant residual risks have been identified through *Designer's* risk assessment (Eliminate Reduce Isolate Control).

Activity	Health Risk	ERIC	Possible Control Measure	Responsibility
General Site Working	All following	E	Site Specific Induction, toolbox talks etc.	*Main Contractor*
		R	Contractors' Method Statements and Risk Assessments to be approved in writing prior to working. All site staff to confirm that they have read and understood MS and RA	*Designer* *Main Contractor* *Archaeological Contractor*
		I	Zoning of site activities to prevent unnecessary overlap of working areas	*Designer* *Main Contractor* *Archaeological Contractor*
		C	Ensure all site staff are competent and aware of risks (e.g. CSCS cards)	*Main Contractor* *Archaeological Contractor*
	Contact with plant/machinery, trips, falls,	E	Zoning of site activities to prevent unnecessary overlap of working areas	*Designer* *Main Contractor* *Archaeological Contractor*
		R	Minimum PPE to be worn at all times to include Hi-Visibility clothing, Hard Hats, site safety boots, safety glasses, gloves.	*Main Contractor* *Archaeological Contractor*
		I	Zoning of site activities to prevent unnecessary overlap of working areas	*Designer* *Main Contractor* *Archaeological Contractor*
		C	Minimum PPE to be worn at all times to include Hi-Visibility clothing, Hard Hats, site safety boots, safety glasses, gloves.	*Main Contractor* *Archaeological Contractor*

Activity	Health Risk	ERIC	Possible Control Measure	Responsibility
	Contaminated land/disease etc	E	Geotechnical reports indicate risk of contamination due to previous site use as railway.	*Main Contractor*
		R	Geotechnical reports indicate risk of contamination due to previous site use as railway. Appropriate PPE to be provided by *Archaeological Contractor* as required.	*Archaeological Contractor*
		I	Any areas of contamination identified during excavation are to be reported and remedial measures put in place prior to further excavation.	*Main Contractor* *Archaeological Contractor*
		C	Staff required to wash hands before ingestion of food/drink etc.	*Main Contractor* *Archaeological Contractor*
			Welfare for hygiene etc. is to be provided by Main contractor at Archaeologist site office, to include washing facilities	*Main Contractor*
Deep excavation Archaeological contractors will require access to deep excavations	Falls from height, tripping etc. Objects falling from height.	E	n/a	
		R	Dedicated Egress – ramping with edge guard is preferred option. Edge Guards/Heras fencing to be specified to provide barrier to deep excavation and prevent falls from objects into trench.	*Main contractor*
		I	n/a	
		C	Deep excavation signs	

Activity	Health Risk	ERIC	Possible Control Measure	Responsibility
	Burial from spoil or loose material falling into the trench	E	Working direction is to be controlled, with spoil delivered to a defined area or areas within the trench to be removed by machine directly into muck-away vehicles	*Designer* *Main Contractor* *Archaeological Contractor*
		R	Two routes are specified into trench (specific locations to be determined by *Main Contractor*)	*Designer* *Main Contractor*
		I	n/a	
		C	No spoil to be placed within 2m of trench edge	*Main Contractor* *Archaeological Contractor*
Plant and Machinery	Proposed Archaeological contractor's working route towards proposed location of plant. Risk of contact with excavating machine arm, crushing etc.	E	n/a	
		R	Appropriate PPE to be provided	*Archaeological Contractor*
		I	Ensure dedicated pedestrian routes away from arc of machine working	*Main Contractor*
		C	Employ banksman	*Main Contractor*
Site Traffic	Risk of injury or death from contact with moving vehicles	E	Proposed working and storage area for *Archaeological Contractor* to be located away from site traffic routes	*Designer* *Main Contractor* *Archaeological Contractor*
		R	n/a	
		I	Controlled crossing points and separation of pedestrian/site traffic routes	*Main Contractor*
		C	n/a	
Use of hand tools	Possible injury resulting from use of hand tools, e.g. mattocks, trowels, spades	E	n/a	
		R	Appropriate training and PPE to be provided	*Archaeological Contractor*

Activity	Health Risk	ERIC	Possible Control Measure	Responsibility
		I	n/a	
		C	n/a	
Adverse Weather	Changeable ground conditions leading to trips and falls etc.	E	n/a	*Archaeological Contractor*
		R	Use of Youngmans boards or similar is to be specified for the transportation of spoil where appropriate	*Main Contractor*
		I	Appropriate finishing to egress ramps (e.g. compacted hardcore/rubble to provide sufficient purchase, edge guard etc.)	*Main Contractor*
		C	Appropriate PPE to be provided for adverse weather working	*Archaeological Contractor*
	Adverse weather conditions may require use of electrical equipment powered by generators (e.g. pumps, temporary lighting etc), with accompanying associated risks for electrocution etc.	E	n/a	
		R	Energy Supply methods and risk assessment to be detailed in Contractor's method statements	*Main Contractor*
		I	n/a	
		C	Only staff with appropriate training are to operate generators and other electrically operated equipment (for example pumps)	*Archaeological Contractor*

Activity	Health Risk	ERIC	Possible Control Measure	Responsibility
Buried utilities/services Existing utilities plan indicates main utilities corridors are routed primarily through road surfaces and are not present within area of proposed evaluation.	Hazardous contact with buried services e.g. electrical shock, gas leakage/explosion, contamination through contact with sewage etc.	E	This area is to be excluded from the archaeological design and identified on plan. *Main Contractor* to confirm that appropriate action has been taken to decommission services prior to archaeological investigation. *Main Contractor* to identify location of utilities/services in Method Statement and on plan.	*Designer* *Main Contractor*
		R	n/a	
		I	Surface sweep (e.g. CAT scan) to be undertaken prior to excavation by *Main Contractor*.	*Main Contractor*
		C	Banksman to be employed to watch for possible buried services/utilities	*Main Contractor*
			Appropriate PPE measures as outlined above for contamination	*Main Contractor* *Archaeological Contractor*
Natural Methane	May be present in areas of peat.	E	n/a	
		R	Avoid creating confined spaces where methane could accumulate	*Main Contractor*
		I	Ensure gas monitors are provided, and training for use, where appropriate	*Main Contractor* *Archaeological Contractor*
		C	Appropriate PPE measures as outlined above for contamination	*Main Contractor* *Archaeological Contractor*
Unexploded ordinances (UXO)	Records show there is a low risk	E	*Main Contractor* to employ UXO specialist to undertake site survey and probe for UXO	*Main Contractor*

Activity	Health Risk	ERIC	Possible Control Measure	Responsibility
		R	Briefing by UXO specialist to site staff where appropriate.	*Main Contractor*
		I	Potential UXO to be reported immediately to site manager and isolated. Any works halted.	*Main Contractor*
		C	Following identification Authorities to be informed. Procedures for remediation as set out in Main Contractor's method statement to be enacted	*Main Contractor*
Dewatering system doesn't draw water down effectively – increases risk of contaminated water in trench	The risk to archaeological contractors is considered to be **low** assuming mitigation measures are followed	E	Geotechnical reports indicate risk of contamination due to previous site use as railway.	*Main Contractor*
		R	Appropriate PPE to be provided by *Archaeological Contractor* as required.	*Archaeological Contractor*
		I	Remedial measures put in place prior to further excavation if water ingress becomes a risk	*Main Contractor* *Archaeological Contractor*
		C	Staff required to wash hands before ingestion of food/drink etc.	*Main Contractor* *Archaeological Contractor*