C140 – Whitechapel Station

WRITTEN SCHEME OF INVESTIGATION

Document Number: C140-HYD-T1-JLT-D061-00001

Document History:

Revision:	Date:	Prepared by:	Checked by:	Approved by:	Reason for Issue:
4.0	03-05-11	[redacted]	[redacted]	[redacted]	IFA

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Document History Continued:

Revision:	Date:	Prepared by:	Checked by:	Approved by:	Reason for Issue:
1.0	10-06-10	[redacted]	[redacted]	[redacted]	IFI
2.0	03-11-10	[redacted]	[redacted]	[redacted]	IFR
3.0	15-12-10	[redacted]	[redacted]	[redacted]	IFR

Document History (CR-SD-WHI-EN-SY-00001):

Version:	Date:	Prepared By:	Checked by:	Approved by:	Description / Version History
1.0	31/01/08	[redacted] (MDC3)	[redacted] (MDC3)	[redacted] (MDC3)	First draft for issue with scheme design
2.0	23/04/08	[redacted] (MDC3)	[redacted] (MDC3)	[redacted] (MDC3)	Second issue
3.0	30/09/08	[redacted] (MDC3)	[redacted] (MDC3)	[redacted] (MDC3)	Scheme Design 3 Submission
4.0	26/11/08	[redacted] (MDC3)	[redacted] (MDC3)	[redacted] (MDC3)	To accompany Schedule 7 Construction Arrangements
5.0	31/03/09	[redacted] (MDC3)	[redacted] (MDC3)		Incorporating PCS03
6.0	24/11/09	[redacted], (MDC 3)	[redacted] (PDP)	[redacted] (PDP)	For inclusion with ITT

Contents

1 Executive Summary

The Crossrail Specialist Technical Reports: Assessment of Archaeological impacts (Part 1-6), published in February 2005 in support of the Crossrail Environmental Statement, identified the archaeological potential of the Whitechapel Station area and the potential impacts of the Crossrail Scheme.

Detailed Desk-Based Assessment (DDBA) has subsequently been undertaken for the main construction elements and associated worksites outlined in the Scheme Design for Whitechapel Station. The report assessed the impact of proposed Crossrail works on archaeological deposits that may survive within the three identified sub-sites (Cambridge Heath Road Shaft, Durward Street Shaft and Interchange, Hammersmith and City and District Line (HCDL) Work Site at Fulbourne Street).

Whitechapel Station is located in the London Borough of Tower Hamlets, with parts of the site situated within an Area of Archaeological Importance. The Whitechapel Street Station sites exhibit a potential for archaeological deposits ranging in date from the Roman to the post-medieval period. A potential for Roman remains can be expected due to the London to Colchester Roman road which lies to the south of the Crossrail worksites at Whitechapel station. In general, Saxon and medieval archaeological evidence from the zone is limited and scattered, as befits a largely rural landscape. By the mid 18th century the area from Whitechapel towards the City of London was developed significantly.

There are no known underground obstructions within the locations of the three sub-sites. A number of buildings identified in the obstruction survey (Crossrail 2007) lie close to the sub-sites, although, these are unlikely to have affected archaeological deposits within the three sub-sites themselves. The construction of Whitechapel station, railway cutting and suburban development will have caused significant disturbance. It is also known that the area was heavily bombed during World War II, so there is a possibility that bomb damage may also have adversely affected archaeological deposits.

Previous archaeological investigation indicates that industrial activity (including brickearth quarries and the extensive basements of late 19th/early 20th century phases of Albion Brewery) will have significantly reduced the survival of earlier archaeological features. The East London Line is in an 8m deep cutting and the District Line platforms are in a cutting approximately 3m below street level (Durward Street). Archaeological deposits are unlikely to survive within the railway cuttings.

The construction of the shafts at Essex Wharf (Durward Street Shaft) and Cambridge Heath Road (Cambridge Heath Road Shaft, Grout Shaft and Tunnel Access Shaft) will remove any archaeological deposits that survive in their footprints.

At Essex Wharf, mitigation will be through an archaeological watching brief.

Archaeological field evaluation will be required at the Cambridge Heath Road Worksite. The evaluation should take place during **Phase 1** Enabling Works, immediately after demolition and site clearance, prior to the Main Works phase. Depending on the results of the trial trench evaluation, further mitigation in the form of archaeological excavation and recording and/or watching brief may be required and would constitute *preservation-by-record*.

Listed Building recording is required for the well at Albion Yard Listed Building. There is a Appendix 2 Heritage Deed for these works.

Non-listed built heritage assets requiring recording and protection have been identified at the Crossrail worksites for Whitechapel Station. This includes the walls, bridges and parts of the existing station that are to be demolished. A Conservation Area Consent is being sought for the demolition of the walls and bridges as these works were not included in the Crossrail Act. Crossrail have determined that Conservation Area Consent is not required for the partial demolition of the station buildings. A heritage report on the station buildings has been prepared for information.

Instrumentation and monitoring is required for some buildings in the Whitechapel area. This information was not available to C140 at this time. The WSI contractor should liaises with Crossrail as required to obtain any necessary information relating to listed and non listed built heritage.

The programme used to prepare this WSI is subject to change and all dates and WS ID refs. must be checked with Crossrail to ensure appropriate time is allowed in the programme for the specified archaeological works. Based on the enclosed programme, Enabling Works are programmed to occur between Mid 2010 and Mid 2011. Main Works are scheduled for Mid 2011 to Mid to Late 2016.

2 Project Background

2.1 Introduction

The overall framework within which archaeological work will be undertaken is set out in the Environmental Minimum Requirements (EMR) for Crossrail (3rd draft November 2007). The requirements being progressed follow the principles of Planning Policy Statement 5: Planning for the Historic Environment (2010). Accordingly the nominated undertaker or any contractors will be required to implement certain control measures in relation to archaeology before construction work begins.

The strategy for archaeological works has been set out in the Crossrail Generic Written Scheme of Investigation (WSI) (Document Number 14022008-44ES-P2Z1). The Generic WSI presents the strategy for archaeology design, evaluation, mitigation, analysis, dissemination and archive deposition that will be adopted for the design and construction of Crossrail. The Generic WSI provides a general statement of objectives, standards and structure for the planning and implementation of archaeological works (Feb 08, version 1.0 section 3).

This site specific WSI addresses the works required for Whitechapel Station.

The programme used to prepare this WSI (Annex 6) is subject to change and all dates and WS ID refs. must be checked with Crossrail to ensure appropriate time is allowed in the programme for the specified archaeological works. Based on the enclosed programme, Enabling Works are programmed to occur between Mid 2010 and Mid 2011. Main Works are scheduled for Mid 2011 to Mid to Late 2016.

2.2 Site Location

Whitechapel Station is located approximately 1 mile east of the City of London along the A11 road corridor which is characterised by the urban scene around Whitechapel Road: a busy street with wide roads and pavements and the home of the Whitechapel Market.

The existing station entrance is set back from Whitechapel Road behind market stalls and therefore is often obscured from view. Whitechapel Road runs south of the facilities, with the ELL railway cutting running north south at its centre.

The Crossrail platforms will be running in an east-west configuration 25m below the ground across the site, with the Cambridge Heath Road Shaft, to the east and Durward Street Shaft and Interchange to the west projecting into above ground buildings.

The locations of the Crossrail works for Whitechapel Station are shown in Figures 1, 2 and 5 (Annex 3).

2.3 Summary of Previous Crossrail Studies

The general archaeological potential in the area of the Crossrail worksites for Whitechapel Station is described in the Crossrail Archaeological Impact Assessment and the Specialist Technical Reports: Assessment of Archaeological impacts (Part 1-6), published in February 2005 in support of the Crossrail Environmental Statement. A detailed desk-based assessment

of the Whitechapel Station site has also been undertaken for Crossrail (CR-SD-WHI-EN-SR-00001).

2.4 Geology and Topography

The records of the British Geological Survey (Sheet 256 – North London – of the 1:50,000 Series Geological Map, Solid and Drift Edition 1994) indicate that the Whitechapel Station site is underlain by Recent Taplow Gravel and River Terrace Deposits (RTD) over Palaeogene London Clay over Lambeth Group over Thanet Sand resting unconformably on Cretaceous C halk. Recent Langley Silt is shown immediately north of the site to the west and also to the north of the intersection of Vallance Road and Whitechapel Road to the east.

Ground level is fairly uniform across the zone, varying from 113m Above Tunnel Datum (ATD) in the west to 108m ATD above the edge of the alluvial silts with a further fall to the south-east to 104m ATD, reflecting the slight slope down to the Thames.

Refer to drawing numbers (see Annex 3: Figure 3) for geological cross-sections and the locations of the boreholes mentioned in the text.

A tributary of the Thames, known as The Black Ditch apparently ran through the Cambridge Heath Road Worksite from north to south (see 2.5 below) but this is not apparent in the geological mapping and modelling of the site.

2.5 Archaeological and Historical Development of the Site

The archaeological sites mentioned in the text are shown on Figure 1 and the location of the boreholes and their long section on Figure 3.

Essex Wharf Worksite (including the Durward Street Shaft and Interchange)

Ground level at the sub-site is consistent at just under 112m ATD with the East London Line (ELL) passing through the sub-site on a northwest-southeast orientation. The railway cutting is 8m deep. Boreholes from within the sub-site (WH5E; WH3TW; WH2R; WH1R; WH13R; WH14P; and WH14R) demonstrate that Made Ground is present across the site to varying depths, but that alluvial deposits may also survive at some locations (boreholes WH1R and WH4P). A layer of River Terrace Deposits overlie the London Clay across the sub-site in varying thicknesses dependent on the level of truncation by Made Ground. This indicates that River Terrace Deposits and possibly an alluvial layer are likely to be encountered at this sub-site.

Historic maps show that the area was largely undeveloped until the early 19th century when the area was developed as a distillery, a fact highlighted by the recent discovery of a large brick lined Victorian well at the sub-site (shown on Annex 3 Figure 1), which is probably related to this industry. To the west of the sub-site the area was extensively developed for housing but to the immediate east were areas of open ground including a Jews Burial Ground (BG213 on Figure 1). By 1873, the distillery was demolished and a railway line constructed running north-south into the Crossrail sub-site. By the early 20th century the site was entirely developed, particularly in terms of the underground railway, which would become the East London Line. This railway line divides the Durward Street Shaft and Interchange sub-site, passing straight through its centre. The large scale development around the underground railway is labelled as Essex Wharf on the 1938 Ordnance Survey map.

There is no potential for the survival of archaeological deposits within the railway cutting for the East London Line. However, boreholes within the sub-site indicate that a layer of River Terrace

Deposits (RTD) exists across much of the site and alluvial deposits may also survive in pockets. Made Ground can generally be expected at approximately 112.00m ATD to between 110.00 and 105.00m ATD, overlying c. 1-4m of River Terrace Deposits. Alluvial deposits, if present, will overlie the RTDs at about 109m ATD. This indicates that horizontally stratified deposits are unlikely to survive at this sub-site, however, cut features may survive within the RTDs and Alluvial deposits. Generally, archaeological remains could date from the Roman to the post-medieval periods, including low potential for Roman remains relating to the London to Colchester Roman Road that ran to the south of the site.

The extent to which modern building has truncated archaeological deposits is unknown, however, there is the potential for the survival of post-medieval remains within the Made Ground relating to the industrial development of the area, in particular the distillery that formerly occupied the site.

Durward Street Worksite

Ground level at the sub-site is at approximately 113.10m ATD (BH WH6) on Durward Street. The majority of the works at this sub-site are located within the cutting of the District and Hammersmith & City Underground Lines and as such will not affect archaeological deposits, which have already been truncated to the level of the London Clay. Beneath Durward Street borehole WH6 indicates that Made Ground is present to a depth of 110.30m ATD overlying c.1m of alluvium. River Terrace Deposits were also recorded at this location from a depth of 109.10 to 103.80m ATD overlying the London Clay. It is likely that that River Terrace Deposits and an Alluvial layer may be encountered at this sub-site.

The sub-site was open land to the north of the former Roman Road (London to Colchester) until the mid 18th century when the site contained some residential development with a Ducking Pond to the east. By the mid 19th century the surrounding area was significantly developed with housing. Durward Street was called Ducking Pond Row at that point and was renamed Bucks Row by 1873. By the early 20th century the site was called Durward Street.

There is no potential for the survival of archaeological deposits within the railway cutting for the District and Hammersmith & City Underground lines. Borehole WH6, within the sub-site indicates that a layer of River Terrace Deposits exists across much of the site, underlying a 1m layer of alluvium. Made Ground can generally be expected at approximately 113.00 to 110.0m ATD indicating that horizontally stratified deposits are unlikely to survive at this sub-site, however, cut features may survive within the RTDs and alluvial deposits.

The roads within the site have existed since the area was developed in the mid 19th century although it is uncertain the extent to which the alignment of the road has altered, particularly in light of the construction of the railway cutting to the immediate south and ELL in the east. The extent of the truncation resulting from the construction of the District and Hammersmith & City line cutting and retaining walls is unknown, however, it is assumed that only 1m beyond the extent of the retaining wall was removed. This appears to be confirmed by the results of borehole WH6 which shows surviving alluvial and RTDs within the sub-site.

Generally, archaeological remains could date from the Roman to the post-medieval periods, including low potential for Roman remains relating to the London to Colchester Roman Road that ran to the south of the site.

Cambridge Heath Road Worksite

Ground level at the sub-site is consistent at around 111.5±1m ATD. Boreholes from within the sub-site (SG1E and SG1EA) show the presence of Made Ground to approximately 107.5m ATD overlying River Terrace Deposits, beneath which is the London Clay (at 105.40m ATD). The bottom layers of the RTDs include black organic deposits, which may relate to the Black Ditch (see below) or its natural precursors. Boreholes just outside of the sub-site (WH10E and WH10EA) encountered brick footings with Made Ground at around 110m ATD, at which point the boreholes ended. To the south of the sub-site borehole WH12 identified 1m of alluvium underlying the Made Ground at a depth of 109.90 to 108.70m ATD. The results of these boreholes show that the level of survival of alluvium and RTDs across the site varies, with some areas likely to be truncated by previous development on the site and some with the potential for surviving alluvial deposits. It is likely that RTDs will be encountered overlying the London Clay across the site.

Historic mapping from 1703 shows the sub-site in use as sunken gardens with a 'Common Sewer' flowing through the area. It is assumed that this is the Black Ditch, a watercourse, probably rising near Spitalfields, which ran south-eastward through Haresmarsh to Mile End, crossing the Colchester road (ie Whitechapel Road) near the junction with Cambridge Heath Road, passing north of the parish church, and curving round into Poplar to enter the Thames at Limehouse dock. It may have given the name to Brokestreet, near the church, by the 14th century. In 1703 it crossed the Colchester road by a bridge, known as Stonebridge in 1731. (The stream was gradually culverted and by the late 18th century, when it was known as the Black Ditch, was clearly distinguished only between Rhodeswell Road and the Thames. Long straight stretches suggest that its course had already been modified.(Stepney: Early Stepney 1998)

In 1665 the parish of St Dunstan's Stepney acquired c1.25 acres of waste land on the north side of Whitechapel Road near Stonebridge for the use as an emergency burial ground (BG240, Figure 1).

The DDBA also noted that St Mary Moorfields had an additional burial ground in Whitechapel, referred to as being in Dog Row (Cambridge Heath Road), off Whitechapel Road, placing it in the general vicinity of the Cambridge Heath Road site. No further records of this burial ground have been located but there is clearly potential for human remains from this burial ground.

In the early 18th century the area was developed into housing fronting onto Whitechapel Road and Cambridge Heath Road. 1746 mapping shows a Ducking Pond which may extend into the north-western corner of Cambridge Heath Road shaft. By the 19th century the sub-site is still in residential use. This housing looks to have changed from irregular housing to terraced homes by the creation of the 1873 Ordnance Survey Map. A brewery is also shown extending into the centre of the Cambridge Heath Road sub-site on the 1819 Map with associated Alms Houses to the south. By the close of the 19th century the Albion Brewery has extended to encompass the majority of the sub-site. The Albion Brewery underwent numerous changes in ownership until it was closed by Grand Metropolitan in 1979. In the 1990s the entrance block (172 Whitechapel Road) was converted into flats and the majority of the brewery buildings were demolished and turned into a car park for Sainsbury's.

The foundations of former buildings, probably relating to the Albion Brewery and housing that existed on the site were encountered in boreholes. This has been confirmed by archaeological

evaluation at ABR93, which found extensive basements in part of the footprint of the Albion Brewery. Archive drawings of the Albion Brewery show that the basement extends into the southernmost section of the Sainsbury's Car Park, just beyond the existing boundary wall. The basements that project beyond the extent of the existing buildings were formerly below a yard and (now demolished) brewery buildings. There is therefore a potential for archaeological remains relating to the Albion Brewery and its development. Older archaeological deposits will have been removed to at least the depths of the basement structures, although alluvial and RTDs may survive beneath the depths of the basements.

Archaeological potential on the site, therefore, includes remains relating to the Roman road to the south, former use of the sub-site as sunken gardens; possible burials relating to the Great Plague of 1665; and post-medieval remains relating to former housing and the Albion Brewery. Generally, archaeological potential in the area could date from the Roman to the post-medieval periods, including low potential for Roman remains relating to the London to Colchester Roman Road that ran to the south of the site.

Wessex Archaeology undertook an archaeological watching brief at Albion Yard Car Park on two machine dug trenches (Annex 3). These were excavated to monitor ground that would be disturbed by the re-routing of services. The trenches went to 1.2m in depth and located only remains associated with the Albion Brewery and its conversion into flats in the 1990s. The results do not preclude the survival of significant archaeological deposits at deeper levels but they do suggest that service diversion may not affect significant archaeological deposits. (Crossrail Albion Brewery Car Park (Whitechapel Station) Archaeological Watching Brief Report MoL Site Code CXC10 Wessex Archaeology March 2010 Report reference: Document 77214.03). The report is included in Annex 2.

2.6 Heritage Consents

The archaeological contractor should be aware of the Heritage consents for Whitechapel station. At this time the following information is available regarding heritage consents

- In filling of Albion Brewery (LB) Well. Consent obtained Ref THA/3/1/H!
- Protection of Albion Brewery (LB) Basements. Consent is not required for the protection measures as described inset out in C140-HYD-T1-BPR-D061-00001. Any change to this method must be reviewed with Crossrail and LBTH.
- Instrumentation and Monitoring. It is understood that there will be some Instrumentation and Monitoring at Whitechapel. The archaeological contractor should consult Crossrail for details.
- Conservation Area Consent – Demolition of Walls and Bridges Ref THA/3/17. Works not specified in the Crossrail Act 2008 Consent is to be submitted to LBTH in May 2011.
- Crossrail have determined that the demolition of parts of the Station, (although not specified in the Crossrail Act 2008) do not require Conservation Area Consent. A Heritage report has been prepared for the station see C140-HYD-T1-XST-D061-00017.

3 Construction Impacts and Mitigation

3.1 Summary

The Crossrail works proposed at Whitechapel Station include a new ticket hall allowing interchange between Crossrail, the East London Line and the London Underground services. A shaft at Durward Street will intersect with western end of the Crossrail platform tunnels while a shaft at Cambridge Heath Road will be located at the eastern end of the Crossrail platform tunnels. Both shafts will provide emergency escape and intervention, ventilation and electrical and mechanical accommodation.

There is the potential for archaeological remains to survive at the following Crossrail worksites for Whitechapel Station:

- Cambridge Heath Road Worksite (Cambridge Heath Road Shaft, Grout Shaft and Tunnel Access Shaft).
- Durward Street Worksite formerly referred to as Hammersmith and City and District Line (HCDL) worksite) (Ticket Hall and HCDL Platforms.)
- Essex Wharf Worksite formerly referred to as Durward Street worksite (Durward Street Shaft).

In addition, there will be utilities diversions and protective works in the streets around the worksites (see below).

At present, no works are proposed in Vallance Road Gardens. This may be subject to change depending on development of C510 design.

The Crossrail works are divided into Enabling Works and Main Works. Enabling Works are defined as those works that are required to facilitate the Main Works, and as such are required prior to the start of the Main Works programme.

3.2 Enabling Works

Enabling Works at Whitechapel that could disturb archaeological remains include:

3.2.1 Essex Wharf Worksite

- Installation of the Diaphragm walls for the Durward Street shaft and West Stair shaft (C511) will remove all archaeological deposits within their footprint.
- Installation of a working platform over the East London Line (C244) is unlikely to affect archaeological deposits.
- Demolition of the buildings at Swanlea School (C245); construction of new accesses; removal of part of the school's canopy; and relocation of an existing utility sub-station in the school grounds are unlikely to affect archaeological deposits.

- New access and protective measures to the North Eastern Storm Relief Sewer (NESRS) (C217) may affect archaeological deposits. The scope of these protective measures is subject to detailed discussion with Thames Water.

- Footing for the tower crane at the work site (C512), which is to be located at different points in the worksite depending on the construction stage, is unlikely to affect any archaeological remains.

- Demolition of part of the Whitechapel Sports Centre (outdoor stores are unlikely to affect archaeological deposits).(C217)

- Worksite establishment is unlikely to affect archaeological deposits (C217).

3.2.2 Durward Street Worksite

- Footing for the tower crane at the work site (C512), which is to be located at different points in the worksite depending on the construction stage, is unlikely to affect any archaeological remains.

- Demolition of Fulbourne Street bridge; Fulbourne Street cable bridge; Court Street bridge; Woods Building bridge; the Booking-On office; removal of rail bridge from above the ELL; removal of the existing District Line canopies, the staircase from Whitechapel Ticket Hall and platform furniture (C512) are unlikely to affect archaeological deposits, however will result in the loss of non-listed built heritage features.

- Worksite establishment will not remove archaeological deposits.(C512)

3.2.3 Cambridge Heath Road worksite

- The diversion of utilities in Sainsbury's car park will partially remove archaeological remains at those locations (C217). There is a potential for burials in the Sainsbury's Car Park worksite.

- Worksite establishment (C217) may partially remove archaeological deposits.

- A well in the Albion Brewery basement (C217) will be infilled and the basement may require strengthening.

3.3 Main Works

The following impacts will be caused by the Crossrail Main Works at Whitechapel Station. It should be noted that location and final sequencing of the construction methodology will be finalised during the detailed design phase.

3.3.1 Cambridge Heath Road worksite

- Installation of the diaphragm walls will remove all archaeological remains at the Cambridge Heath Road Shaft. (C511)

- Excavation of the Cambridge Heath Road Shaft (C511) to the underside of ground floor ring beam level (110.6m ATD) will remove all archaeological remains to that depth (e.g. within Made Ground).

- Excavation of the Grout Shaft (C512) to approximately 106.0m ATD will remove all archaeological remains within the footprint of the shaft.

- Excavation of the Tunnel Access Shaft (C512) to approximately 106.0m ATD will remove all archaeological remains within the footprint of the shaft.

3.3.2 Durward Street and Essex Wharf Worksite worksites

Design is ongoing of the final station design at the Durward Street and Essex Wharf Worksites. This report will be updated when design is finalised. However, it is envisaged from previous investigations that the following impacts may be caused.

- Excavation behind existing retaining walls down to ELL levels (C511) will remove all archaeological remains at that location, if not truncated previously by the original construction of the retaining walls.

- Excavation of the shaft from within the diaphragm walls will remove all archaeological remains at that location (C512).

4 Aims and Objectives

4.1 Research Aims

Selected research themes derived from *A Research Framework for London Archaeology 2002* (Nixon et al, 2003) are included in the *Assessment of Archaeology Impacts Technical Report* (Crossrail 2005), and are set out below.

Evidence for burials relating to the emergency burial ground acquired by the Parish of St Dunstans Stepney following the Great plague of 1665 has the potential to contribute to the following research aims.

- Understanding life expectancy, origins and belief, seen through studying health, diet and disease, and preparing models for future research;
- Considering the relationship between cemeteries and major or minor roads, in terms of symbolism, status, privacy and convenience; and
- Understanding the differences, if any, between burial practices in the city and outlying cemeteries.

Evidence relating to post-medieval development of the area, and in particular the development of the Albion Brewery and the Distillery at the Durward Street Shaft site may contribute to:

- Establishing how daily work and life in London reflected and contributed to the rise of London as the commercial centre of the British Empire, and to its continued eminence as a world city thereafter;
- Charting how and why different parts of London developed as specialist producers and understanding the implications of this for London as a world city; and
- Examining the concept of core/periphery for different periods in London's past, as a means of understanding how evolving settlement patterns reflect the need for sustainable, beneficial relationships between a settlement and its environs, a city and its hinterland.

Specifically, archaeological investigations at the work site for the Durward Street shaft and Cambridge Heath Road shaft have the potential to recover:

- Archaeological remains of Roman - medieval date relating to the Roman – medieval road from London to Colchester.
- The possible site of St Mary Moorfields Catholic Church additional burial site (the exact location for which is unknown). It may be located by the Cambridge Heath Road shaft or, possibly, any of the other works.

- Archaeological remains of post-medieval agricultural, industry and general urbanisation, including the Albion Brewery at Cambridge Heath Road Shaft and the Distillery at the Durward Street Shaft and Interchange.

- 'Black Ditch', once a natural watercourse but probably culverted from the medieval period. It ran from north to south, through the area of the Cambridge Heath Road work site and may be located by the Cambridge Heath Road shaft or, possibly, any of the other works.

- Possible emergency burial ground used during the Great Plague of 1655 on the Cambridge Heath Road worksite which might be located by any of the works on that site.

5 Scope of the Investigation and field methodology

The results of archaeological monitoring of Geotechnical Package 13 investigations have been reviewed but no updates to the strategy are considered to be required.

5.1 Essex Wharf Worksite

A watching brief will not be required at the establishment of the worksite on Essex Wharf Worksite because of the shallow nature of the works and the depth of made ground in this area.

Archaeological mitigation in the form of a targeted watching brief by C261 will be required on works identified to potentially impact archaeological deposits during both the Construction works by C511 and C512.

Mitigation measures are defined in the Crossrail Archaeology Generic Written Scheme of Investigation (Document Number 14022008-44ES-P2Z1).

Should particularly complex remains (that is to say, more than isolated features which can easily be dealt with by the on-site archaeological team) be revealed work may have to cease in the area while an archaeological team is brought in and the remains recorded. See Annex 7 for accommodation and storage requirements.

5.2 Durward Street Worksite

Enabling and Main Works

A watching brief will not be required at the establishment of the worksite on Durward Street (Bus Stand Area) because of the shallow nature of the works and the depth of made ground in this area.

5.3 Cambridge Heath Road Worksite

Enabling Works

General watching brief (C261) (AE1130) will be required at the utilities diversions (C217) within the Sainsbury's Car Park.

General watching brief (C261) at the establishment of the worksite at the Sainsbury's Car Park (C217) (EWWHIX0203).

Archaeological field evaluation (C 217) comprising three trial trenches will be required to establish the nature, extent, survival and significance of archaeological remains. The location of the area in which evaluation will be required is shown on Figure 4, Annex 2. The dimensions shown are those of the trenches at their base. It has been assumed (not least for the CDM RA) that they will have vertical sides lined by steel sheeting with appropriate support but the design of the support is a matter for C217. Provided the excavations are of the dimensions shown (on Figure 4) at their base then they could be in open-cut with battered sides.

Results of the archaeological evaluation will inform the mitigation design, and will constitute *preservation-by-record* (e.g. archaeological excavation and/or watching brief). These mitigation measures are defined in the Crossrail Archaeology Generic Written Scheme of Investigation (Document Number 14022008-44ES-P2Z1).

The mitigation would consist of an excavation or a targeted or general watching brief on works identified as potentially impacting archaeological deposits during both the Enabling works and the Construction works.

5.4 Non-Listed Built Heritage Assessment and Recording

Non-listed built heritage assessment and recording forms part of the archaeological mitigation strategy for Crossrail. The definition of non-listed built heritage adopted follows Information Paper D22 Archaeology and encompasses above ground historic features and structural elements of historical interest.

Two main groups are:

- Non-listed buildings proposed for demolition in conservation areas; and
- Historic street furniture and materials falling within a worksite and being temporarily or permanently impacted upon by the works.

The detailed scope for this element of works includes:

- Important non-listed buildings of historic interest proposed for demolition in conservation areas (as set out in Information paper D18, Listed Buildings and Conservation Areas);
- Important non-listed historic street furniture and materials;
- Other important non-listed buildings and structures of historic interest outside conservation areas (i.e. the standing walls at Stepney Green), locally listed station buildings and railway structures and any industrial and defence archaeology of significance.

The Crossrail Environmental Statement and supporting Specialist Technical Reports define the baseline built heritage resources (both statutorily protected and non-listed) across the route, the potential significant impacts, mitigation and any residual impacts after that mitigation is employed (Crossrail 2009).

An archaeological (non-listed built heritage) assessment and internal inspection has been carried out to determine the need for, and/or level of, mitigation works in advance of demolition. The results of the survey undertaken by the MDC3 contractor are presented below. Additionally Conservation Area Consent has been required to demolish the Winthrop Street and Durward Street Bridges.

Street furniture surveys have been carried out by EWMA, which have identified all elements of street furniture at Whitechapel Station. The results of the EWMA survey have been reviewed by the MDC3 Heritage Specialist in order to identify street furniture of historic significance and start compiling the scope for NLBH recording. The results of the survey are outlined in Table 1, Annex 2. The location of NLBH assets are shown on Figure 5, Annex 3.

Demolition works are proposed for the existing station. This includes demotion of part of the station building, demolition of Winthrop St bridge and Durward St Bridge and associated walls. CRL have determined that Conservation Area consent is not required for the partial demolition of the Station. Conservation Area Consent is currently being sought from the London Borough of Tower Hamlets for;

- THA/3/17 - Conservation Area Consent - Bridges and Walls

It is likely that the consent will require some form of monitoring, recording and salvage of built heritage assets located within the Whitechapel Conservation Area. The Conservation Area Consent will confirm any need for these works to be undertaken but they are considered likely to be a specified below. These works (see below) will then be undertaken by Archaeological Contractor C261. Sufficient time must be allowed within the Main Works programmes to allow for this required recording and salvage work.

Whitechapel Station
An English Heritage Level II Building Record will be required (C261) of all areas of the station that are going to be affected by the works. See Table 1, Annex 2.

Albion Brewery – Well and East basement
Works to be undertaken to the well in the Albion Brewery basement are set out in the Submission of Particulars under Appendix 2 of the Heritage Deed for the works (C140-HYD-T-RGN-D061-00008 – Annex 2). This specifies that a new CCTV survey is part of the proposed works (C217) and that photographs will also record the progress of the works (C261). Upon completion the photographs will be indexed and referenced (C261) to the existing drawn survey to produce (C261) an English Heritage Level 2 record. In addition, any physical works to the fabric of the Albion Brewery Listed Building (eg opening up the access hole in the ceiling of the basement) should be undertaken with the supervision of an archaeologist (C261).

Albion Brewery – West Basements
There is a risk of the basement of the Albion Brewery collapsing depending on the final method of construction developed by the contractors on site. One option has been developed for basement strengthening (C140-HYD-T1-BPR-D061-00001). This has been submitted to the London Borough of Tower Hamlets (LBTH) for information advising that if such works were required and were carried out in accordance with the method set out in the report Listed Building consent would not be required. LBTH have confirmed in letter (REF ENV/THA/3/D1of10 November 2010) that should works be required and if they were carried out in accordance with method described then LBC would not be required. Any deviation from this

method may require LBC and it would be for the Contractor on site to secure any necessary consents.

Other wells and basements
There is a risk that the work may uncover other wells and basements in the Cambridge Heath worksite. The proposals developed for the know wells and basement will be applied as appropriate to any other listed wells/basements

6 Programme

6.1 Introduction

Site-specific evaluation and mitigation measures are presented using the following phasing:

- **CRITICAL phase** advanced archaeological works which need to be undertaken prior to the Enabling Works (this may apply to very significant archaeological remains where complex mitigation is required and where early site access is required);
- **Phase 1** archaeological works to be undertaken commensurate with the programme of Enabling Works;
- **Phase 2** archaeological works to be undertaken commensurate with the Main Works; and
- **Phase 3** archaeological works to be undertaken after the Main Works (e.g. post excavation assessment, analysis, publication and dissemination).

The results of archaeological monitoring of Geotechnical Package 13 investigations shall be reviewed at detailed design and the archaeological evaluation and mitigation strategy will be updated if necessary.

Where information regarding obstructions (existing piles, foundations and basements) is currently unknown, a review of information collected at detailed design will be undertaken at the earliest opportunity. Archaeological evaluation and mitigation strategies will be updated as required.

The programme details have been taken from PCSO4 - WBS P02 June 2010. Programme and order of work for implementation of works and integration with other activities can been found in Annex 6. It should be noted that the programme of works is an active document and therefore all dates and activities highlighted herein are subject to change.

6.2 Archaeological Investigation – Essex Wharf Worksite

Enabling Works

A watching brief will not be required at the establishment of the worksite on Durward Street (Essex Wharf) at Enabling Works stage (Mid 2009 – Early 2011) because of the presence of 2-7m of modern made ground and the shallow depth of excavations.

The enabling works will be carried out by C217 and C511. C217 will carry out the North East Storm Relief Sewer, mobilisation will occur between the 18th of November and 15th of December 2010 all works will be complete by the 27th of May 2011. The following enabling works will require archaeological supervision:

- C217: North East Storm Relief Sewer Work: construct Access shaft between 15th February and the 6th March 2011 (AWWHIC5055).

Construction Works

Mitigation during the construction phase would consist of a targeted watching brief by C261. C511 work commence at Durward Box on the 17th of June 2011. C511 complete works and handover to C512 on the 16th of April 2012. C512 complete works on the 11th of October 2016. Works which require mitigation are:

- Durward Street Shaft Phase 1:
  - C511 excavate to +105m and remove gravity wall between the 26th October 2011 and the 19th December 2011 (WS2020)
  - C512 "bottom-up" excavate to formation level between the 1st May and 1st November 2012. (WS2050)

A targeted watching brief will be undertaken during C511's removal of the gravity wall and bulk excavation to 105m ATD. This will seek to identify and record any archaeological remains which may be revealed in the course of the excavation. Should particularly complex remains be revealed which cannot be dealt within a working day by C261's on-site team work may have to cease while an archaeological team is brought in and the remains are recorded.

6.3 Archaeological Investigation – Durward Street Work Site

Enabling Works

Non-listed built heritage recording of various elements at Whitechapel Station and consultation regarding the donation of architectural elements and/or furniture to the London Transport Museum or other relevant body.

The following works will require input from C261 in terms of both English Heritage Level 2 Building Record and supervision of the removal of heritage assets to be retained or re-used.

- C512 Demolition of northern arm of footbridge (WS3035) to be observed and photographed by C261.
- C512 Soft strip existing ticket hall (WS3330) to be recorded by C261 and the wooden panels and iron ribs retained for re-use (see Table 1 Annex 2)
- C512 Dismantle existing ticket hall canopy structure (WS3340) to be recorded by C261
- C512 Demolition of the small room structures and stair cases at the end of the ELL platforms (WS3350) to be recorded by C261
- C512 Remove roof sections of the existing ticket hall (W3380) to be recorded by C261
- C512 Demolition of the internal structure of the ticket hall from within and above the ELL bridge/brick arch structure (WS3390) to be recorded by C261

A watching brief will not be required at the establishment of the worksite Durward Street (Bus Stand Area) at the Enabling Works stage (Mid 2009 – Early 2011) because of the depth of modern made ground and minimal impact of these works.

6.4 Archaeological Investigation – Cambridge Heath Road Worksite

Enabling Works

C217 will carry out the enabling works at Cambridge Heath Road Worksite between the 16th of December 2010 and the 18th July 2011 (EWWHIX2015)

In the Sainsbury's Car Park C261 commence Archaeological watching brief (AE1130) from the 16th of December 2010.

General watching brief will be required at the utilities diversions with the Sainsbury's Car Park at the Enabling Works stage (Early 2010 – Late 2010). Archaeological mitigation will be required for the following works:

- Phase 1 works:
  - carry out utility diversion works between 11th and 31st of January 2011
  - Install new drainage between 16th of December 2010 and the 17th of January 2011
- Phase 2 works:
  - Utility Diversion between the 11th of January and the 7th of February 2011.
  - Sub Station strengthening and EDF cable realignment (cable realignment (access shaft) and install the cable pits and ducts for EDF) between the 20th of September 2010 and the 15th of July 2011

General watching brief at the establishment of the worksite at the Sainsbury's Car Park at Enabling Works stage (Mid 2009 – Early 2011). Detail of these works are presented below.

- Phase 1 works:
  - Set up site facilities (phase 1) 15th and 22nd of December 2010.
  - Albion Brewery alternative (specifically install foundations (piles or deep concrete strip) for access) between 18th of November 2010 and the 12th of April 2011
  - Sainsbury's/ Albion Brewery wall demolition, between 12th and the 28th of April 2011.
- Phase 2 works:
  - Albion Brewery Basement Strengthening (installation of strengthening works/ fill basement) carried out between 13th of May and the 8th of July 2011
  - Albion Brewery Basement strengthening (under the west car park) between 20th of May and the 18th of July 2011.
  - Albion Brewery well stabilisation between 18th of November 2010 and 24th of June 2011.

Archaeological field evaluation should occur in the Enabling Works stage (Early 2011) after utilities diversions have taken place.

Field evaluation should occur as soon as feasible to allow time for possible mitigation measures.

The archaeological evaluation (C217) will consist of three trial trenches. One trial trench will be located in the Tunnel Access shaft, orientated north-south (2m by 11m at its base). The second trial trench will be located across the Grout shaft, orientated north-south (2m by 4m at its base). The final trail trench will be located within the Cambridge Heath Road Shaft, orientated south-east to north-west (4m by 10m at its base, c.4% area). Borehole information (WH 32R and WH33R) indicates that made ground is present between 3.5m and 4.5m below ground level. RTDs are present below the made ground. The depth of the made ground means that it is likely the trial trenches will be excavated to 4.5m to reach archaeological deposits. Attendance requirements are listed in Annex 7.

Archaeological field evaluation will take c. 2-4 weeks on site. Reporting will also take up to 4 weeks (total 8 weeks).

The results of the evaluation will inform the mitigation design and will comprise *preservation-by-record* (e.g. archaeological excavation and/or watching brief). Mitigation will be programmed according to feasibility in the construction sequence and could occur at Phase 1 Enabling Works or Phase 2 Main Works.

A minimum of 8 weeks should be allowed in the programme between evaluation fieldwork end and start of mitigation work. This incorporates the 4 weeks of reporting mentioned above and preparation of a WSI for mitigation works.

Construction Works

Mitigation during the construction phase would consist of a watching brief. The need for a watching brief will be determined by the results of the evaluation. C511 work commence at Cambridge Heath Road shaft on the 19th of July 2011. C511 complete works and handover to C512 on the 23rd of February 2012. C512 complete works on the 27th of April 2015. Works which may require mitigation are:

- C512: set up tower crane base and crane on the 8th March 2012.(WS1090)
- C512: Bulk excavation to +106m between 8th March and 19th of May 2012. (WS1100)
- C512: Bulk excavation to +101m between the 21st May 2012 to 2nd June. (WS1210)
- C512: Bulk excavation to +96m between the 6th June and 26th June 2012. (WS1230)
- C512: Bulk excavation to +86m between the 27h June and the 17th July 2012. (WS1250)
- C512: Bulk excavation to +81m and blinding between the 21st August to 10th September 2012. (WS1270).

7 Specification for Evaluation & Mitigation (including Watching Brief)

7.1 Generic Standards

7.1.1 The archaeological evaluation and mitigation works and scope of any archaeological scientific methods shall be designed and undertaken in accordance with the Generic WSI and relevant best practise guidance (and any subsequent revisions) i.e.:

- Crossrail standards and specifications;
- Institute for Archaeologists - Standard and Guidance for archaeological field evaluation, 2008 (revised);
- Institute for Archaeologists - Standard and Guidance for archaeological excavation, 2008 (revised);
- Institute for Archaeologists - Standard and Guidance for an archaeological watching brief, 2008 (revised);
- Museum of London collections and archive policies and guidance;
- English Heritage - Geoarchaeology, 2007;
- English Heritage - Archaeological Science at PPG16 interventions: Best Practice Guidance for Curators and Commissioning Archaeologists, 2003;
- GLAAS Archaeological Guidance Papers 1999;
- Corporation of London archaeology guidance - Planning Advice Note 3, 2004;
- Museum of London Archaeology Service site recording manual (MOLAS 1994); and
- English Heritage - Understanding Historic Buildings - A guide to good recording practice, 2006

Potentially nationally important remains

7.1.2 Where unexpected, potentially nationally important archaeological remains (as defined in the Crossrail Environmental Minimum Requirements and Generic WSI) are identified during the works, the Archaeology Contractor shall undertake works in accordance with the Environmental Requirements (archaeology) section of the relevant package Works Information and shall adhere to procedures as set out in the SS-WSI.

7.1.3 The Archaeology Contractor shall submit details of their procedure for excavating and recording potentially nationally important remains in the Archaeology Contractor's Method Statement.

7.1.4 Project Archaeologist to insert the procedure (or reference to the procedure) to be followed in the SS-WSI, identifying any specific individual roles or circumstances that are relevant to the works. Details shall include how relevant parties are to be informed

of such discoveries, the criteria to be utilised by the Archaeology Contractor in the assessment of the significance of such discoveries and the timescales to be adhered to.

7.1.5 As a result of the discovery of unexpected, potentially nationally important archaeological remains, the SS-WSI will be updated by the Project Archaeologist to incorporate any additional specific primary fieldwork event aims.

Human Remains

7.1.6 Certain aspects of the normal legal procedure for the removal of human remains (and associated monuments) from burial grounds has been modified by Schedule 15 to the Crossrail Act 2008. However for other aspects, normal legislation applies.

7.1.7 Where human remains are identified, all subsequent works must be undertaken in accordance with relevant legislative and environmental health requirements as set out in the Environmental Requirements (archaeology) section of the relevant package Works Information.

7.1.8 Project Archaeologist to insert the procedure (or reference to the procedure) to be followed in the SS-WSI, identifying any specific individual roles or circumstances that are relevant to the works. Details shall include how relevant parties are to be informed of such discoveries, the criteria to be utilised in the assessment of the significance of such discoveries, the application process for licences and the timescales to be adhered to.

7.1.9 The Archaeology Contractor shall confirm how the requirements set out in the SS-WSI will be implemented as part of their procedure for excavating and recording human remains in the Archaeology Contractor's Method Statement. This should incorporate best practice guidance e.g. Council for the Care of Churches (1999) and English Heritage (2002 and 2002a).

7.1.10 At sites known in advance to have a high risk of encountering human remains, provision shall be made by the Archaeology Contractor for site inspection by a recognised specialist.

7.1.11 Should human remains be discovered, the Archaeology Contractor shall notify the Project Archaeologist immediately so that these procedures can be implemented. This notification may be initially made personally or by telephone but shall be confirmed in writing within 24 hours of discovery.

7.1.12 The Principal Contractor will be required to cease all works at that location until further instruction is provided by the Project Archaeologist. The Archaeology Contractor shall undertake an initial in situ observation and assessment of the remains and shall advise the Project Archaeologist of the course of action required.

7.1.13 Lifting of human skeletal remains shall be kept to the minimum which is compatible with an adequate evaluation or excavation. Notwithstanding this, the Archaeological Contractor shall ensure that all burials are planned/photographed in-situ and that appropriate samples have been recovered prior to any lifting.

7.1.14 Visible grave goods and other obvious artefacts, shall be recorded and lifted before the end of the working day to avoid the risk of vandalism and theft. Where this is not feasible or appropriate, the Archaeology Contractor shall ensure, on liaison with the Project Archaeologist that adequate site security is provided by the Principal

Contractor. As a minimum, this will require a 24 hour comprehensive security regime until sensitive remains have been recorded and lifted.

7.1.15 As a result of the discovery of unexpected, potentially nationally important archaeological remains, the SS-WSI will be updated by the Project Archaeologist to incorporate any additional specific primary fieldwork event aims.

Treasure Act

7.1.16 The Treasure Act 1996 defines 'Treasure' as:

- Any object at least 300 years old when found which is: not a coin, but has metallic content of which at least 10% is precious metal; or
- One of at least two coins with at least 10% precious metal content;
- One of at least 10 coins;
- Any object at least 200 years old designated as treasure by the Secretary of State;
- Any object which would have been 'Treasure Trove';
- Any object found with any of the above.

7.1.17 The Treasure (Designation) Order 2002 extends the definition of treasure to include:

- Finds of at least two base metal objects (other than coins) of prehistoric date; and
- Any object (other than a coin) of prehistoric date with any precious metal content.

7.1.18 All finds falling within the definitions of treasure shall be reported immediately to the Project Archaeologist and all subsequent works must be undertaken in accordance with the relevant legislative requirements as set out in the Environmental Requirements (archaeology) section of the relevant package Works Information.

7.1.19 The Archaeological Contractor should immediately inform the PDP Archaeologist and the PDP Site Manager of any such finds. All parties will then, if required, meet to agree appropriate timescales to deal with such finds.

7.1.20 To protect the finds from theft, the Archaeology Contractor shall record the finds and remove them to a safe place. Where recording and removal is not feasible or appropriate on the day of discovery, the Archaeology Contractor shall ensure, on liaison with the Project Archaeologist that adequate site security is provided by the Principal Contractor.

7.1.21 Subject to the Provisions of the Treasure Act 1996, all material that is defined as Treasure is vested in the franchisee or, if none, the Crown.

7.1.22 With respect to Treasure finds, a reward may be payable to the finder, the landowner and/or the occupier. The Crown usually offers finds to a museum.

7.2 Use of Plant and material

7.3 Health and safety

7.2.1 The Archaeology Contractor shall undertake the works in accordance with the Employer's Health and Safety requirements and the Principal Contractor's Health and Safety Plan. Where specific health and safety constraints or requirements for the Archaeology Contractor's method of work are required, these shall be set out in this section and detailed in the Archaeology Contractor's Method Statement (in the Health and Safety Plan).

7.2.2 No ground intervention or other survey shall be made without approval of the Archaeology Contractor's Health and Safety Plan, Method Statement and Risk Assessment by the CDM co-ordinator.

7.2.3 Hand excavation or other remote sensing method may be required prior to any mechanical excavation in the first instance to locate any known or suspected below ground hazards. The Archaeology Contractor's Method Statement and Risk Assessment shall take account of any design information (including the Designer's and Principal Contractor's Risk Assessment) pertaining to above ground hazards such as buildings and other structures or public rights of way and below ground hazards such as services, utilities and infrastructure and shall contain a site specific Risk Assessment for unknown below ground hazards such as contaminants including unexploded ordnance. All appropriate mitigation measures shall be in place prior to commencement of any ground intervention or other survey.

7.2.4 Trial trench excavation method and earthworks support design, shall conform to Health and Safety legislation and safety standards as well as incorporating current engineering best practice, where appropriate

7.3 Spatial survey setting out and recording requirements

7.3.1 The spatial extent of the investigation(s) shall be set out in accordance with the setting out co-ordinates supplied by the Project Archaeologist. All spatial setting out and recording shall be in accordance with The London Survey Grid Standard (formerly Crossrail Survey Grid). See Crossrail standard CR-STD-010.

7.3.2 Interventions shall be located to a horizontal accuracy of +/-500mm in relation to the detail illustrated in the contract drawing(s). The corner points of each excavation or the centre point of each soil core location shall be set out with a Total Station Theodolite or other suitable automated equipment referenced from approved Permanent Ground Marker (PGM) data supplied to the Archaeology Contractor by the Project Archaeologist. The positions of the trenches and survey points shall be verified by the Archaeology Contractor taking additional check measurements to additional known-location points of detail.

7.3.3 Surface heights shall be recorded and related to PGMs or approved Ordnance Survey Bench Marks (OSBM) .The full descriptions and locations of PGMs and OSBMs known to the Employer will be supplied to the Archaeology Contractor by the Project Archaeologist. Levelling accuracy between OSBMs/PGMs and site TBMs shall be within 10 mm k: where 'k' is the total distance levelled in kilometres. Each TBM shall be levelled as part of a closed loop starting and finishing on approved OSBMs or Crossrail PGMs. Where more than one TBM is required per site the Archaeology Contractor shall establish the TBMs as part of the same closed loop.

7.3.4 The Archaeology Contractor shall include details of their surveying methodology within their Method Statement (see Section 8), including the setting out of the grid and how

they intend to provide the project grid co-ordinates to the Project Archaeologist with the Survey Report.

7.3.5 The Archaeology Contractor shall ensure that all trench or excavation limits, and significant archaeology detail are surveyed 'as dug' in relation to the project grid before leaving the site. Ground level height data shall be recorded for each intervention. Survey methodology and a detailed survey record shall be provided to the Project Archaeologist within the Survey Report.

7.4 Specification for watching brief

Scope of Watching Brief

7.4.1 Watching brief, as defined in the Generic WSI, is a programme of archaeological monitoring (i.e. observation, investigation and recording) which is carried out by a suitably qualified archaeologist during site investigations (e.g. geotechnical test pits, boreholes and utilities trial trenches) and construction works. The purpose of a watching brief is to identify the potential of any archaeological remains that are uncovered in the course of the works and record them appropriately (as far as is reasonably practicable). The watching brief shall result in the preparation of an ordered archive which will be incorporated into the post-excavation works and into publication of the project results.

7.4.2 The Archaeology Contractor shall undertake the watching brief for all areas of ground disturbance which may potentially contain archaeological remains as set out in the SS-WSI. This shall include any activities (including those associated with site set-up and demolition) undertaken by the Principal Contractor that involve the removal of modern material, made ground and topsoil, subsoils, and superficial geological deposits such as alluvium and colluvium.

7.4.3 Areas that have been previously subject to archaeological excavation and which are known not to contain significant deposits (for example tunnels, cuttings, and areas of known large-scale modern disturbance) shall be excluded from the scope of the watching brief, unless stated otherwise in the SS-WSI. Areas that have been subject to previous assessment and evaluation (e.g. geophysical survey, surface artefact collection, geotechnical survey, trial trenching etc.) shall be included within the watching brief, as appropriate.

7.4.4 Two classes of watching brief are set out in the Generic WSI:

i) A general watching brief shall comprise observation and recording of the Principal Contractor's works without constraint on their working methods.

ii) A targeted watching brief shall comprise observation and recording of the Principal Contractor's works with specific operations carried out under the supervision of the Archaeology Contractor. Under targeted watching brief, the Archaeology Contractor may impose constraints on, or require changes to, the Principal Contractors' or his sub-contractor's method of working to enable the archaeological investigation to take place alongside construction works.

7.4.5 Targeted watching brief shall be used for areas of known occasional, dispersed features which are either not considered to be of sufficient significance to warrant archaeological investigation in advance of construction, or where access prior to construction has not been possible and where, as a result, there is a possibility of unexpected discoveries

7.4.6 Except in cases where unexpected, potentially nationally important, archaeological remains are discovered, the targeted watching brief shall be designed and

implemented so as to avoid adverse impact on the construction programme, wherever practicable.

7.4.7 The Principal Contractor shall make allowance in their activity programme for the completion of any targeted or general watching briefs as set out in the SS-WSIs.

7.4.8 The specification for watching briefs (general and targeted) are set out below:

Scope of Targeted Watching Brief - Constraints on Principal Contractor's Methodology

7.4.9 In archaeologically sensitive areas, where the need for a targeted watching brief has been identified in the SS-WSI, the Principal Contractor will strip soils (which may include modern made ground, topsoil, subsoil, alluvium and colluvium) using a 360 degree excavator and toothless ditching bucket under the supervision of the Archaeology Contractor. The Principal Contractor will limit their tracking of vehicles and plant within areas specified in the SS-WSI and/or as instructed by the Project Archaeologist. The Principal Contractor will facilitate mapping and sampling of deposits by the Archaeology Contractor through use of agreed plant, a site share agreement and careful liaison between the Archaeology Contractor's supervising archaeologist and the Principal Contractor's site supervisor.

Specification for watching brief

7.4.10 The Archaeology Contractor shall undertake a general watching brief at the establishment of worksites at Durward Street Worksite; the bus stand area of Durward Street; and within the Sainsbury's car park at worksite establishment and during utilities diversions. The general watching briefs will take place during enabling works. These areas are illustrated on drawing P30103-C1M12-E00-D-50003 (Annex 3).

7.4.12 The Works to be carried out by the Archaeology Contractor shall consist of two parts:

a) Watching brief ('observation') following, and without interruption to, the progress of the Principal Contractor by a core team of archaeologists.

b) Investigation of archaeology and remains of quaternary geological importance undertaken either:

- by the core team, following the progress of the Principal Contractor; or
- by additional archaeologists (the 'support team'), to be deployed to investigate unanticipated archaeological remains, where appropriate.

7.4.13 The Archaeology Contractor's core team shall consist of the Archaeology Contractor's key person (the field director) and other appropriately experienced archaeologists commensurate with the scale and nature of the Principal Contractor's works.

7.4.14 The core team shall undertake the observation and any required investigation such as they may reasonably be able to undertake.

7.4.15 The Archaeology Contractor's support team shall consist of additional experienced archaeologist. The size of the support team shall be commensurate with the scale and programme of the Principal Contractor's works. The Archaeology Contractor shall be required to supply teams of 5 and 10 persons within 24 and 48 hours notice respectively.

7.4.16 The Archaeology Contractor's core and support teams shall be advised where necessary by specialists, as appropriate and as agreed with the Project Archaeologist.

7.4.17 The Archaeology Contractor shall record the following observations on a daily basis. The record shall consist of, as a minimum:

- The Event Code and chainage/location of the area observed;
- The date(s) of the observation;
- Personnel employed on site;
- A description of the construction works observed;
- The works (sub) contractor and personnel undertaking and supervising the construction activity;
- Depths and extents of excavation works observed;
- Measure of confidence that any archaeological remains would have been observed and reasons;
- The areas and horizons (both those containing archaeological or remains of quaternary geological importance and those which do not) unaffected by construction activity (with special reference to archaeological sites identified for preservation in situ);
- The reasons why any particular area of the works was not observed, and noting those areas not subject to disturbance from construction;
- Location and description of any archaeological remains; and
- Location and description of any modern remains.

Investigation undertaken during watching brief

7.4.18 An appropriate sample shall be excavated from cut features and other archaeological remains of importance. Sampling of cut features shall include feature inter-sections to establish relative chronologies. The extent of sampling shall be determined by the Archaeology Contractor in liaison with the Project Archaeologist (and as discussed with the London Borough of Tower Hamlets and English Heritage, and a quaternary specialist, if necessary) but may, for instance, include the sample excavation of a selected number of deposits (both layers and negative, cut features), recording of structural remains, drawn sections and profiles, and/or be aimed at recovering sufficient information to determine function, form, and date. Any specific variations from this specification shall be indicated in The Archaeology Contractor's Method Statement.

7.4.19 Heights for all deposits shall be related to approved Permanent Ground Markers (PGMs) or approved Ordnance Survey Bench Marks (OSBM), where reasonably accessible. Levelling accuracy between OSBMs/PGMs and site Temporary Bench Marks (TBMs) shall be within 10 mm?k: where 'k' is the total distance levelled in kilometres. Each TBM shall be levelled as part of a closed loop starting and finishing on approved OSBMs or URL PGMs. Where more than one TBM is required per site, the Archaeology Contractor shall establish the TBMs as part of the same closed loop. The Archaeology Contractor shall prepare a record of their surveying methodology for inclusion in the archive.

7.4.20 It may not be possible to clean and record the archaeological profile of geotechnical test pits, due to health and safety or access constraints. Every effort shall be made to

establish the presence or absence of archaeological deposits by establishing the absolute ordnance datum (AOD) for the height of significant deposits, including the depth of modern intrusions, key stratigraphic components and natural deposits.

Recording standards

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

7.4.22 The recording is to include as a minimum:

- The written record of individual context descriptions on appropriate pro-forma.
- The drawn record shall normally include, plans and section drawings of appropriate features, structures and individual contexts (1:50 1:20 or 1:10). Isolated archaeological remains (artefacts) may be spot located in plan and a height provided where possible. Deposits which are regular in plan (pits and ditches) may be located though co-ordinates, annotated with dimensions, and may be recorded digitally.
- Other appropriate drawn and written records shall also be produced (for environmental sampling etc.).
- The photographic record shall consist of monochrome prints/negatives and colour transparencies. A 35mm format (film or digital) SLR camera is acceptable for all site photography. The Archaeology Contractor shall maintain a minimum of two 35mm SLR cameras on site at all times during working hours. The photographic record shall include photographs and transparencies of archaeological features, appropriate groups of features, structures, and quaternary deposits. Each photograph and transparency shall clearly show details of the above. Each photograph and transparency shall include an appropriate graduated scale, a north arrow, and a header board detailing (as a minimum) the event code and context/feature number. In addition, the Archaeology Contractor shall take appropriate record photographs to illustrate work in progress.

7.5 Specification for archaeological investigation

7.5.1 A sufficient sample of the archaeological features and deposits revealed must be sampled/or fully excavated to allow the resolution of the aims and objectives of the work. Structures, features, or finds which might reasonably be considered to merit preservation in-situ shall not be unduly damaged.

7.5.2 Where modern foundations are likely to be present, the SS-WSI shall identify whether they should be left in-situ for the purposes of the evaluation or removed. Where it is clear that modern foundations have truncated certain archaeological levels they should be removed to assess lower archaeological levels. The Archaeology Contractor shall take all reasonable care to ensure that any damage is limited as for as practicable. If significant damage is likely to occur the work shall be suspended and the Project Archaeologist informed so that a technical solution can be agreed with the Project Manager.

7.5.3 The location and objectives of the trial excavations set out in Section 5 of the SS-WSIs have been established in consultation with the project's statutory consultees.

7.5.4 Each trial excavation will be assigned a unique ID number by the Project Archaeologist. The Archaeology Contractor shall not vary this number unless agreed by the Project Archaeologist in writing.

7.5.5 The dimensions of each trial excavation in plan, inclusive of the trench support system employed (if required) to secure personnel entry to the excavation, shall be set out in the SS-WSI. Trial excavations shall be excavated to the base of the alluvial sequence or to a depth specified in the SS-WSI (Section 5). This shall be dependent on the agreed objectives of the excavation.

7.5.6 Temporary works and any required hand investigation to address below ground hazards shall be carried out by the Principal Contractor under supervision by the Archaeology Contractor in accordance with their approved Method Statement and Risk Assessment. All subsequent trial excavations shall be excavated by the Principal Contractor under supervision by the Archaeology Contractor using a mechanical excavator with toothless ditching bucket, except where the nature of the made ground or surface of the pits is such that an alternative bucket or means of breaking out prior to excavation is required (and the Project Archaeologist has agreed an alternative method).

7.5.7 All machine work and demolition of below-ground obstructions (e.g. removal of basement slabs) shall be carried out by the Principal Contractor under supervision by the Archaeology Contractor. The Principal Contractor shall cease work when archaeological evidence is revealed and allow the Archaeology Contractor to undertake investigation, as appropriate. An excavator shall not be used to cut arbitrary trial trenches down to natural deposits without regard to the archaeological stratification.

7.5.8 All undifferentiated topsoil, or overburden of recent origin, shall be removed down to the first archaeological layer. An exception to this would be where a focused soil-sampling strategy is proposed to record and collect data from reworked soil contexts above recognisable stratified archaeological contexts. If a mechanical excavator is to be used to remove modern overburden, such as floor slabs or recent levelling layers, this shall be undertaken in spits of 0.20m-0.5m depth (dependant on specific site conditions), moving along the length of the trench or area. The Archaeology Contractor's supervising archaeologist shall use their professional judgement to determine the appropriate depth of each spit and will advise the Principal Contractor accordingly. Any variations to the excavation methodology shall be at the discretion of the supervising archaeologist and recorded in writing for inclusion in the final report to the Project Archaeologist.

7.5.9 Each spit shall be examined carefully to assist the recovery of any archaeologically significant artefacts and thus to determine when to cease machining.

7.5.10 The archaeological level shall be cleaned in plan by the Principal Contractor using a wide blade, ditching bucket or similar, with no teeth. If the machine has to re-enter the trench care will need to be taken to ensure that it does not damage underlying remains.

7.5.11 The Archaeology Contractor shall undertake hand excavation and cleaning of any archaeologically significant horizons, to fulfil the aims of the work. Within alluvial sequences the Archaeology Contractor shall pay particular attention to establishing the vertical extent of layers of archaeological potential and shall be aware that horizons of cultural activity may be interdigitated with horizons of sterile alluvium. The Archaeology Contractor shall supervise the excavation of each test pit in such a manner so as to allow a cumulative or continuous section to be recorded.

7.5.12 The Archaeology Contractor's excavation, sampling and recording policy shall be included in the Archaeology Contractor's Method Statement. This is to include, as a minimum:

- The recording of individual contexts on appropriate pro-formas;
- Excavation plans at 1:50 scale; planning and section drawing of appropriate single contexts and features (usually at 1:20 scale for plans and 1:10 scale for inhumations and sections);
- Photographs; and other appropriate drawn and written records; and
- Permanent Ground Markers (PGM's), any temporary benchmarks and approved OS benchmarks shall be indicated on the relevant plans.

7.5.13 The Archaeology Contractor's survey and recording policy shall meet the following requirements:

- All levels shall be recorded to London Grid standards and reduced to OS datum;
- All trial pit locations shall be electronically surveyed with reference to the London Grid and Crossrail PGM's upon the completion of fieldwork by the Archaeology Contractor;
- The locations of trial pits shall be plotted on appropriate scale plans related to the London Grid and labelled with six figure eastings and northings; and
- The electronic survey record shall be retained with the project archive.

7.5.14 In alluvial sequences, each trial excavation shall be excavated to the base of the alluvial sequence, and shall be appropriately shored and kept free of water by the Principal Contractor to allow 'person entry' to the excavations i.e. to allow the Archaeology Contractor to undertake investigation and recording to fulfil the aims of the work.

7.5.15 The Archaeology Contractor shall identify any temporary works and dewatering requirements associated with the archaeological investigation in the Archaeology Contractor's Method Statement and shall agree the detailed arrangements for such with the Principal Contractor. The Archaeology Contractor will be required to undertake works in accordance with the Principal Contractor's arrangements for matters such as off site-spoil disposal or storage, on-site facilities and services. Relevant requirements shall be incorporated in the Archaeology Contractor's Method Statement.

7.5.16 Where areas of extensive archaeological stratification are encountered, trial trenches shall not be fully excavated. However, the horizontal and vertical extent of archaeological stratification shall be assessed by the Archaeology Contractor through implementation of an appropriate strategy including, either the excavation of features cut into horizontal stratification, limited test pitting or auguring. The aim shall be to recover suitable stratigraphic, finds and environmental samples from the full,intended depth of the trench, as far as is practicable. The exact methodology may need to be determined by the Archaeology Contractor during the excavation of individual trenches and agreed with the Project Archaeologist.

7.5.17 A sufficient sample shall be excavated from cut features and other archaeological deposits to fulfil the aims of the work. Sampling of cut features shall include feature intersections to establish relative chronologies.

Recording systems

7.5.18 The trial excavations shall be recorded by the Archaeological Contractor to the standards of current best practice. The recording systems adopted during the investigations must be fully compatible with those published by the Museum of London Archaeology Service (MoLAS 1994 3rd ED) and Museum of London (MoL 1998).

7.5.19 The recording is to include, as a minimum:

- At least one representative section at (1:10 or 1:20 scale) of each trial excavation from ground level to the base of the excavation;
- The written record of individual context descriptions on appropriate pro-forma;
- Plans at appropriate scales (1:10 or 1:20);
- Single context planning if appropriate; and
- Photographs and other appropriate drawn and written records.
- Other sections, including the half-sections of individual layers or features shall be drawn as appropriate to 1:10 or 1:20.

7.5.20 Site plans shall identify both London Grid and OS co-ordinates. A 'site location plan', indicating site north shall be prepared at 1:1250. Individual 'trench plans' or 'excavation area plans' at 1:200 (or 1:100) shall be prepared which show the location of archaeology investigated in relation to the investigation area.

7.5.21 Section drawings shall be located on the relevant plan and both London Grid and OS co-ordinates recorded. The locations of the OSBM or PGM bench markers used and any site TBM shall also be indicated.

7.5.22 A record of the full extent in plan of all archaeological deposits as revealed in the investigation shall be made; these plans shall be on polyester based drawing film, and be at a scale of 1:10 or 1:20 unless otherwise agreed with the Project Archaeologist. 'Single context planning' shall be used on deeply stratified sites. Drawing information shall be digitised for eventual CAD applications. The GLSMR will accept Autocad DXF or .DWG format of extent of site and location of major features with the completed Sites and Monuments Report Form.

7.5.23 A 'Harris matrix' stratification diagram shall be employed to record stratigraphic relationships (Harris 1993). This record shall be compiled and fully checked by the Archaeological Contractor during the course of the excavations. Spot dating shall be incorporated onto this diagram during the course of excavations.

7.5.24 Recording of structural evidence revealed below ground level will vary according to the level of special interest of the structure and its relationship to below-ground archaeology. Structures of little or no significance shall be noted on a site plan. Detailed element detail drawings of important features revealed in investigations may be required in accordance with the aims and objectives of the investigation.

7.5.25 The Archaeology Contractor shall agree the appropriate level of recording and analysis for discovered standing structures with the Project Archaeologist, in accordance with

the Crossrail procedure for non-listed built heritage recording (Document CR-PN-PRW-EN-PD-00010). The Archaeology Contractor shall revise the Archaeological Contractor's Method Statement to reflect any additional requirements for built heritage recording.

7.5.26 The photographic record shall consist of monochrome prints/negatives and colour transparencies. A 35mm format SLR camera (film or digital) is acceptable for all site photography. The Archaeology Contractor shall maintain a minimum of two 35mm SLR cameras on site at all times during working hours. The photographic record shall include photographs and transparencies of archaeological features, appropriate groups of features, and structures. Each photograph and transparency shall clearly show details of the above, and may require the use of artificial lighting to achieve suitable definition. Each photograph and transparency shall include an appropriate graduated scale, a north arrow, and a header board detailing (as a minimum) the project event code and context/feature number. In addition, the Archaeology Contractor shall take appropriate record photographs to illustrate work in progress.

7.5.27 The transparencies shall be mounted in suitable frames for long-term curation in preparation for deposition with the archive. Digital photography and video recording may be appropriate in some circumstances and the Archaeology Contractor shall set out proposals for such recording in the Archaeology Contractor's Method Statement for approval by the Project Archaeologist.

7.5.28 Where appropriate a photogrammetric record or laser scan record shall be made of complex structures, features and horizons, liable to be damaged in the course of the investigation, such as buildings or parts of buildings. Appropriate technical specification and scales shall be specified in the SS-WSI and addressed in the Archaeology Contractor's Method Statement.

7.6 Specific Requirements for the excavation of trial trenches or pits

7.6.1 The Archaeology Contractor shall ensure that water is discharged and arisings from archaeological excavations are stored in accordance with the Principal Contractor's environmental protection requirements (as set out in the package Works Information and their Environmental Management Plan) and any relevant consents for the worksite. The Project Manager shall monitor discharge rates and if necessary conductivity of discharge waters to ensure compliance.

7.6.2 Should any material be excavated that is deemed to be contaminated or potentially contaminated it shall be investigated, controlled (e.g. placed separately from clean material) and removed from the site in accordance with the Principal Contractor's environmental protection requirements (as set out in their Environmental Management Plan).

7.6.3 The Archaeology Contractor shall ensure, in liaison with the Project Archaeologist that adequate protection is provided for any archaeological remains. Any specific archaeological requirements relating to backfilling shall be included by the Archaeology Contractor in their Method Statement.

7.6.4 The trenches shall be pumped dry by the Principal Contractor and any necessary protection measures for archaeological remains (in addition to those for below ground infrastructure, services or utilities) shall be completed prior to backfilling. Backfilling and reinstatement shall be undertaken by the Principal Contractor as specified in the package works information and in accordance with the approved Archaeology Contractor s Method Statement or other instruction from the Project Archaeologist and/or Project Manager. Generally, all backfill material shall consist of non-toxic,

uncontaminated, non-putrescible, natural and inert material which shall be compacted and (if necessary) tested (dynamic compaction test or other) in accordance with a specification provided by the Project Manager. Surface conditions shall be reinstated to the required standard.

7.6.5 In order to protect any waterlogged remains during the works, the Archaeology Contractor may identify a requirement for trial excavations to be allowed to refill with water overnight. In such cases, the Archaeology Contractor shall request approval from the Project Manager and shall ensure that any hazards to staff or 3rd parties are minimised.

7.7 Archaeological science

7.7.1 The strategy for sampling archaeological and palaeo-environmental deposits and structures (which can include soils, timbers, pollen, diatoms, animal bone, human bone etc.) will be developed by the Project Archaeologist in consultation with English Heritage Regional Science Advisor and the Archaeology Consultant. On-site work and off-site analysis of the processed samples and remains will be undertaken by the Archaeology Contractor's environmental archaeologist as specified in the Archaeology Contractor's Method Statement.

7.7.2 The finds retrieval policies of the appropriate recipient museum will be adopted. In accordance with the collection and retention strategy set out in SS-WSI, all finds (artefacts and ecofacts) visible during excavation shall be collected and processed by the Archaeology Contractor. In some cases, sampling may be the most appropriate strategy. Finds shall be appropriately packaged and stored under optimum conditions, as detailed in the RESCUE/UKIC publication First Aid for Finds (Watkinson and Neal 1998).

7.7.3 Where there is evidence for industrial activity, macroscopic technological residues (or a sample of them) shall be collected by hand. Separate samples (c. 10ml) shall be collected for micro-slags (hammer-scale and spherical droplets). Reference should be made to the Centre for Archaeology Guideline on Archaeometallurgy (English Heritage 2001). Assessment of any technological residues shall be undertaken.

7.7.4 Where appropriate, samples shall be taken for scientific dating (for example radiocarbon dating, OSL, thermoluminescance at the evaluation stage). This may apply where dating by artefacts is insecure or absent, and where dating is necessary for development of the SS-WSI for subsequent mitigation strategies. Procedures and specifications shall follow English Heritage guidance (English Heritage 2008b).

7.7.5 Buried soils and sediment sequences shall be inspected and recorded on site by the Archaeology Contractor's geoarchaeologist, since field inspection may provide sufficient data for understanding site formation processes. Procedures and techniques presented in the English Heritage documents Environmental Archaeology (English Heritage 2002) and Geoarchaeology (English Heritage 2007) shall be followed. Samples for laboratory assessment shall be collected where appropriate, following agreement with the Project Archaeologist.

7.7.6 Deposits shall be sampled for retrieval and assessment of the preservation conditions and potential for analysis of biological remains following English Heritage guidance (English Heritage 2002). The sampling strategy shall include a reasoned justification for selection of deposits for sampling, and shall be developed by the Archaeology Contractor's environmental archaeologist or recognised bioarchaeologist in liaison with the Project Archaeologist. Flotation samples and samples taken for coarse-mesh sieving from dry deposits shall be processed at the time of the fieldwork wherever

possible, to permit variation of sampling strategies if necessary. Sampling strategies for wooden structures shall follow the methodologies presented in Brunning (1996).

7.7.7 Artefacts, biological samples and soils shall be assessed for evidence of site and deposit formation processes and taphonomy and especially for evidence of recent changes that may have been caused by alterations in the site environment.

7.7.8 Assessment of finds assemblages shall include x-radiography of all iron objects (after initial screening to exclude obviously recent debris) and, where appropriate, non-ferrous artefacts (including all coins). Where necessary, active stabilisation /consolidation shall be carried out to ensure long-term survival of the material, but with due consideration to possible future investigations.

7.7.9 Once assessed, all material shall be packed and stored in optimum conditions, as described in First Aid for Finds (Watkinson and Neal 1998). Waterlogged organic materials shall be processed in accordance with: Guidelines for the care of waterlogged archaeological leather (English Heritage/Archaeology Leather Group 1995) and Waterlogged wood: the recording, sampling, conservation and curation of structural wood (Brunning 1996).

7.7.10 Samples for absolute dating shall be submitted promptly to the supply laboratory proposed by the Archaeology Contractor or other supplier as instructed by the Project Archaeologist. Delivery times shall be agreed to ensure that the results are available to aid development of specifications for subsequent mitigation strategies in the SS-WSI. Where it is proposed to date human remains, the time limits for reburial imposed by Schedule 15 of the Crossrail Act (for remains removed from burial grounds) or set out in the relevant burial licence under the Burial Act 1857 (in all other cases) shall be adhered to.

7.7.11 Processing of all soil samples collected for biological assessment, or sub-samples of them, shall be completed as soon as reasonably practicable. The preservation state, density and significance of material retrieved shall be assessed by the Archaeology Contractor's recognised specialist. Special consideration shall be given to any evidence for recent changes in preservation conditions that may have been caused by alterations in the site environment. Unprocessed sub-samples shall be stored in appropriate conditions in accordance with the Archaeology Contractor's Method Statement.

7.7.12 Samples collected for geo-archaeological assessment shall be processed promptly by the Archaeology Contractor's specialist, particularly where storage of unprocessed samples is thought likely to result in deterioration. Appropriate assessment shall be undertaken as agreed with the Project Archaeologist. Where preservation in situ is a viable option, consideration shall be given to minimising the possible effects of compression and loading on the physical integrity of the site and any hydrological or chemical impacts of the proposed construction works (English Heritage 2002).

7.7.13 Animal bone assemblages, or sub-samples of them, shall be assessed by the Archaeology Contractor's specialist with reference to English Heritage guidance (English Heritage 2002).

7.7.14 The results from any specific investigations in Archaeological Science shall be included in the Site Archive and presented in the evaluation report or final fieldwork report. Reports shall include sufficient detail to permit assessment of potential for analysis. They shall include tabulations of data in relation to site phasing and contexts, and include non-technical summaries. The objective presentation of data shall be clearly separated from interpretation i.e. recommendations for further investigations,

(both on samples already collected, and at future excavations), shall be clearly separated from the results and interpretation.

Generic specification for Environmental Sampling

7.7.15 Appropriate features and deposits shall be sampled to retrieve palaeo-environmental and economic indicators. The Archaeology Contractor shall make provision for the sampling of a wide range of contexts for potential assessment and analysis for plant and animal micro/macro fossils and soils/sediments in order to fulfil the aims set out in the SS-WSI.

7.7.16 The Archaeology Contractor shall use ten litre plastic buckets (with lids and handles), or strong polythene bags (double bagged) secured at the neck, for the recovery of bulk 'disturbed' environmental samples. An adhesive label recording the project event code, context number and sample information shall be securely fixed to a vertical face of the bucket only or attached to the neck of the bag. Labels shall be completed with an indelible ink pen. A duplicate non-adhesive label shall be inserted within the bucket or between the polythene bags.

7.7.17 The selection, preparation for and methods of taking samples together with their size, presentation and processing shall be in accordance with current best practice (e.g. IFA Standard and Guidance for Artefact and Environmental Study, Collection, Research and Conservation 2008d; English Heritage -Geoarchaeology, 2007; English Heritage - Archaeological Science at PPG16 interventions: Best Practice Guidance for Curators and Commissioning Archaeologists, 2003).

7.7.18 The Archaeology Contractor shall be responsible for the protection of all samples and finds and for their transport (including loading and unloading) to the Archaeology Contractor's facilities or other location as agreed with the Project Archaeologist. Samples shall be protected at all times from temperatures below 5 and above 25 degrees Celsius and from wetting and drying out due to weather exposure.

7.7.19 Bulk samples shall normally be in the range of 10-60 litres. The size selected will depend on the likely density of macrofossils in the soil. The lower end of the range (10-20 litres) will be suitable for the recovery of macrofossils from waterlogged deposits. For non-waterlogged deposits the sample volume is likely to be in the middle to higher range (20-40 or 40-60 litres) dependant upon site activity, conditions and preservation. The residue of soil left in the bottom of any inhumations after the removal of human remains shall be retrieved for bulk processing. Vessel or pit fills containing human remains shall be processed as bulk samples to ensure the maximum retrieval of cremated bone. Cremation vessels and deposits of placed human bone within cut features may require excavation in spits. The fill residues from the excavation of these features shall be bulk sampled to ensure maximum retrieval of cremated bone, associated small finds and floral and faunal remains. All work shall be undertaken in compliance with the generic Crossrail standards for Human Remains (see Section 7A) which may require the reburial of human remains within a specific timeframe.

7.7.20 For 'bulk disturbed' samples the limits of the sample zone shall be recorded and identified on plan.

7.7.21 The Archaeology Contractor shall use appropriately sized monolith or kubiena boxes for the recovery of 'undisturbed' monolith samples for geo-archaeological study (pollen, other microfossil and micromorphological studies etc). Care shall be taken to ensure that wherever possible only newly exposed sections are sampled to avoid contamination, desiccation and decalcification. This sampling shall be undertaken under supervision of the Archaeology Contractor's environmental specialist. Boxes

shall be wrapped neatly and tightly in bin-liners or plastic sacks and secured with rubber bands. A label shall be attached to the outside (in duplicate) with site name and code, feature/context number and depths of sample.

7.7.22 The Archaeology Contractor shall record the depth of the 'undisturbed' monolith at the top and the bottom of the sample. There shall be a 50mm overlap between each monolith. This information shall be plotted onto a section drawing at an appropriate scale, with all levels reduced to heights relative to Ordnance Datum. Where the sample crosses archaeological context boundaries these shall be noted on the sample recording pro-forma.

7.7.23 Where it is not possible to insert monolith boxes, the Archaeology Contractor shall take a vertical series of small 'spot' samples. Samples shall be at 20mm vertical intervals with no more than 10mm depth being sampled. In the case of deposits with a low organic content it may be necessary to take as much as 5g or even 20g per sample. If so, sampling shall be extended laterally at a given depth in 10mm deep spits.

7.7.24 Where appropriate, the Archaeology Contractor shall take contiguous column samples for the retrieval of macrofossils. The individual sub-samples will be of 1-10kg, depending on the nature of the deposit and the category of material to be retrieved. Where several specialists are involved it may be necessary to take separate sub-samples for a range of palaeo-environmental evidence, for example, insects, molluscs and seeds, to ensure that adequate sub-samples are available for specialist assessment.

7.8 Required attendances (Annex 7)

8 Deliverables

8.1 Archaeological Contractors Method Statement

8.1.1 The Archaeology Contractor shall provide a detailed Method Statement for each of the works for the Project Archaeologist's approval. The Method Statement shall be prepared in association with the Principal Contractor, taking account of their Environmental Management Plan and other relevant site information provided by them and requirements for the works set out in the Works Information (e.g. relating to health and safety, security, engineering design requirements and attendances). The Method Statement shall include, as appropriate:

a) A resource plan and programme and CV's;

b) The Archaeology Contractor's IT capability and proposed IT plan (including specific survey methods for on-site recording of stratigraphic profiles and sub-surface topographic modelling;

c) The Archaeology Contractor's approach to Archaeological Science;

d) The methods for survey and setting out works;

e) The methods to address the specific event types required (trial trench, area excavation etc);

f) The safe method of working whilst excavating trenches or pits including any temporary works required;

g) The method for disposing of water from trenches and test pits in waterlogged ground;

h) Site management plan to include details of the method for preparing safe access route to the working areas, the proposed site accommodation, services and welfare;

i) The retention and disposal policies for samples and artefacts recovered during the work;

j) The method for excavating and recording inhumations and cremations in compliance with the generic Crossrail standards for Human Remains (see Section 7.1);

k) The method for preparation of the required reports, archive and all associated deliverables;

l) The procedures for assessment of potential for analysis (post excavation assessment); analysis and publication proposals;

m) The method for preparation of the digital dataset, digital drawings, and digital report deliverables;

n) The Archaeology Contractor's methods and approach for undertaking the site based works and off site processes to completion.

o) The Health and Safety Plan and Site-Specific Risk Assessment (including unexploded ordnance);

p) The Quality Assurance Plan;

q) The procedures for on- and off- site security and emergency response plan (including environmental incidents);

r) The method for complying with project generic and site specific environmental and consent requirements; and

s) The Archaeology Contractor's requirements and specification for services and facilities and attendances required to be supplied by the Principal Contractor or the Employer.

8.2 Archaeological Contractors Health and Safety documents (Annex 4)

8.3 Programme, Programme Risk Assessment, Cost Plan and Resource Plan

8.4 Site Archives

8.2.1 The site archive shall be organised to be compatible with other archaeological archives in London, or where outside the greater London area, any specific requirements of the receiving museum. This requirement for archival compatibility includes computerised databases.

8.2.2 For London archives, individual descriptions of all archaeological strata and features excavated or exposed shall be entered onto prepared pro-forma recording sheets which include the same fields of entry on the recording sheets of Museum of London Archaeology. Sample recording sheets, sample registers, finds recording sheets, registered finds catalogues and photographic record cards shall also follow the Museum of London Archaeology equivalents.

8.2.3 Archives shall be prepared to conform with current best practise (e.g. Brown and Duncan 2007; Institute of Field Archaeologists 2008f) The archive shall cover all finds, samples and records (drawn, written, photographic and electronic) collected and produced during the works. The archive shall be indexed and internally consistent. The Archaeology Contractor shall complete the site archive and submit to the Project Archaeologist within 8 weeks of completion of a fieldwork event.

8.2.4 The site archive shall be deposited by at a museum to be confirmed by the Project Archaeologist.

8.5 Digital Data

8.3.1 The Archaeology Contractor shall produce a digital data archive of all primary field data produced during the works in accordance with ADS guidelines (Richards and Robinson 2001).

8.3.2 The Archaeology Contractor shall prepare and provide field and laboratory data, evaluation or excavation trench and phasing plans showing archaeological features recorded, and report text in digital form, as well as in paper form. Consideration should be given to recording electronic plans during fieldwork.

8.3.3 The digital archive for each fieldwork event shall be copied to CD-R or DVD (recordable laser disc) and submitted to the Project Archaeologist for archiving in the Employer's document management system.

8.3.4 Final reports, site plans and other illustrations shall be prepared in accordance with the Employer's Information Management standards and procedures.

8.3.5 All data files submitted shall be scanned by a virus detection programme updated to the most current version. The disk label shall clearly indicate:

- Confirmation that this check has been carried out (including details of the virus checking programme name and version used) and that the submission is virus free.
- Fieldwork event name and code.
- Supplier company name, date and QA details (as a minimum, the name, position and signature of the approver).

8.3.6 Prior to commencing the works, the Archaeology Contractor shall submit an example hard copy and data output of each of the data formats required (i.e. data, graphic, CAD and text) produced by their current software, for approval by the Project Archaeologist. The Archaeology Contractor shall inform the Project Archaeologist of any changes or upgrades made to approved software prior to processing any works data. The sample disk shall include data from a previous real job or jobs.

8.3.7 A sequential numbering of data issues shall be rigorously adhered to so that no data versions are submitted out of sequence. The organisation of the data prior to submission shall be the responsibility of the Archaeology Contractor. The Archaeology Contractor shall ensure that data originating from different sources within the Archaeology Contractor's organisation is compatible with the project requirements. The Archaeology Contractor shall nominate one person to the Project Archaeologist who is the main point of contact for matters relating to the digital data submissions.

8.3.8 Where errors or inconsistencies are noted in the data, by either the Project Archaeologist or Archaeological Contractor they shall be corrected by the Archaeology Contractor and a corrected data file issued to the Project Archaeologist. When a change or addition is made to the data within an issue, a complete data group shall be re-issued, not just the changed fields. This may not require complete replacement of the whole data set which includes other previous issues.

8.3.9 Where any changes are made to a data record between digital data submissions, the Archaeology Contractor shall record the date of the change and the name of the person carrying out the change. The Archaeology Contractor shall ensure that each data amendment is carried out correctly.

8.3.10 The Archaeology Contractor shall make two identical copies of the digital archive. The first copy shall be retained by the Archaeology Contractor until the expiry of the Contract maintenance period. The second copy shall be issued to the Project Archaeologist.

8.3.11 A digital archive for each Crossrail site (incorporating individual event archives) shall be submitted to a regional or national data archive as agreed with the service provider by the Employer.

8.6 Interim Statement

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

8.4.2 The Interim Statement shall be brief, and the information contained commensurate with the timescale for production. The report shall not duplicate effort to be utilised at a later date and shall draw on the data gathered during the initial assessment undertaken during fieldwork.

8.4.3 A site plan indicating all as-dug investigations shall be provided. Key stratigraphic profiles and topographic templates of the major stratigraphic units shall be provided.

8.4.4 The Interim Statement including illustrations shall be submitted as a single PDF file to the Project Archaeologist. CAD drawing files shall also be submitted.

8.4.5 The Interim Statement text shall be submitted in hard copy and as an MS Word *.document in accordance with the Employer's information management standards and procedures.

8.4.6 The Interim Statement shall include an approved report title sheet and QA page (to be supplied by the Employer).

8.4.7 The following shall appear in the footer or header of each Interim Statement:

CRL Ltd, 20$$

8.4.8 Copies of the Interim Statement shall be provided by the Project Archaeologist to Rob Whitehead (English Heritage) and the London Borough of Tower Hamlets for comment.

8.7 Survey Report

8.5.1 The Archaeology Contractor shall provide a written and graphic survey report for the works upon completion of fieldwork. Evidence shall be provided for check measurements and results of levelling for establishment of TBM's. The survey report shall be submitted by the Archaeology Contractor to the Project Archaeologist within 2 weeks of the completion of fieldwork.

8.5.2 The Archaeology Contractor shall prepare and submit 'as excavated' site area outlines and levels in accordance with Crossrail standard CRS-SDT-05. Each drawing shall identify the relevant event code and sub-site division, if applicable.

8.8 Fieldwork Report

8.6.1 The evaluation, excavation, level 2 records and watching brief reports shall be prepared by the Archaeology Contractor within 6 weeks of the completion of the fieldwork (unless this is varied by the Project Archaeologist). The Fieldwork Report shall follow the standard structure set out in City of London Planning Advice Note 3 and IFA standards i.e.:

Contents list

Non technical summary

1. Introduction
2. Planning background
3. Previous work(s) relevant to archaeology of site (DBA, DDBA, surveys etc)
4. Geology and topography of site
5. Research objectives and aims
6. Methodology of site-based and off-site work
7. Results and observations including quantitative report, stratigraphic report(including any constraints on site).
8. Assessment of results against original expectations (using criteria for assessing national importance i.e. period, relative completeness, condition, rarity, and group value) and review of evaluation strategy
9. Statement of potential of archaeology

10. Conclusions and recommendations for appropriate mitigation strategy
11. Publication and dissemination proposals (in addition to fieldwork report)
12. Archive deposition
13. Bibliography
14. Acknowledgements
15. Sites & Monuments Record form
16. A3 plans

8.6.2 The Fieldwork Report shall provide an illustrated factual statement and statement of importance with associated assessment of potential for further fieldwork and/or analysis of the archive. The Fieldwork Report shall utilise information collected during archaeological fieldwork and from any other appropriate sources agreed with the Project Archaeologist.

8.6.3 The Fieldwork Report shall include sections detailing the background to the project, any previous relevant research and investigation, location and topography/geology, a description of the methodology employed and the techniques adopted. Where relevant, these sections shall include location plans with scale and grid co-ordinates.

8.6.4 Each component of the works (e.g. stratigraphic/structural, artefactual and environmental/economic) shall be supported by a statement setting out:

- A quantification of the resource (tabulated and cross referenced as appropriate);
- Provisional dating and evidence for residuality and intrusiveness;
- The range of material, including sampling and/or taphonomic biases; and
- The condition of the material, including preservation bias.

8.6.5 The stratigraphic statement shall include: a description of the geomorphology and sedimentation record of the survey area; a description of the fieldwork results (brief context descriptions supported by plans and sections as necessary, with levels related to Ordnance Datum); a trench summary table indicating depths of all major stratigraphic units, and their boundaries. Photographs shall be included where appropriate.

8.6.6 The Archaeology Contractor shall produce a subsurface model(s) and profiles to illustrate the extent, character and depth of the major stratigraphic topology identified. The model shall be correlated with previous works within the survey area in order to inform the mitigation design. The processing software and presentation format of the data shall be included in the Archaeology Contractor's Method Statement for approval by the Project Archaeologist.

8.6.7 The assessment of results and statement of potential shall include the Archaeology Contractor's conclusions based on the recorded data, e.g. the monument/site class represented, site/feature function and relevant parallels. The statement shall also comment on the potential of the data to address the projects' research themes. As appropriate, comment shall be made on the site as a whole and the individual components (e.g. artefactual, palaeo-environmental, economic). The statement shall

utilise the criteria laid down by the Secretary of State for Culture, Media and Sport Criteria for Scheduling, to establish importance.

8.6.8 In reporting the results of the works, the accuracy of the original expectations and the appropriateness of the methods adopted shall be assessed by the Archaeology Contractor in order to illustrate what level of confidence can be placed on the information. The Project Archaeologist will use that information as the basis for developing any further mitigation strategy and/or further analysis and publication.

8.6.9 The report shall be illustrated with a site location plan, survey location plans as appropriate (to include archaeological interpretation of results), and individual trench and area plans identifying archaeological features exposed and investigated.

8.6.10 When submitted at evaluation stage, the report shall set out an outline recommendation for mitigation. This may include preservation in situ and/or further investigation and recording of the remains and/or watching brief. The development of a detailed mitigation strategy shall be progressed by the Project Archaeologist in liaison with the Project Manager's engineering design team, the Archaeology Contractor, and the English Heritage Regional Science Advisor (and other statutory authority), as appropriate.

8.6.11 Copies of the Fieldwork Report shall be provided by the Project Archaeologist to Rob Whitehead (English Heritage) and the London Borough of Tower Hamlets for comment.

8.6.12 The following shall appear in the footer or header of each Fieldwork Report:

CRL Ltd, 20$$

8.9 SMR/HER Summary Sheet

8.7.1 The Archaeology Contractor shall complete a GLSMR Summary Sheet for the works (i.e. one per fieldwork event). The Summary Sheet shall be included in the Fieldwork Reports.

8.10 Summary Report

8.8.1 A short summary report of no more than 500 words (the Summary Report) for the works shall be prepared by the Archaeology Contractor for submission to the Project Archaeologist for subsequent publication within London Archaeologist or another local (county) journal or publication outlet specified by the Project Archaeologist.

8.8.2 The Archaeology Contractor shall submit the draft Summary Report to the Project Archaeologist for approval within 8 weeks of the completion date of the fieldwork event. The Archaeology Contractor shall allow two weeks in the programme of works for the Project Archaeologist to provide comments. The Archaeology Contractor shall include any amendments required by the Project Archaeologist in the final Summary Report which shall be submitted within one week of receiving the Project Archaeologist's comments on the draft report.

8.8.3 The Summary Report shall be submitted as an MS Word *.document in accordance with the Employer's information management standards and procedures.

8.11 Site condition Photographs, Progress Photographs and Reports

8.12 Post excavation assessment

8.9.1 If instructed by the Project Archaeologist, the Archaeology Contractor shall undertake a post-excavation assessment of the site archive and submit a report of their findings

to the Project Archaeologist for approval. Assessment of potential for analysis shall be undertaken in accordance with English Heritage guidelines.

8.9.2 The Archaeology Contractor shall provide details of its current post excavation assessment procedures with their Method Statement.

9 Results of Consultation and Site Monitoring Process

9.1.1 Consultation has been undertaken with the GLAAS Advisor from the London Borough of Tower Hamlets Ms Kim Stabler (2/11/2010). She has professed herself satisfied with the WSI (21/2/2011) and wishes to monitor the archaeological fieldwork when it is undertaken. Prior to commencing the works the Archaeology Contractor shall agree a programme of weekly written progress reports and periodic progress meetings with the Project Archaeologist and/or Project Manager and shall be represented at such meetings to the satisfaction of the Project Archaeologist. The Archaeology Contractor shall provide information describing progress on-site to date, the processing of samples and artefacts and feedback from any initial assessment.

9.1.2 The London Borough of Tower Hamlets, GLAAS officer and, if required the English Heritage Inspector for works affecting a Scheduled Monument (collectively the 'external consultees') shall be informed in writing at least one week in advance of commencement of fieldwork by the Project Archaeologist.

9.1.3 Periodic updates on the progress of the Crossrail archaeology programme shall be submitted to the external consultees by the Project Archaeologist. The Archaeology Contractor shall provide information to the Project Archaeologist as requested to inform this reporting.

9.1.4 The Project Archaeologist shall arrange and convene monitoring site visits by the external consultees, as appropriate. There shall be no unauthorised access to the works in any other circumstances. Any visits to the works shall be in accordance with the Principal Contractor's health and safety, site access and security requirements.

9.1.5 The Archaeology Contractor may propose that archaeological excavation be carried out as an extension to evaluation works, if the scope of such work is readily incorporated into the SS-WSI. The detailed method for this work shall be agreed between the Archaeology Contractor and the Project Archaeologist at a site meeting and subsequently in writing between the Project Archaeologist and the relevant external consultees.

10 Personnel requirements

10.1.1 The Archaeology Contractor shall provide project personnel of experience as described below. The personnel shall be approved by the Project Archaeologist. Approval may be withdrawn by the Employer at their discretion and in accordance with the contract conditions.

10.1.2 The Archaeology Contractor shall submit CVs of all proposed personnel including any specialists, but excluding site technician grades, to the Project Archaeologist for approval if this has not already been done as part of the pre-qualification process.

10.1.3 The works shall be managed, directed and staffed by appropriately qualified and experienced personnel. The Archaeology Contractor's Key Person shall possess at least ten years relevant experience.

10.1.4 The excavation, sampling and recording of the works shall be directed in the field by a Fieldwork Director who is a Member of the Institute of Field Archaeologists (MIFA) The Fieldwork Director shall be on site throughout the fieldwork stages.

10.1.5 The Archaeology Contractor's project team shall include an environmental archaeologist suitably qualified in archaeological science and geo-archaeological sediment description methods, and on site sample processing and assessment techniques.

10.1.6 The Archaeology Contractor's project team shall be staffed by technician grades with minimum six months experience in appropriate aspects of excavation and recording.

10.1.7 Specialist staff employed on any aspect of the works, including post-excavation assessment or analysis of any kind including the writing of reports, shall be suitably qualified and shall be supervised by personnel with a minimum of ten years of relevant experience in their field (this may be inclusive of post-graduate studies). At Whitechapel specialists that may be required include Geoarchaeologist (to assess any deposits which may be associated with the Black Ditch); Industrial Archaeologist (to advise on Albion Brewery, the Essex Wharf distillery well and Whitechapel Station); Romanist, Medievalist; human bone specialist. Other specialist requirements may be identified during the course of the works.

10.1.8 Specialist staff shall be available, normally at 24 hours notice, for the duration of the works to provide advice on any specialist tasks to be undertaken.

11 References and glossary of terms

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Annex 1 – Archaeological Research Agenda

There are set out in the Generic WSI CR-PN-PRW-EN-PD-00009

Research Aims

- Understanding life expectancy, origins and belief, seen through studying health, diet and disease, and preparing models for future research;
- Considering the relationship between cemeteries and major or minor roads, in terms of symbolism, status, privacy and convenience; and
- Understanding the differences, if any, between burial practices in the city and outlying cemeteries.
- Establishing how daily work and life in London reflected and contributed to the rise of London as the commercial centre of the British Empire, and to its continued eminence as a world city thereafter;
- Charting how and why different parts of London developed as specialist producers and understanding the implications of this for London as a world city; and
- Examining the concept of core/periphery for different periods in London's past, as a means of understanding how evolving settlement patterns reflect the need for sustainable, beneficial relationships between a settlement and its environs, a city and its hinterland.

Annex 2: Site Information

Table 1 - Historic street furniture and railway heritage assets identified within the Whitechapel Station Area

Note: Figure 5 of Annex 3 illustrates the location of the below assets in relation to Whitechapel Station

Name [Fig Ref]	Image	Description	Significance	Impact	Mitigation/Further Investigation
Historic sett surface on Winthrop Street [1]		Granite sett surface continuing from Durward Street to Kempton Court. Good survival of mid to late 19th century rectangular setts laid in rows. Some ground disturbance has been caused by modern services and patches of poor reinstatement.	Makes a positive contribution to the character and appearance of the Whitechapel Conservation Area.	The road is to be used to provide access to the Whitechapel Station worksite and will also be impacted upon by the diversion of utilities.	If any works necessitate the removal of the surface, or part thereof, the setts should be replaced upon completion. The surface should also be protected from construction vehicles. .

Name [Fig Ref]	Image	Description	Significance	Impact	Mitigation/Further Investigation
Footbridge leading to District Line Platforms [2]		Early 20th century glazed timber panelled footbridge, leading to the District Line platforms	Of historic and architectural interest as an early addition to the station.	To be demolished.	English Heritage Level II survey. 1930s illuminator train describer to be reclaimed by C512 and re-sited C512. The bridge should be offered to the London Transport Museum or other relevant body.

Name [Fig Ref]	Image	Description	Significance	Impact	Mitigation/Further Investigation
Platforms 1/2 and 3/4 canopies [3]	  	At east end both islands have canopies, steel girder uprights supporting steel sheet cladding and a glazed apex, along with decorative valances. To the western ends the platforms are covered by a later development. Platforms also feature historic items of interest including Cast Iron Rain water goods	The canopies are of historic interest as part of the late 19th century station, and although the platforms have undergone piecemeal repair and modernisation there are still numerous fixtures and fittings of historic interest including ticket collector's box and cast iron rain water goods.	To be demolished.	English Heritage Level II survey. Fixtures and fittings of historic interest including rain water goods and ticket collector's box should be offered to the London Transport Museum or other relevant body.

Name [Fig Ref]	Image	Description	Significance	Impact	Mitigation/Further Investigation
2 Low level subways leading from plat forms 1/2 and 3/4 to platform 5 [4]	  	Finishes include extensive use of Poole large profile ceramic tiles, in oatmeal/yellow, with decorative bands in blue, green and orange. Above the staircases are two fine 1938 Standard Signs Manuel pattern v/e bronzed framed signs.	Of historic interest as part of the early 29th century amalgamation of stations. Also of architectural interest due to the use of London Underground branded design (*see below)	To be demolished.	English Heritage Level II survey. Tiles to be retained/reused if possible; signage to be replaced in new station if feasible. If not, elements should be donated to the London Transport Museum or other relevant body.

Name [Fig Ref]	Image	Description	Significance	Impact	Mitigation/Further Investigation
East London Line Platforms 5/6 [5]	 	The open sections of the platforms display fine brick retention walls, with details and replica lighting.	Although the platform itself is only of marginal historic interest as part of the development of the station, it does contain a number of historically interesting features	To be partially demolished.	English Heritage Level II survey. Timber poster frame to be donated to the London Transport Museum or other relevant body.

Name [Fig Ref]	Image	Description	Significance	Impact	Mitigation/Further Investigation
Non-public Areas [6]	 	The non-public areas of the station, particularly the area in the basement used as staff accommodation has extensive and important survivals of early passageways, staircases and rooms.	Remnants of historic passageways that were allegedly used during WW2 to transport wounded soldiers to the Royal London Hospital. Also piecemeal survival of historic archways, stair cases, cast iron rain water goods and foundation brickwork for the original station.	Further inspection required to determine extent of disturbance.	English Heritage Level II survey.

Name [Fig Ref]	Image	Description	Significance	Impact	Mitigation/Further Investigation
Early 19th century distillery well [7]		A brick lined well made up of stock bricks in the stretcher bond. Numerous original functional elements are still extant in the well including 'I' beam joists and openings. The well measures 22 metres in depth to infill level.	An interesting example of an early Regency period well. The structure is likely to be contemporary with an early 19th century distillery now demolished.	To be demolished	Level II survey of the structure be undertaken of top of structure to supplement the existing survey video of the structure. (C261)

Name [Fig Ref]	Image	Description	Significance	Impact	Mitigation/Further Investigation
Iron ribs and timber panelling to walls in Ticket Hall [8].	 		Original early 20th century ironwork and timber panels	To be removed as part of demolitions (C512)	To be carefully removed (C512) under archaeological supervision (C261) and retained for re-siting

Name [Fig Ref]	Image	Description	Significance	Impact	Mitigation/Further Investigation
London Overground Platforms [9]	 	VE cladding	Panels with artwork done by a local artist c1985	Within working area. Would be affected if were not	To be removed by C512, retained and re-sited.

Name [Fig Ref]	Image	Description	Significance	Impact	Mitigation/Further Investigation
Winthrop Street Bridge [10]		19th century bridge over ELL.	Within Conservation Area. See CAC statement of significance (C140-HYD-T1-XST-D061-00016)	To be demolished	Level II building record (C261). Setts and bricks to be salvaged by C512 for re-use.

Annex 2 – cont.

Submission of particulars under Appendix 2 of the Heritage Deed - Albion Brewery Well (C140-HYD-T-RGN-D061-00008)

C140 – Whitechapel Station

SUBMISSION OF PARTICULARS UNDER APPENDIX 2 OF HERITAGE DEED:

Albion Brewery Well

Document Number: C140-HYD-T -RGN-D061-00008

Document History:

Revision:	Date:	Prepared by:	Checked by:	Approved by:	Reason for Issue:
4.0	21-10-10	Joanna Sanderson	William Filmer-Sankey	Jim McCarthy	IFA

CROSSRAIL CENTRAL (PDP) REVIEW AND ACCEPTANCE STATUS

This decal is to be used for submitted documents requiring acceptance by Crossrail Central

☑	Code 1	Accepted. Work May Proceed
☐	Code 2	Not Accepted. Revise and resubmit. Work may proceed subject to incorporation of changes indicated
☐	Code 3	Not Accepted. Revise and resubmit. Work may not proceed
☐	Code 4	Received for information only. Receipt is confirmed

Reviewed/Accepted by (signature)		
Print Name	M DE SILVA	Date: 25/10/10

Acceptance by Crossrail Central does not relieve the designer/supplier from full compliance with their contractual obligations and does not constitute Crossrail Central approval of design, details, calculations, analyses, test methods or materials developed or selected by the designer/supplier

Document History Continued:

Revision:	Date:	Prepared by:	Checked by:	Approved by:	Reason for Issue:
1.0	13-08-10	Joanna Sanderson	William Filmer-Sankey	Jim McCarthy	IFR
2.0	18-08-10	Joanna Sanderson	William Filmer-Sankey	Jim McCarthy	IFA
3.0	02-09-10	Joanna Sanderson	William Filmer-Sankey	Jim McCarthy	IFA

Crossrail Act 2008

Crossrail Ltd

London Borough of Tower Hamlets

Albion Brewery Well

Appendix 2 Heritage Deed
Submission of Particulars
for the backfilling of a well to the rear of the Albion Brewery, Whitechapel.

Submission Ref: THA/3/1/H1

Document Number: C140-HYD-T-RGN-D061-00008

Definitions

Term	Meaning
ATD	Above tunnel datum. All heights in relation to the London height datum which is 100metres below Ordnance Datum Newlyn. This is a Crossrail standard.
mATD	Metres above tunnel datum.
mbfl	Metres below basement floor level. The basement floor is 6 meters below ground level.
GRP	Glass reinforced plastic.
ROV	Remotely operated vehicle.
SCL	Sprayed concrete lining.

Executive Summary

This statement is the 'submission of particulars' required under Appendix 2 of the Heritage Deed provided to the London Borough of Tower Hamlets in relation to mitigation of potential settlement or ground movement. It begins by describing the present state and historical development of a well at the former Albion Brewery in Whitechapel. This leads onto an assessment of the well's significance which concludes that it has some historic and archaeological, but no architectural and artistic, significance. There follows a discussion of the issues arising from Crossrail works in the vicinity of the well and Brewery. Next is an appraisal and justification of various works options in terms of causing the least harm to the significance of the well whilst achieving the stability required. The favoured option is the backfilling of the well to a level where the top can still be seen and accessed in future. Lastly, the detailed technical requirements of this work and the steps taken to mitigate harm are outlined.

1 Introduction

This statement is the 'submission of particulars' required under Appendix 2 of the Heritage Deed to be provided to the London Borough of Tower Hamlets in relation to mitigation of potential settlement or ground movement (full text in Appendix G). This submission relates to 333-335 (odd) Whitechapel Road known as the Albion Brewery and seeks the written consent of Tower Hamlets for the method of backfilling a well to the rear of the listed Brewery building.

1.1 Introduction to Crossrail

Crossrail is a major new cross-London rail link project that has been developed to serve London and the southeast of England. Crossrail will support and maintain the status of London as a World City by providing a world class transport system. The project includes the construction of a twin-bore tunnel on a west-east alignment under central London and the upgrading of existing National Rail lines to the east and west of central London. The project will enable the introduction of a range of new and improved rail journeys into and through London. It includes the construction of seven central area stations, providing interchange with London Underground, National Rail and London bus services, and the upgrading or renewal of existing stations outside central London.

Crossrail will provide fast, efficient and convenient rail access to the West End and the City by linking existing routes from Shenfield and Abbey Wood in the east, with Maidenhead and Heathrow in the west. Crossrail will be a significant addition to the transport infrastructure of London and the southeast of England.

It will deliver improved services for rail users through the relief of crowding, faster journeys and the provision of a range of new direct journey opportunities. The project will also have wider social and economic benefits for London and the southeast of England.

1.2 The Crossrail Act 2008

The Crossrail Act 2008 has dis-applied Section 7 of the Planning (Listed Buildings and Conservation Areas) Act 1990 for certain specified works. There is therefore no longer a requirement to submit listed building applications for some works authorised by the Act. In order to ameliorate any potential impacts on the historic environment Crossrail has signed a Heritage Deed with English Heritage and Tower Hamlets.

These Deeds generally are in two parts. The first part (Appendix 1) deals with known works to named buildings. The second part (usually Appendix 2) deals with ground movement (settlement) (full text in Appendix G).

There is a possibility that on occasion it maybe necessary to carry out physical works to a building to mitigate settlement that would have normally required listed building consent. This requires a 'submission of particulars' for the local planning authority's written approval under the Heritage Deed. This document is that submission under Appendix 2.

2 Location and characteristics: the well

2.1 Introduction

The well at the Albion Brewery is believed to have been built sometime between 1860 and 1878. The well is located in a basement to the rear of the Brewery and is all that remains of the equipment relating to the brewing process.

The Brewery is located on Whitechapel Road (nos 333-335 odd) adjacent to the Blind Beggar public house (no. 337), near to junction of Whitechapel Road and Cambridge Heath Road (Grid ref TQ 34880 81929).

2.2 Description

Materials and design

In the northeast corner of the basement room in which the well is located is a short flight of stairs, which lead down to an inspection doorway set within the well. The lower section of the steps is formed in cast iron.

The well is circular in plan form. It has a total depth of approximately 200m and can be divided into three main elements: upper section, main shaft and borehole.

The **upper section** is 2.7m in diameter and has a depth of 4.3 metres below floor level. It is lined with cast iron panels which are riveted together. At its base is a metal grillage cover. At the level of this cover is an inspection doorway which is connected by a short flight of stairs to the basement floor.

The well top rises above the basement floor level. It has no fixed or fitted capping, but is covered by a modern plyboard and timber lid, which is unsafe and in poor condition.

The **main shaft**, below the upper section, is 2.1m in diameter and is 73mbfl. Its upper 57.8m have a cast-iron lining. Below that, it is unlined. A CCTV

survey (by European Geophysical, October 1999) showed that the shaft contains pipework and cables, as well as bricks at other debris at its base. It is not known whether there are any additional pipes or pumps outside the metal lining of the shaft.

At a depth of between 68.5 and 70.4 mbfl, the CCTV survey located an adit of unknown length and direction, opening off the unlined section of the shaft.

The CCTV survey also showed that the well was in good condition, with no structural defects recorded.

The **borehole**, below the main shaft, is 0.3m in diameter and has an approximate depth of 125m.

Fig. 1 View looking into top section of the well

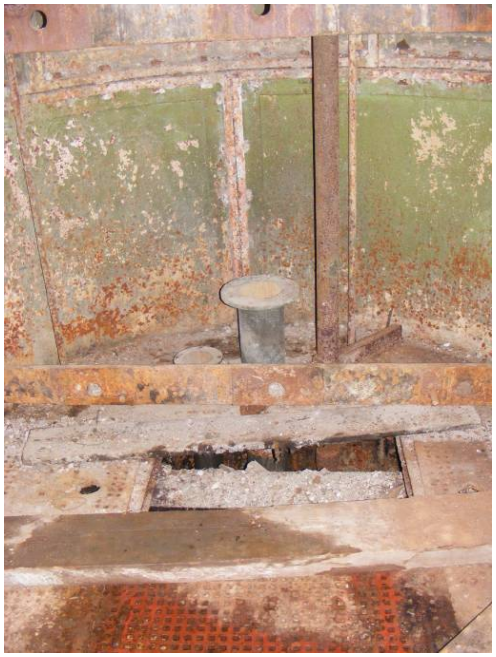


Fig. 2 View of grill and surviving pipework within well.

Fig. 3 View looking up to well top from inspection door.

Fig. 4 The well top, looking north towards stairs down to the inspection door within well.

Fig. 5 The well top

Location

The well was originally located within a large basement room or pumping station to the rear of the Brewery. The 1875-80 Ordnance Survey map (Fig. 7) shows that the rear of the Brewery appeared not to have any extension or development so it is not clear if the well was definitely present at this time. The later maps show an extension, beneath which is the basement room housing the well (Figs. 8-10).

The basement roof was substantially demolished, most likely in 1974 and the surviving room subsequently subdivided, with part now containing an electricity sub-station. The current position of the well is offset within the room and is located closer to the south wall (Fig. 6). The access to the well room is off a short narrow corridor, which links the well and substation rooms with the main basement area of the listed Brewery immediately to the south.

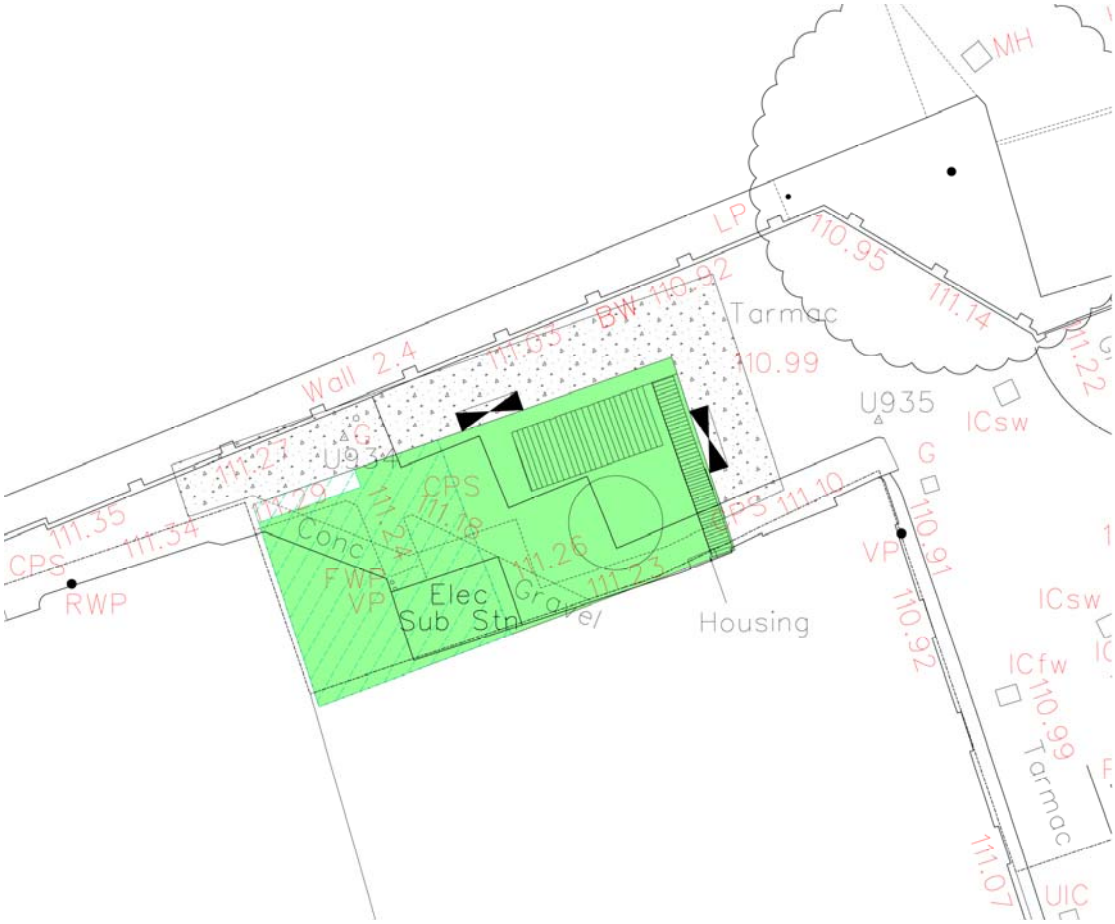


Fig.6 Plan of the well showing its position within the basement. The electricity sub-station is also shown.

Fig.7 Extract from 1875-1880 OS map (1:2500). No extension into rear yard shown.

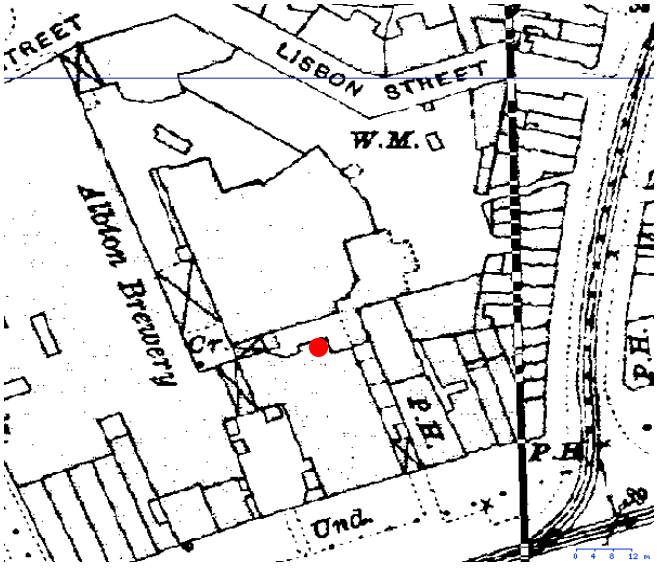


Fig.8 Extract from 1916 OS map (1:2500). Extension into rear yard shown.

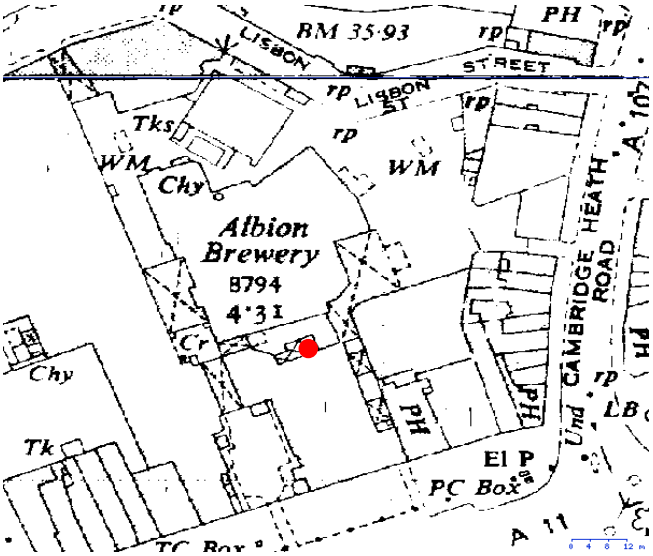


Fig.9 Extract from 1951 OS map (1:2500).
Extension shown to rear with glass roof.

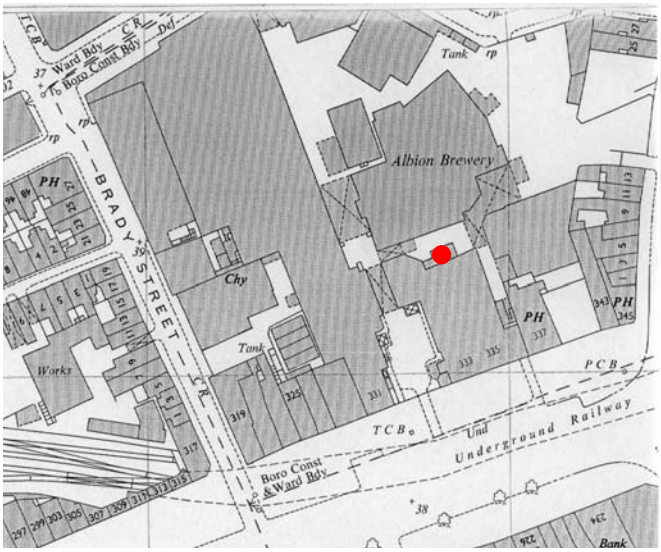


Fig.10 Extract from 1969 OS map (1:2500)

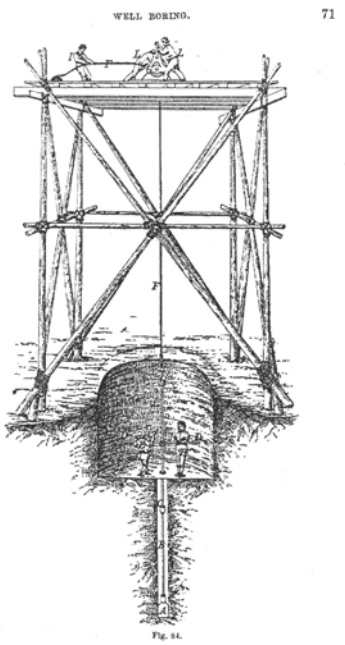
2.3 Historical Development

The Well

The well at the Albion Brewery provided water for the brewing process. The well could be the same well which features in a paper by James Barrow, 'On large and deep bore holes by the diamond drill' published in 1878. The well is described as having a 12 inch borehole and lined with wrought iron tubes.

The well is of a type known as an 'artesian well' which taps into water accumulated in the chalk basin. In London, the natural pressure of water within the chalk beneath the impermeable London clay causes the water to rise up to a level where it can be pumped up or raised in buckets. London artesian wells are usually in two parts; firstly, a brick lined shaft about 50-60 metres deep; secondly, a series of nested iron pipes from the base of the shaft for another 60 metres into the chalk.

The Albion well is lined with cast iron which would have cost much more than simple brick. Barrow describes how the water naturally rose to within 105 feet of the surface, from where it would be pumped up day and night to produce 500,000 gallons of water used in the brewing process.



The construction of artesian wells in London followed the rapidly increasing demands of industry between 1750 and 1900. Coupled with an increase in population, more and more water was being extracted from the chalk, lowering the water pressure and causing many wells to dry up by the late 1800s. Sometimes adits were dug below the chalk level to try to increase the volume of water in the well. However, many artesian wells simply ceased to function as the pressure dropped and were abandoned since developments in water treatment enabled usage of water supplied from the Thames.

Fig. 11 Boring an artesian well

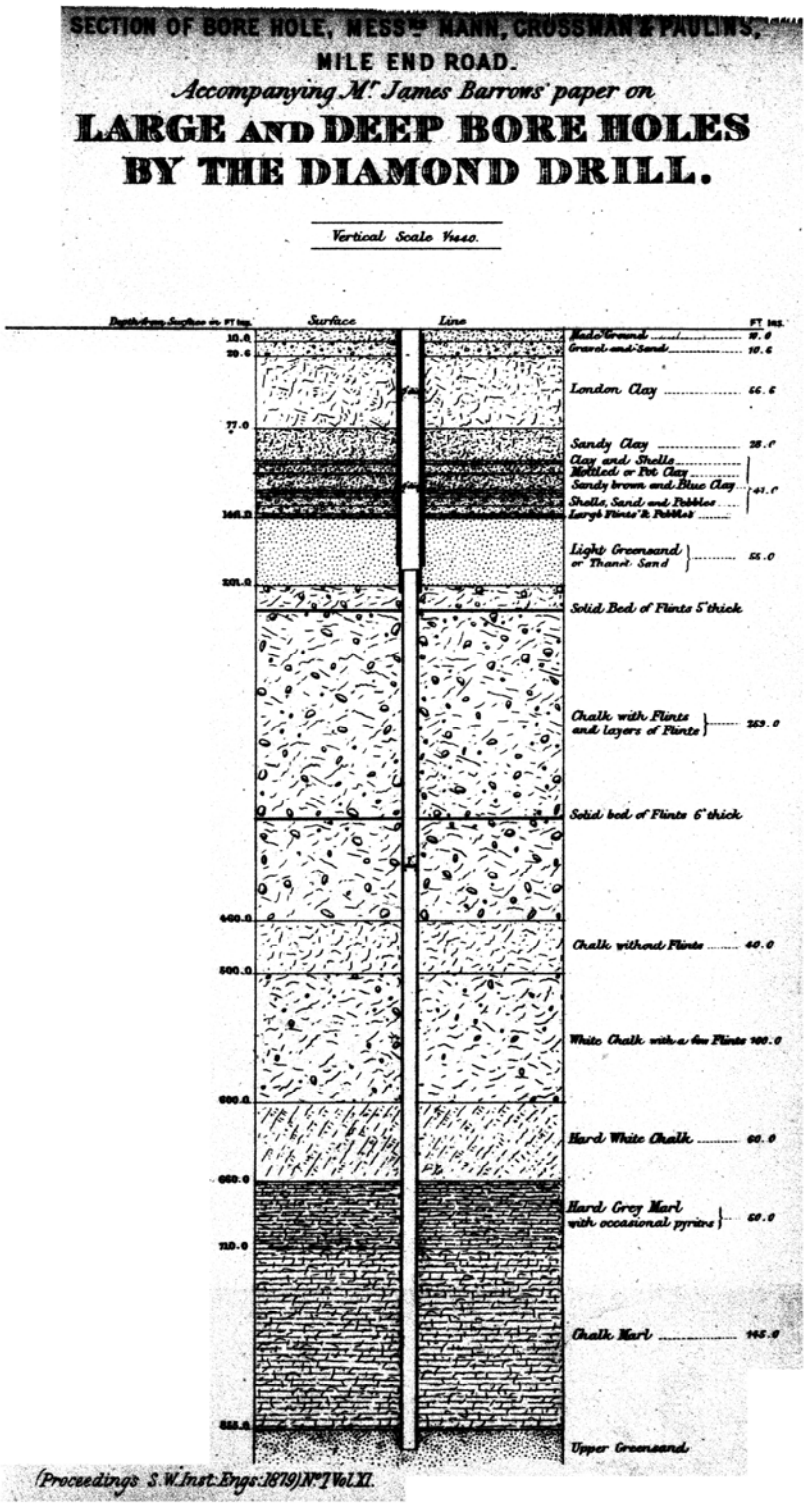


Fig. 12 Borehole Log- Whitechapel Brewery Water Well. Source: James Barrows, 1879

The Brewery

The first Albion Brewery was built in 1808 by Richard Ivory, the landlord of the Blind Beggar Public House. The Brewery was built through subscription on land previously occupied by Ivory's old brewhouse. The site was accessed through a set of large gates to the side of the Blind Beggar tavern, beyond which there was a shop, house and almshouses. Therefore, the Brewery did not have a frontage directly onto Whitechapel Road as it does now.

The Brewery was first let in September 1809 to John Hoffman. The Brewery was subsequently acquired by Blake and Mann of the Stanbridge Brewery, Lambeth in 1818. In 1846 Robert Crossman, who was the manager of the Border Brewery in Berwick-upon-Tweed, became a partner. The same year Thomas Paulin of the Isleworth Brewery also joined the partnership. The company became known as Mann, Crossman & Paulin Ltd.

In 1863 there was further rebuilding as the Draper's Company sold the freehold of the Pennell's Almshouses with their valuable road frontage. As part of the deal, the Brewery agreed to fund the erection of a new Almshouse in Tottenham. By 1866 the Blind Beggar acquired some land in Dog Row (now Cambridge Heath Road) and a right of way was established. This reunited the Brewery with the tavern it was intended to serve.

By 1868 the rebuilding programme, started 10 years earlier, of the old Albion Brewery was complete. The remodelling included new offices, steam engines and other plant machinery. These improvements to the site led to a rise in production of 220,000 barrels. By 1880 the Brewery had grown to cover a large site off Whitechapel Road.

In 1958 the Company merged with Watney, Combe, Reid & Co. Ltd. to form Watney Mann Ltd. This was the start of the decline of the Brewery and in 1972 it was bought by Grand Metropolitan. Buildings at the rear of the Brewery were demolished in 1974 and the site was closed in 1979. During the 1990s the surviving elements of the Brewery were converted into residential flats and the site of the demolished buildings to the north became the current Sainsbury's supermarket and car park.

Fig. 13 The Albion Brewery and Pennell's Almshouse circa 1880's
Source: James H, Albion Brewery 1808-1958 The story of Mann, Crossman and Paulin Ltd; Harley Publishing.

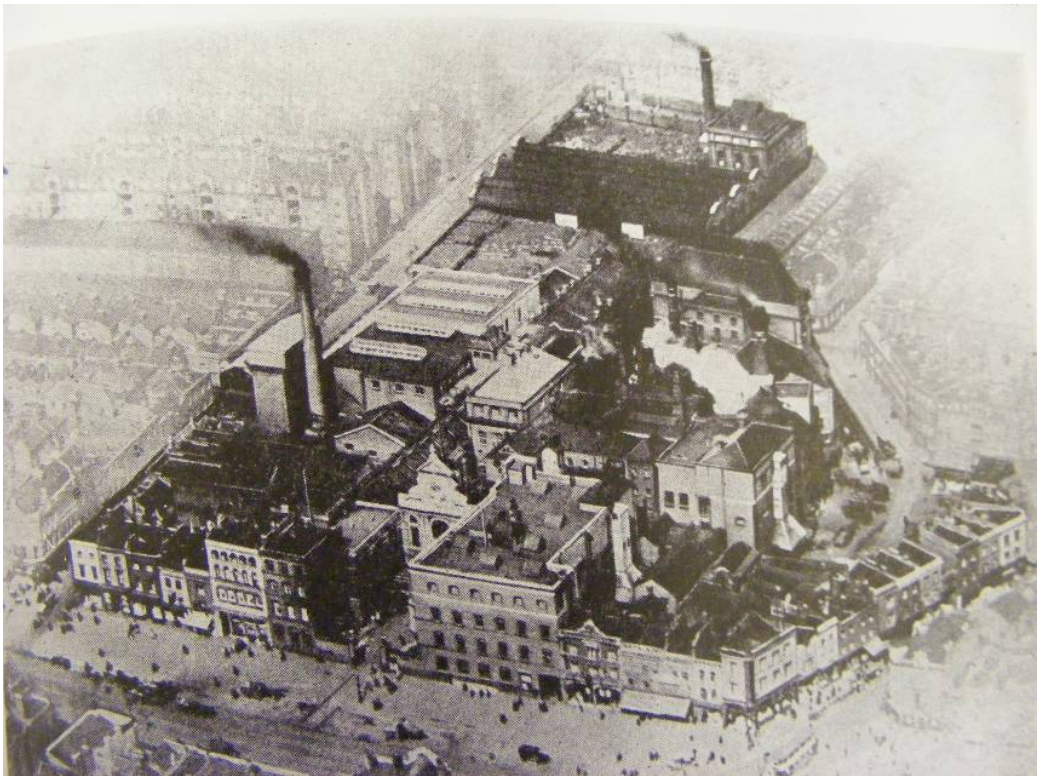


Fig. 14 Aerial Photograph of the Albion Brewery site circa 1920's
Source: James H, Albion Brewery 1808-1958 The story of Mann, Crossman and Paulin Ltd; Harley Publishing.

2.4 Significance

Designation

The main entrance building and gated entrance from the original early 19th century Brewery remain, albeit with some alteration and additions. These buildings were included in the statutory list of buildings of special architectural or historic interest in September 1973 under the single entry of the Albion Brewery (Entrance Block).

The list description (Appendix B) sets out the main features of the gated entrance and the arched carriageway:
'*Early C19 with alterations and additions. Eastern block to Whitechapel Road of stock brick, white stone cornice and bands. Roof not visible. 4 storeys, 6 windows set in double brick arches, those of top floor blank. Unbarred sashes. Walls connect with gate piers with white stone caps. Wrought iron overthrow. Main entrance recessed. Stock brick, brown and white stone. Carriageway with round arch under broken pediment. Decorated tympanum with name 'Albion Brewery'. Fluted Ionic pilasters and 3 round headed windows with architraves on 1st floor. Pediment surmounts building. Entrance lodge, white stone, inside outer Gateway.*

The well is deemed to be within the 'curtilage' of the listed building since it was constructed before 1st July 1948, was present when the building was listed and is still physically attached to the Brewery.

The well also lies within the Whitechapel Market Conservation Area.

Significance

Planning Policy Statement 5: Planning for the Historic Environment (PPS5), sets out the Government's national policies on historic environment planning. PPS5 considers 'heritage assets', those parts of the historic environment that have significance due to their historic, archaeological, architectural or artistic interest. The assessment of significance of heritage assets and the contribution of setting to that significance is required by local authorities under policy HE6.

The Grade II designation covers the whole of the Brewery (within the definition of curtilage) but not all parts of the site are equally significant. This section aims to analyse the fabric of well and its role in the Brewery in order to demonstrate which aspects are most architecturally and historically significant. The purpose of this is to ensure that any alterations or interventions take into account the 'special interest' of the well and Brewery [as defined under the Planning (Listed Buildings and Conservation Areas) Act 1990].

The well is of some historic and archaeological significance in that it was a key part of the brewing processes on this site from the late nineteenth century. However, as none of the other equipment remains, and the well is now isolated from the Brewery and is disused, this relationship has been lost. The well is also evidence of the technology of artesian wells and their usage in London between 1750 and 1900.

The well has no architectural and artistic significance.

Being underground, the basement does not contribute to the setting of the Albion Brewery itself but has been present in its plan form (in various guises) since about 1880. The rearrangement of the structures at the rear of the Brewery over the Well and sub-station has required the below ground room to be spanned and covered by a roof structure capable of taking the loadings and this has been formed using concrete on low profile iron sheeting supported on substantial cast iron beams.

The cartographic evidence appears to indicate that the metal roof structure must date from the mid 20th century, although the physical evidence suggests earlier 19th century origins. What is evident however is that the external architectural and cartographic evidence clearly indicates that the present room and ceiling/roofing arrangement is not original to the building. The original design of the room in which the Well and sub-station are located is not known, although the evidence suggests a higher ceiling level than the present one.

The basement setting of the well contributes some significance because the room contains historic fabric such as glazed bricks and metal roof structure. However, this fabric been severely damaged by water ingress over many years resulting in severe corrosion. The roof structure in the adjacent substation has been sprayed with fire retardant foam, which has deteriorated and in parts failed due to water ingress.

In summary, together the well and the basement are of some, but not high, special interest and significance. The well has been hidden from public view and has not been used for several decades. In contrast, the Brewery entrance itself is of high significance since it is the earliest surviving part of the site and has strong architectural presence within the appearance of the conservation area.

Fig. 15 View of ceiling/roof over well showing roofing materials and electrical conduits and condition resulting from severe water ingress.

Fig. 16 View of ceiling/roof over well showing roofing materials and electrical conduits and condition resulting from severe water ingress.

Fig. 17 Western wall of the tiled room –well is located beneath the new concrete roof slab. Power cables are suspended in the ducts crossing the room.

3 Description of Crossrail works in the area of the Albion Brewery

Whitechapel station will provide an important interchange with the London Underground District and Hammersmith & City Lines, and the extended East London Line which is part of the London Overground network. The main works at Whitechapel station involve the construction of the station itself, together with two shafts that are required for evacuation/intervention and ventilation functions.

The new Whitechapel Crossrail Station will comprise two underground platforms between Cambridge Heath Road to the east and Fulbourne Street to the west. A surface level ticket hall will be provided at the location of the existing London Underground / London Overground station location. This will be supported by two shaft structures, both with surface level head house structures, located at Cambridge Heath Road and Durward Street, providing emergency evacuation / intervention and ventilation.

The construction of Whitechapel Station will take place from three worksites:

Main Construction Sites	Location Description/ Comment
District Line / Fulbourne Street	To be used primarily for the construction of the main station. This worksite will be located above the existing District Line platform areas, and partly on Durward Street, and includes an area used as a bus stand and turning area.
Durward Street / Essex Wharf	To be used primarily for the construction of the Durward Street shaft. The western part of the site will temporarily occupy the car park of the Whitechapel sports centre. The eastern part of the site will comprise Essex Wharf, an electrical substation and part of the grounds of Swanlea School.
Cambridge Heath Road / Sainsbury's	To be used for the construction of the Cambridge Heath shaft and some tunnelling works. This worksite is situated at the junction of Whitechapel Road and Cambridge Heath Road, with the entrance and exit on Cambridge Heath Road. An entrance only will be provided from Brady Street.

4 Analysis

4.1 Description of existing well construction

As described in section 2.2, the well is a cylindrical structure, the majority of the main shaft being lined with cast iron. The bottom of the main shaft is 75m below floor level from which there descends a borehole some further 125m into the chalk. There is also an adit which extends from the base of the main shaft.

There are no particularly sensitive architectural features of the well which would be affected by ground movement. However, it is highly likely that the structural integrity of the well would be affected if the cast iron lining became dislodged. Movement of, or damage to, the lining by ground movement connected to tunnelling could cause further ground movement. This is likely to lead to the development of a large cavity that can 'chimney' upwards as

ground loss into the well void occurs. The cavity could then in turn lead to major damage to the listed Brewery if the foundations fail. This application is for works that form one component of the mitigation plan to prevent such an occurrence.

4.2 Justification

4.2.1 Short-term stability concern

During construction of the proposed Crossrail tunnels, ground disturbance may cause the cast iron well lining to be dislodged and reduce support to the lateral soil. This could result in large volumes of material collapsing into the well void inducing significant ground movements and presenting a threat to the foundations of the listed building.

4.2.2 Long-term stability concern

There are long-term stability risks concerning the adit that may extend under the proposed station footprint and which may collapse at some later date causing additional stress on the station tunnel lining. The crown of the adit is approximately 45.5m below the proposed Crossrail Whitechapel Station's westbound platform tunnel. The potential for future adit instability cannot however be discounted. It would result in the creation of a chimney type failure of the overlying strata and/or flow of water-bearing Thanet sands into the adit that could migrate to the station tunnel level. Whilst potential adit instability can be considered a low risk, the impact consequences are very high.

Should the adit be extensive then backfilling from the well alone may not be sufficient and additional drilling may be required from either within the Crossrail tunnels or from the surface. This would be 45m below the ground and beyond the curtilage of the surface building and so is not part of this 'submission of particulars'.

4.2.3 Possible aquifer contamination

This application deals with the mitigation for possible damage to the Brewery which is a heritage asset with national designation and significance to the local community. There is a separate application made under Section 17 of the Crossrail Act to the Environment Agency that deals with preventing possible aquifer contamination. The agreed solution needs to satisfy both requirements

4.3 Options

Options for mitigation must strike the right balance between a solution which will reduce the risk of collapse to an acceptable level and causes a minimum of alteration to, and therefore harm to the significance of, the listed building.

Compensation grouting from a shaft to be sunk in Sainsbury's car park will mitigate potential settlement caused by Crossrail works at a depth around 30m but would not mitigate the risk of ground loss into the well void and subsequent building damage. This is because compensation grouting can only compensate for the potential settlement of the area above the tunnels and below the building basement whereas the well shaft descends far below this level. Compensation grouting would not prevent contaminated groundwater entering the chalk aquifer through the lining of the well if it was dislodged or damaged, so an alternative impermeable solution is required.

For these reasons, the risk of ground loss can be only be mitigated by backfilling the well, although this will have inevitable impacts on its fabric (Appendix E).

Backfilling the well void below station tunnel invert level will reduce the potential volume loss should a collapse occur and prevent a health and safety issue for the tunnel construction crew. Backfilling the well void above station tunnel invert up to the surface will remove the potential risk of material collapsing into the tunnel when it is constructed. It will also provide structural support to the well lining and a seal against potential contamination through groundwater movement.

Compensation grouting may result in the ground surrounding the well being raised to counteract the tunnel induced excavation settlement. The Albion well is lined for approximately 62m length and the ground/lining friction generated is considered to be in excess of the compensation grouting uplift pressures. As a result there is a risk that whilst the ground surrounding the upper well (above the SCL tunnel crown) may move, the well would remain stationary with the potential for dislocation between the well head and basement floor. In order to mitigate this risk the design includes for the existing well lining to be cut circumferentially just below the level of the compensation grouting tubes. This will permit a greater freedom for the well section above the level of compensation grouting to move in unison with the surrounding ground. In order to prevent internal resistance to movement within the grouted backfill a break layer of sand has been included. Sand has been included in the design as it can be placed remotely via a delivery pipe. Other methods of achieving a break such as installing a geomembrane could be an alternative but may require man access to the well.

On completion, the basement roof openings will be made good.

Following decommissioning the upper section of the well will remain open. The top of the well currently stands proud of the basement floor posing an inherent fall hazard. In order to prevent this, a GRP cover is to be provided (Appendix F).

5 Chosen option particulars

5.1 Description (see also Appendix E)

The part of the listed building affected by this work is primarily the well, although some minor access openings are required through the basement roof.

The historic significance of the well stems from its part in the brewing process. The most significant aspects of the well are its historic fabric and form and archaeological interest. It does not possess any architectural or artistic features of significance.

The historic significance of the basement stems from its location in the plan form of the building i.e. there has been a basement there for about 100 years. However, partial demolition, alterations to the roof and water damage have greatly harmed and diminished this significance.

Initial proposals envisaged the full backfilling of the well and sealing with a reinforced concrete slab with finished level being coincident with the existing basement floor. This solution was proposed in order to be in full compliance with the Environment Agency guidelines for decommissioning redundant boreholes and wells. However, it would result in the well being completely filled and covered, so that its existence would be hidden.

It is now proposed that the backfill terminates where the shaft widens in diameter from 2.1 to 2.7m, approximately 4m below the well head. This would allow the riveted cast iron panels, as well as the access stair, to remain visible, providing continuing evidence of its original function. This option still effectively mitigates the risks of ground movement and collapse, as well as sealing the well and reducing the risk of contamination of the chalk aquifer. It has been discussed with the Environment Agency.

5.2 Proposed works

Summary

The proposed works are shown on the drawing in Appendix E. They include:

- Creating access to the well through the roof of the basement;
- Surveying and recording of the well;
- Removal of pipework and debris from the well shaft;
- Zone 1: filling the adit and the lower part of the shaft with cement/bentonite grout;
- Zone 2: filling the upper part of the shaft with a cement grout;
- Making a cut in the well lining and filling with fine sand to allow for movement of upper section as a result of later compensation grouting;
- Filling the remainder of upper shaft with more cement grout.

The two zones have been identified for the backfilling operations considering the Environment Agency's guidelines, the geological profile of the area, the proposed tunnelling works in the vicinity of the well, previous works/experiences on well backfilling, as well as the backfill materials.

Details

The preparation by contractors, of the site and structure for purposes of backfilling will include:

- Creation of an opening (maximum 1.5 x 1.5 metres) through the basement roof to allow for man entry and passage of CCTV logging cables, air ducts, power, comms, grout tubes and delivery pipes through to the basement and withdrawal of any tubulars or other materials recovered from the pumping equipment in the well.

The stabilisation of the well will include:

- Removal of as much pumping equipment and staging as possible by use of grapples. Grabbing tools will preferably be used to remove the wood and bricks but man entry may be required to remove some of the pipework if sufficient access cannot be created by the grabbing tools.
- Repeat CCTV survey with a logging robot using internal lighting with both vertical and side look operating modes. Results will be recorded to DVD. Low rate pumping will be started up after the first camera pass to the base so that any upflow from the borehole section can be observed.
- Side look (with side lighting) into the adit will be undertaken, and, space permitting, a mini-ROV (remotely operated vehicle) inspection along the adit will be carried out.

Backfilling of the well will include:

Filling zone 1:

- The 300mm diameter borehole will be filled with medium viscosity/gel strength cement/bentonite grout and full penetration will occur as the filling of the main shaft above takes place. Infill in layers up to the base of the adit to minimise settling.
- Infill to a minimum of 20m above adit roof in one pass with low viscosity/gel strength, retarded cement/bentonite grout.
- Continue infill to 80.5 mATD with cement/bentonite grout.

Cement-bentonite grout is considered for zone 1 because it is self healing against shrinkage and thus reduces contamination pathways. As shown in Drawing No. C121-MMD-C-DDL-D061-57101 the well has no internal lining at between approximately 66mbfl (43.3mATD) and the base of the well. The use of cement-bentonite will prevent the mixing and movement of contaminated and uncontaminated groundwater from different aquifers. Bentonite is included in order to reduce permeability and to assist in infilling fissures local to the well.

Filling zone 2:

- Infill to 98.4 mATD with cement grout.

Cement grout is preferred over concrete for this zone. This is because tunnel SCL excavation works will be easier if the well is encountered as cement grout can support itself in short term.

Cutting and filling the lining:

- Create the circumference cut at 98.7mATD through the cast iron lining by high pressure water/carborundum jet or gas burner.
- Infill with fine sand to 99 mATD.
- Make a second cut back into cast iron lining just above the sand layer.

Finishing the well top:

- Infill to 105.5 mATD with cement grout with a capping layer across the shaft.
- Form shallow sump in capping layer for future installation of a drainage pump.
- Provision of an open mesh GRP cover. This is 38mm thick with 38 x 38mm mesh size. The mesh is supported over the well span by 40 x 40mm cross section Grade S275 mild steel bars. See Appendix F for details.

On completion, the basement roof openings will be made good.

Future activities, not included in this application, will include provision of pumped drainage from within the well.

5.3 Justification

PPS5 policy HE9 requires that any substantial harm to, or loss of significance of, a heritage asset should be supported by convincing justification and that the public benefits outweigh the harm or loss. Policy HE10 applies the same consideration to the setting of heritage assets.

At present, the well is redundant and has no viable use. It is not linked to any other equipment which was once part of the brewing process, therefore there is no possibility of the well being put back into use. Additionally, there is no longer a functioning Brewery on the site, reiterating the lack of possibility for the well to return to its original use. Despite having no function, the well still retains some historic significance as outlined in section 2.4. However, the unsafe and difficult access route to the well means this significance can no longer be appreciated

The proposed works have been selected in order to minimise harm to the well's significance whilst simultaneously preventing potential ground movement and aquifer contamination problems.

The proposed favoured option herein, will result in the partial removal of the well's original historic fabric (pipework and cables) and the backfilling with cement; an irreversible alteration. However, the level of backfilling will stop short of the well head and access steps, allowing for their visible retention. The addition of a well cover will also provide safer access to the well.

In conclusion, the chosen option retains the well's significance where possible and does not constitute 'substantial harm'.

5.4 Mitigation

Proper recording of the site will need to take place prior to work starting. We understand that a condition survey has been completed showing the well both in general terms and showing structural and jointing details. In addition, in 1990 a CCTV survey was carried out as part of the exercise to understand the extent and construction of the structure.

A new CCTV survey is part of the proposed works, the results being recorded on DVD. Photographs will also record the progress of the works. Upon completion photographs will be indexed and referenced to the drawn survey to produce an English Heritage level 2 record. In accordance with PPS5 policy HE12, copies of any records will be supplied to the local historic environment record.

6 Conclusion

This Submission of Particulars has sought to demonstrate why the backfilling of the well is essential for the safe construction of the Crossrail tunnels through Whitechapel.

The proposed works take into account the relative significance of different parts of the well and its surroundings. They seek to have the minimum impact on that significance whilst providing an effective solution to the problems of ground movement and will have minimal visible impacts once completed.

As well as the health and safety and heritage benefits of the works, wider public benefits will be brought about by the construction of Crossrail itself. This will provide a valuable travel link for people who live and work in the Whitechapel area. It will not be possible to construct the tunnels without undertaking the vital works to the well.

Whilst it is acknowledged that there is some harm to the well caused by these works, the public benefits of Crossrail and the protection of a listed building substantially outweigh this.

Appendices

Appendix A - Location plan and settlement contour map (Drawing No. 1IO402-C1E00-E00-F-50226 B) (scale 1:1250)

Large well to former distillery

School canopy

School storage

Caretaker's house

Part of hall?

Gantry

Wall

Extension to Sainsbury's

Covered walkway in car park

Metropolitan Water Board Abstraction Well 4m+Ø Ref LD3

Heritage Deed Appdx 2 submission

Building of cultural heritage importance : meeting hall attended by Lenin, Stalin and Trotsky

- Crossrail Tunnel - Alignment N
- 10mm Settlement Contour (Align.N)
- 1mm Settlement Contour (Align.N)
- Well

25m 0 25m 50m 75m 100m 125m

Appendix B - List description

IoE Number: 206360
Location: ALBION BREWERY (ENTRANCE BLOCK), WHITECHAPEL ROAD E1 (north side)
STEPNEY, TOWER HAMLETS, GREATER LONDON
Photographer: Mr G.W. Garthwaite LRPS
Date Photographed: 10 September 2007
Date listed: 27 September 1973
Date of last amendment: 27 September 1973
Grade II

1.WHITECHAPEL ROAD E14431(North Side)Albion Brewery(Entrance Block)TQ 3481 15/515

1. WHITECHAPEL ROAD E1 4431 (North Side) Albion Brewery (Entrance Block) TQ 3481 15/515 II 2. Early C19 with alterations and additions. Eastern block to Whitechapel Road of stock brick, white stone cornice and bands. Roof not visible. 4 storeys, 6 windows set in double brick arches, those of top floor blank. Unbarred sashes. Walls connect with gate piers with white stone caps. Wrought iron overthrow. Main entrance recessed. Stock brick, brown and white stone. Carriageway with round arch under broken pediment. Decorated tympanum with name 'Albion Brewery'. Fluted Ionic pilasters and 3 round headed windows with architraves on 1st floor. Pediment surmounts building. Entrance lodge, white stone, inside outer Gateway.

Appendix C - Extract from 'Industrial Buildings Selection Guide', Heritage Protection Department, English Heritage, 2007.

Breweries grew rapidly in size from the eighteenth century to meet increased demand and accommodate changes in science and technology, notably the introduction of steam engines and the widespread use of metal equipment. The nineteenth century saw the introduction of mechanised mashing (1855) and improvements in controlled heating and, particularly, cooling techniques. As with so many industries, the tendency was towards integrating processes vertically in a single building – the 'tower', which contained liquor tanks, grist mills, grist hopper, mash tun, and wort receiver- and a wider range of functions – from malting to bottling - on a single site. The major breweries are often monumental in scale and architectural ambition, but many towns contained one or more that were equally up-to-date, replete with tower, albeit built on a smaller scale... Recent changes in the brewing industry have resulted in a major loss of breweries of all sizes: towers, that were often embellished, are always serious candidates for designation; their importance is enhanced if they form part of a well-preserved integrated site.

Appendix D – Extract describing the Mile End borehole from James Barrow's paper, On Large and Deep Boreholes with the Diamond Drill (Transactions of the South Wales Institute of Engineers, Volume XI, pp326-327, 1878).

MILE END BORE-HOLE.

Having given some particulars of two Borings made to the north of London, and of the Caterham Bore-hole on the south, where an abundant supply of good water was obtained, the Writer would now explain what had been done in the East End of London, so as to show that an ample supply of good water was obtained from the Greensand in that direction.

In December 1878 a Bore-hole was commenced at Messrs. Mann, Crossman, and Company's Brewery, at Mile End, East London, for the purpose of supplying water of good quality to the brewery.

A section of the Bore-hole was given in Plate 53; its diameter at the surface was 12 inches, and was carried down through the surface earth, Gravel, London Clay, Woolwich and Reading Beds, and Thanet Sands, until, at a depth of 201 feet from the surface, a thin bed of Flints was reached, immediately overlying the Chalk. Thence the boring was carried down through the Upper Chalk and Flints, in which solid cores of flint were cut varying from 2 to 8 inches in thickness; and on the 22nd February, ten weeks from the commencement, the Bore-hole had reached a depth of 400 feet from the surface.

The Chalk strata producing but little water at that depth, the Borehole was deepened to 491 feet, but still without any supply of water; and the Boring was resumed on the 27th May, and passed through the Grey Chalk and Chalk Marl, until the Upper Greensand was reached on the 19th of July, and the Boring continued a further depth of 20 feet into the same, making a total depth of 870 feet from the surface; when the water was found to rise to within 105 feet of the top of the Bore-hole, and by subsequent continuous pumping, night and day, upwards of 500,000 gallons of water were lifted per week, having a constant temperature of 54 degrees Fahrenheit, a matter

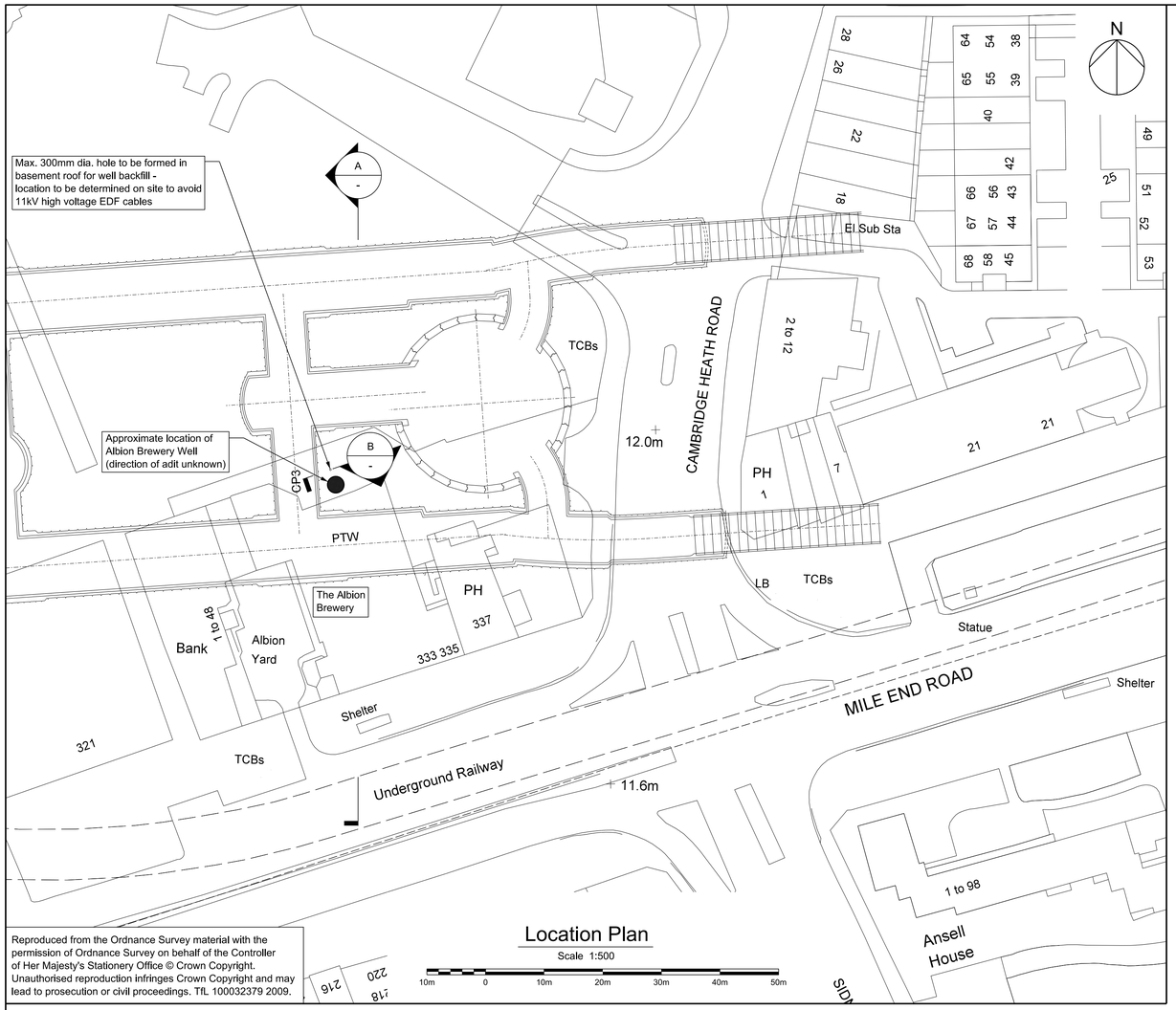
of great importance, in affording good water at an unvarying temperature, so essential for brewing purposes.

The whole work of Boring only occupied twenty weeks, deducting stoppages for test pumping; being an average of 43 feet per week.

The Bore-hole was lined throughout with permanent wrought-iron Lining Tubes.

The contract was carried out by Mr. Joseph T. Jones, of the Crown Works, who has undertaken the working of the Diamond Rock Boring Company's Patent Machinery, on Royalty, and who has of late had general charge of the Company's Large Borings, and under whom the works had made satisfactory progress through his skill and careful management; and every credit was due to that gentleman for the manner in which difficulties had been overcome.

Appendix E - Cross section of Well with proposed works (Drawing C121-MMD-C-DDL-D061-57101 P08)



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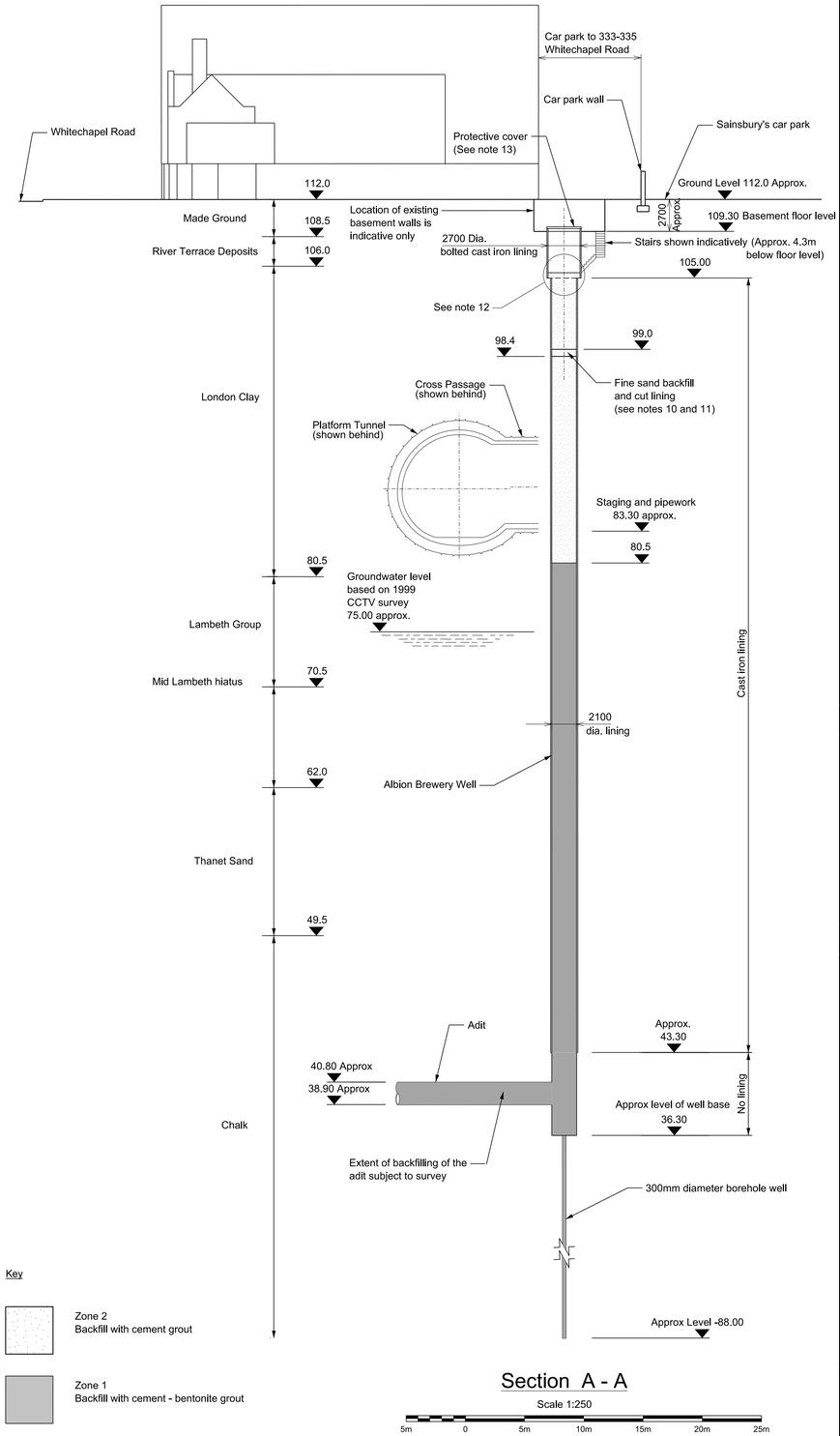
Location Plan

Scale 1:500

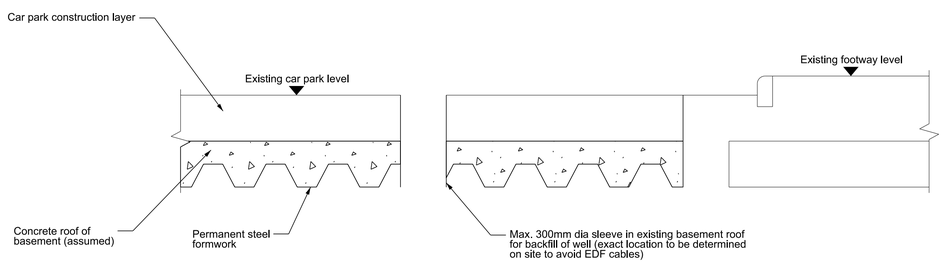
10m 0 10m 20m 30m 40m 50m



Section A - A

Scale 1:250

5m 0 5m 10m 15m 20m 25m



Section B - B

Scale 1:20

400mm 0 400mm 800mm 1200mm 1600mm 2000mm

Key

Zone 2
Backfill with cement grout

Zone 1
Backfill with cement - bentonite grout

Notes

1. Confirmation of all survey data must be obtained from the Crossrail survey team.
2. Coordinates to the London Survey Grid, heights to the London height datum which is 100 metres below Ordnance Datum Newlyn. See Crossrail standard CR-STD-010.
3. All dimensions are in millimetres unless specified otherwise.
4. This drawing shall be read read in conjunction with the design report and specification.
5. Direction and length of adit to be determined by survey.
6. For details of grouting requirements including strength, testing, hold points and submissions refer to specification.
7. Placement of materials to be staged in accordance with an approved method statement.
8. During backfilling of the well, displaced ground water is likely to rise.
   Provision must be made for the removal of this water during backfilling and the construction of the reinforced concrete cap.
9. All levels shown are in metres above tunnel datum (mATD)
10. Well lining to be cut circumferentially at 98.70m ATD.
11. Layer of fine sand to be placed between 98.40m ATD and 99.00m ATD.
12. The final level of the backfill shall be at the bottom of the staircase.
13. For details of protective cover refer to drawing number C121-MMD-C-DDL-D061-57104.
14. This well is a heritage structure and a principle of minimum intervention shall be employed during this work. Penetrations into the existing fabric of the well will not be permitted unless agreed with English Heritage.
15. Hole to be formed in basement roof for access. Maximum dimension is 300mm diameter.
16. Well lining intergrity during tunnel construction is dependent upon high quality compensation grouting undertaken such that settlements are small.
17. Geological profile extrapolated from surrounding borehole data . Actual levels may vary.

Reference Drawings

C121-MMD-C-DDL-D061_2-57104	Albion Brewery Well Protective Cover Details

Reference Documents

C121-MMD-C2-RGN-D061-00005	Whitechapel Station Albion Brewery Well Decommissioning
C121-MMD-C2-RSP-D061-00001	Grouting Specification for Albion Well Decommissioning

Safety, Health and Environmental Information

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

Construction
- Ci. Presence of asbestos in basement.
- Cii. Confined spaces working.
- Ciii. Working adjacent to open hole.
- Civ. Flooding by displaced water.
- Cv. Presence of 11 kV high voltage power cables.
- Cvi. Presence of carbon dioxide.
- Cvii. Man entry into the well.

Operations
- Oi. No significant issues currently identified.

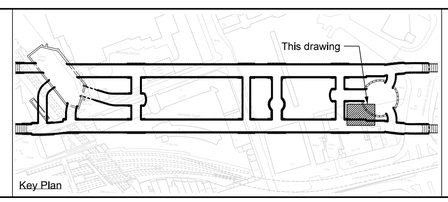
Maintenance
- Mi. Deterioration of exposed upper well.
- Mii. No loading permitted on protective cover.

Dismantling/Demolition (Future)
- Di. No significant issues currently identified.

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

Rev.	Date	Description	By	Chkd	App	Auth
P01	13/11/2009	First Issue	IM	AD	TD	
P02	04/02/2010	Second Issue Stage E Report	WH	AD	TD	
P03	04/03/2010	Third Issue - revised Stage E report	IM	AD	TD	
P04	27/05/2010	Fourth Issue - Stage F	WH	AD	TD	
P05	04/06/2010	Fifth Issue - Revised Stage F	IM	BL	TD	
P06	09/06/2010	Sixth Issue - Revised Stage F - C140 comments incorporated	IM	AD	TD	
P07	07/07/2010	Seventh Issue - Revised Stage F - Gate 3 comments incorporated	IM	AD	TD	
P08	22/07/2010	Revised Stage F - Well position moved and Section B - B revised	IM	AD	TD	

Notes



Key Plan

Crossrail Limited
25 Canada Square
Canary Wharf
London
E14 5LQ

www.crossrail.co.uk

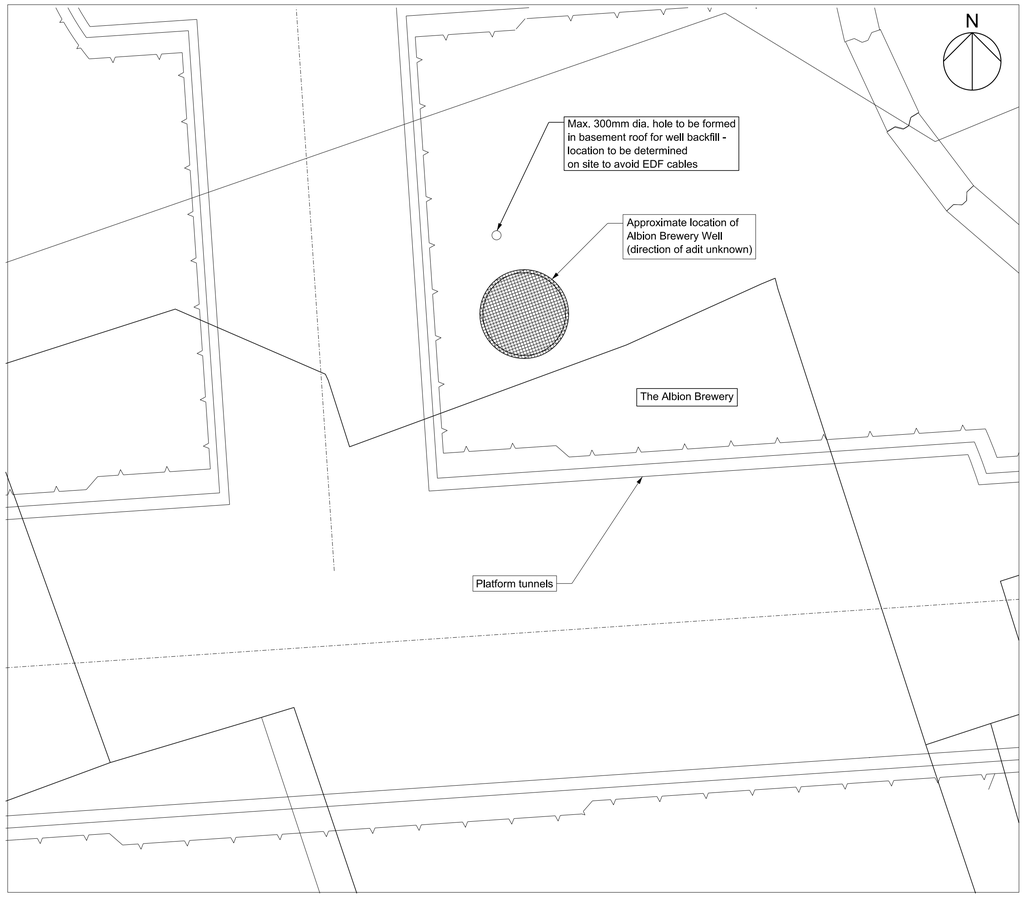
Contract : Sprayed Concrete Lining
Originator : Mott MacDonald Limited
Location : Whitechapel Stn District
Title : Whitechapel Station Albion Brewery Well Decommissioning
By : I.MITCHELL
Chk : A.DAVIS
App : T.DEANE
Auth :
Scale : Various@ A1
Drawing and CAD file No : C121-MMD-C-DDL-D061-57101
Rev : P08
Suitability : S4

Fit for authorisation

RESTRICTED

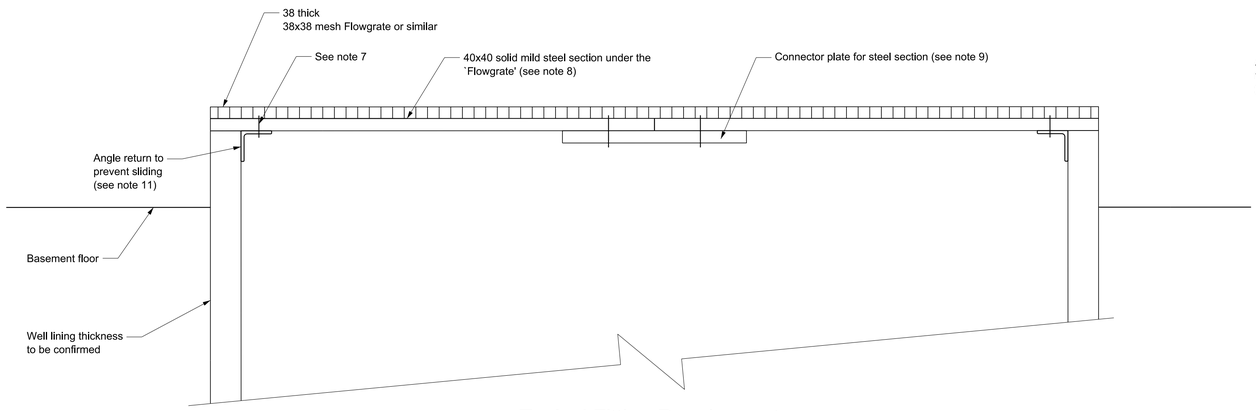
Copy Approved for Design - Created: 22-JUL-2010

Appendix F - Drawing of protective cover (Drawing C121-MMD-C-DDL-D061-57104 P05)



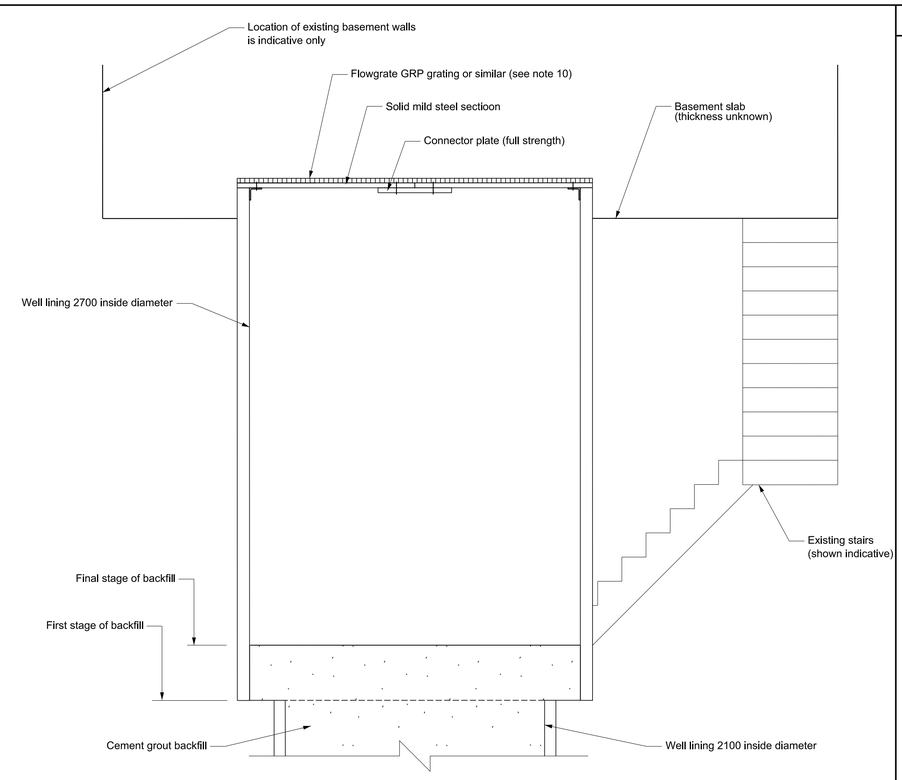
Location Plan
Scale 1:100

2m 0 2m 4m 6m 8m 10m



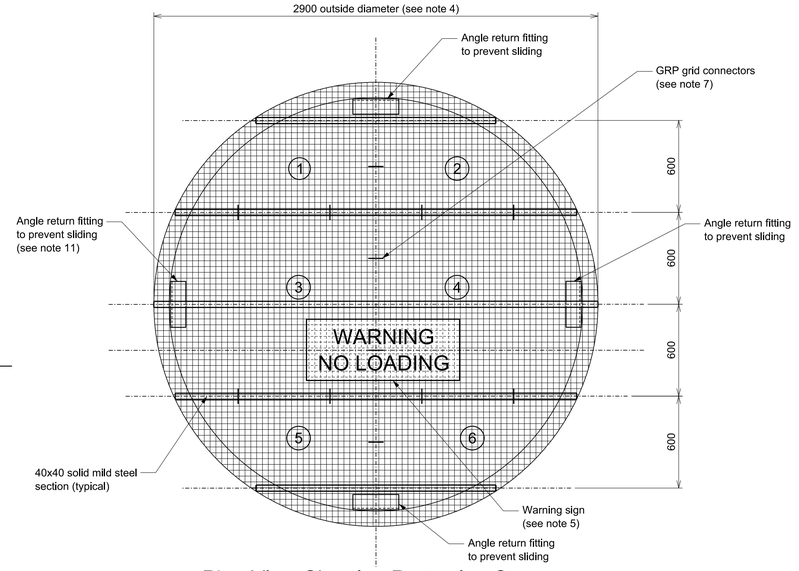
Typical Fitting Requirements
Scale 1:10

200mm 0 200mm 400mm 600mm 800mm 1000mm



Detail at Top of Cast Iron Lining Showing Location of Handrails
Scale 1:25

0.5m 0 0.5m 1m 1.5m 2m 2.5m

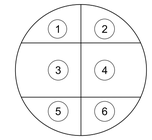


Plan View Showing Protective Cover
Scale 1:25

0.5m 0 0.5m 1m 1.5m 2m 2.5m

Notes

1. Confirmation of all survey data must be obtained from the Crossrail survey team.
2. Coordinates to the London Survey Grid, heights to the London height datum which is 100 metres below Ordnance Datum Newlyn. See Crossrail standard CR-STD-010.
3. All dimensions are in millimetres unless specified otherwise.
4. Exact dimensions of the well shall be confirmed on site before fabrication of the cover.
5. A warning sign including the text "WARNING NO LOADING" shall be placed on well cover. Text to be minimum height of 100mm and be in red capitals
6. Access gate to the well area is believed to be 700mm x 1200mm high. Exact size shall be verified by the contractor before fabrication.
7. GRP grid connection details to be confirmed by the manufacturer.
8. 40mm x 40mm solid mild steel S275 sections shall be fabricated with a maximum length of 1500mm.
9. Where the span is greater than 1500mm, two solid mild steel sections of adequate length shall be connected with a full strength connector plate to allow for transportation of materials into the basement. Connection details to be confirmed by the manufacturer.
10. GRP grating to be 38mm thick with a 38mmx38mm mesh size (Flowgrate or similar approved). The grating shall be in a neutral colour to be accepted by the project manager.
11. Protective cover to be fixed to prevent sliding by the inclusion of angle returns. A minimum of four are required but more may be required to ensure rigidity. Angle returns shall not be fixed to the well lining.
12. Hole to be formed in basement roof for access. Maximum dimension is 300mm diameter.
13. Mesh to be fabricated in 6 sections as shown on the key below and assembled on site due to limited access.



Reference Drawings

C121-MMD-C-DDL-D061-57101	Decommissioning drawing

Reference Documents

C121-MMD-C2-RGN-D061-00005	Whitechapel Station Albion Brewery Well Decommissioning
C121-MMD-C2-RSP-D061-00001	Grouting Specification for Albion Well Decommissioning

Safety, Health and Environmental Information

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

Construction
- Ci. Presence of asbestos in basement.
- Cii. Confined spaces working.
- Ciii. Working adjacent to open well.
- Civ. Presence of carbon dioxide.
- Cv. Presence of 11kV high voltage power cables.

Operations
- Oi. No significant issues currently identified.

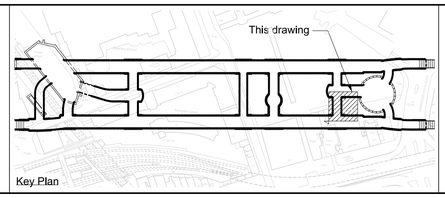
Maintenance
- Mi. No significant issues currently identified.
- Mii. No loading permitted on protective cover.

Dismantling/Demolition (Future)
- Di. No significant issues currently identified.

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

Rev.	Date	Description	By	Chkd	App	Auth
P01	27/05/2010	First Issue - Stage F	WH	AD	TD	
P02	04/06/2010	Revised Stage F issue	IM	BL	TD	
P03	09/06/2010	Third Issue - Revised Stage F - C140 comments incorporated	IM	AD	TD	
P04	07/07/2010	Fourth Issue - Revised Stage F - Gate 3 comments incorporated	IM	AD	TD	
P05	22/07/2010	Revised Stage F - Well position moved	IM	AD	TD	---

Notes



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

Contract : Sprayed Concrete Lining
Originator : Mott MacDonald Limited
Location : Whitechapel Stn District
Title : Whitechapel Station Albion Brewery Well Protective Cover
By : I.MITCHELL
Chk : A.DAVIS
App : T.DEANE
Auth : ---
Scale : Various@ A1
Drawing and CAD file No : C121-MMD-C-DDL-D061-57104
Rev : P05
Suitability : S4

Fit for authorisation

RESTRICTED

Copy Approved for Design - Created: 22-JUL-2010

Appendix G - Appendix 2 Settlement Mitigation Deed

The following six pages form the deed known as an Appendix 2 Settlement Mitigation Deed.

Dated 200X

[*Name of the nominated undertaker***] (1)**

The Mayor and Burgesses of the London Borough of Tower Hamlets (2)

The Historic Buildings and Monuments Commission for England (3)

Crossrail: Settlement mitigation works affecting Listed Buildings

THIS DEED is made the day of 200X

BETWEEN

[ ] of [ ] ("the nominated undertaker")(1)

AND

THE MAYOR AND BURGESSES OF THE LONDON BOROUGH OF TOWER HAMLETS [address] ("the Council")(2)

AND

THE HISTORIC BUILDINGS AND MONUMENTS COMMISSION FOR ENGLAND [address] ("English Heritage") (3)

WHEREAS

(1) The Crossrail Act 200[] ("the Act") has been enacted authorising works in connection with the construction and operation of Crossrail;

(2) Paragraph 2 of Schedule 9 to the Act disapplies sections 7, 38(1), 42(1) and 54 of the Planning (Listed Building and Conservation Area) Act 1990 in relation to certain works for the maintenance or restoration of the character of specified listed buildings as buildings of special architectural or historic interest;

(3) Section [48] of the Act provides for the Secretary of State to appoint one or more bodies as nominated undertaker to carry out the works for Crossrail and the nominated undertaker has been so appointed;

(4) The nominated undertaker has been required by the Secretary of State to enter into this Deed providing for certain details of works affecting listed buildings to be approved by the local planning authority.

NOW THIS DEED WITNESSES as follows:-:

1 Definitions

"the appointed person" means a person appointed by the Secretaries of State under clause 4 for the purpose of determining outstanding matters or referring them to those Secretaries of State for determination;

"EH related request" means a request for approval under this agreement which, if it were to comprise an application for listed building consent, would require notice to be

given to English Heritage by virtue of paragraph 15(2) of circular 01/01 of the Office of the Deputy Prime Minister;

"emergency" means circumstances where there is a risk to health and safety or to the preservation of an affected property such that any of the mitigation works require to be carried out immediately;

"excluded building" means a listed building which is exempt from the provisions of sections 7 to 9 of the Planning (Listed Buildings and Conservation Areas) Act 1990 by virtue of –

(a) section 60 (ecclesiastical buildings) of that Act (ignoring article 5(5) of the Ecclesiastical Exemption (Listed Buildings and Conservation Areas) Order 1994 or any similar provision of any subsequent order under that section), or

(b) section 61 (scheduled monuments) of that Act;

"mitigation works" means works for the alteration or extension of a listed building in the London Borough of Tower Hamlets which is not an excluded building, being works which fall within paragraph 2(1)(a) of Schedule 9 to the Act and which do not require consent under section 7 of the Planning (Listed Buildings and Conservation Areas) Act 1990 by virtue of paragraph 2 of that Schedule 9 but which would affect the character of the building as a building of special architectural or historic interest (whether carried out in exercise of the nominated undertaker's powers under paragraph 5 or 6 of Schedule 2 to the Act or under any agreement reached by it with a person with an interest in the building);

"the Secretary of State" means the Secretary of State for Transport;

"the Secretaries of State" means the Secretary of State for Transport and the Secretary of State for Communities and Local Government.

2 Approval of mitigation works

2.1 Subject to clause 2.7, the nominated undertaker must not carry out any mitigation works except in accordance with particulars submitted by it to the Council, and approved by the Council or determined under clause 4.

2.2 In the case of an EH related request, the nominated undertaker must at the same time as submitting particulars under clause 2.1 send that information to English Heritage, and the Council must not approve the works details submitted to it in such a case unless either–

(a) a period of 6 weeks or, in the case of a Grade I or II* listed building, 9 weeks has elapsed after the submission, or

(b) English Heritage have either given their comments on those particulars to the Council or have indicated that they do not intend to comment.

2.3 The approval of the Council of particulars of mitigation works –

(a) shall not be unreasonably withheld;

(b) may be given subject to reasonable amendments or requirements.

2.4 The decision of the Council to approve or refuse approval of particulars of mitigation works–

(a) shall be given as soon as reasonably practicable and in any event (but subject to clause 2.5) –

(i) within 8 weeks of receipt of the particulars in the case of a Grade II listed building and

(ii) within 12 weeks of receipt of the particulars in the case of a Grade I or Grade II* listed building;

(b) shall be sent in writing to the nominated undertaker.

2.5 Where under clause 2.3(b) the Council proposes reasonable amendments or requirements to the particulars of mitigation works ("the Council's proposals"), the nominated undertaker shall in writing within 4 weeks of receipt –

(a) confirm acceptance of the Council's proposals, or

(b) propose further amendments to the Council's proposals ("further amendments"), or

(c) unless otherwise agreed between the Council and the nominated undertaker, apply for the matter to be determined under clause 4.

2.6 Where the nominated undertaker proposes further amendments under clause 2.5(b) the Council shall in writing within 4 weeks of receipt –

(a) confirm acceptance of the further amendments, or

(b) unless otherwise agreed between the Council and the nominated undertaker, apply for the matter to be determined under clause 4.

2.7 Clause 2.1 does not apply in the case of emergency but the nominated undertaker must inform the Council and, in a case where if there were to be a request for approval for emergency works under this agreement the request would comprise an EH related request, English Heritage, as soon as reasonably practicable of the nature of the emergency and the works to be carried out or which have been carried out, and shall so far as reasonably practicable take into account any proposals made by the Council and (where English Heritage were required to be informed as aforementioned) by English Heritage, where the emergency works have not yet been carried out.

3 Changes to mitigation works

3.1 Where the nominated undertaker wishes to make changes to any particulars of mitigation works previously approved by the Council under this Deed or determined under clause 4, the nominated undertaker shall submit revised particulars of the mitigation works to the Council for approval.

3.2 The approvals procedures under clauses 2.2 to 2.7 and clause 4 shall apply to the revised particulars as they apply to particulars submitted under clause 2.1.

4 Determination

4.1 In the event that the nominated undertaker and the Council cannot agree all the elements of the mitigation works, either of them may submit any outstanding matter to an appointed person for the purpose of his determining that matter or (if so directed by the Secretaries of State) of making recommendations to the Secretaries of State to enable the Secretaries of State to determine it.

4.2 The circumstances in which the nominated undertaker and the Council shall not be taken to have agreed for the purposes of clause 4.1 include a case where –

(a) the nominated undertaker is dissatisfied with an amendment or requirement specified by the Council under clause 2.3(b), or

(b) no decision is given by the Council in respect of a submission by the nominated undertaker within the respective periods mentioned in clause 2.4(a).

4.3 In approving any particulars of mitigation works under this clause 4 the appointed person or the Secretaries of State may give the approval subject to any amendments or requirements which the Council could specify under clause 2.3(b), and the determination of the appointed person or of the Secretaries of State shall be final and binding.

5 Co-operation and consultation

Annex 2 – cont.

Wessex Archaeology March 2010 Crossrail Albion Brewery Car Park (Whitechapel Station) Archaeological Watching Brief Report MoL

All other site information to be obtained from the PDP site manager and Principal Contractor

Wessex Archaeology

Albion Yard Car Park (Whitechapel Station)

Archaeological Watching Brief Report

MoL Site Code CXC10

Ref: WA 72214.03

March 2010

CROSSRAIL

Albion Yard Car Park
(Whitechapel Station)

Archaeological Watching Brief Report

Prepared for:
Crossrail Ltd
25 Canada Square
Canary Wharf
London
E14 5LQ

by
Wessex Archaeology
Portway House
Old Sarum Park
SALISBURY
Wiltshire
SP4 6EB

MoL Site Code: CXC10

WA Report reference: Document 72214.03

March 2010

DISCLAIMER

QUALITY ASSURANCE

SITE CODE	**72214**	**ACCESSION CODE**	**CXC10**	**CLIENT CODE**	
PLANNING APPLICATION REF.		**NGR**	**534910, 181935**		

VERSION	STATUS*	PREPARED BY	APPROVED BY	APPROVER'S SIGNATURE	DATE	FILE
1	I	PAH	DDR		26/02/10	
2	I	DDR	NDT		5/3/10	

*** I= INTERNAL DRAFT E= EXTERNAL DRAFT F= FINAL**

CROSSRAIL

Albion Yard Car Park (Whitechapel Station)

Archaeological Watching Brief Report

Contents

CROSSRAIL

Albion Yard Car Park (Whitechapel Station)

Archaeological Watching Brief Report

Summary

Wessex Archaeology was commissioned by Crossrail Ltd to undertake a general watching brief to monitor and record two machine-dug trenches at the Albion Yard car park, within the area of the former Albion Brewery, Whitechapel. The trenches were dug as part of ground investigation work to evaluate deposits that would be impacted by the rerouting of services in advance of construction of the Cambridge Heath Road Shaft. The total length of trenching amounted to 15 m.

The results of the work suggest that the car park area has been built up to some degree using demolition rubble from the brewery. Some truncation of the underlying ground surface appears likely by utbuildings of the former brewery. Below these levels archaeological deposits, including post medieval soils, may be preserved.

If it can be confirmed that these soil deposits are undisturbed and do not represent backfilled material into former brewery basements it remains a possibility that more detailed undisturbed archaeological deposits may be preserved at a greater depth than those recorded.

At the present depth of excavation it is considered unlikely that any significant archaeological deposits or features will be threatened by rerouting of services in this area of the Cambridge Heath Road Shaft site.

CROSSRAIL

Albion Yard Car Park (Whitechapel Station)

Archaeological Watching Brief Report

Acknowledgements

This project was commissioned by Crossrail Ltd and Wessex Archaeology is grateful to Dennis Kelly in this regard.

The fieldwork was undertaken by Phil Harding, who also compiled this report, and Jon Milward. The illustrations were prepared by Will Foster. The project was managed for Wessex Archaeology by Damian De Rosa.

CROSSRAIL

Albion Yard Car Park (Whitechapel Station)

Archaeological Watching Brief Report

1 INTRODUCTION

1.1 Project Background

1.1.1 This document reports on the results of an archaeological watching brief undertaken by Wessex Archaeology on behalf of Crossrail (the Client) during ground investigation works in Albion Yard Car Park (hereafter the Site).

1.1.2 The Site, which lies within the area of the former Albion Brewery, Whitechapel (centred on National Grid Reference 534910, 181935), is now located within the proposed Whitechapel Station Crossrail portal and specifically within the Cambridge Heath Road Shaft and Worksite sub-site (**Figure 1**).

1.1.3 Mitigation measures were required at the Site in the form of a general watching brief (GWB) to monitor ground investigation works by EDF Energy for the re-location of existing utilities. This work is part of the Enabling Works phase being undertaken across the Whitechapel Station Crossrail portal

1.1.4 The archaeological work to monitor the groundworks was undertaken from the 8th to 12th February 2010.

1.1.5 The methodology of how the work would be undertaken was set out in a Method Statement (WA Ref. 72214.01), produced by Wessex Archaeology and submitted to Crossrail, prior to the fieldwork commencing.

1.1.6 All work was undertaken according to established procedures, and the following guidelines and documentation:

- Crossrail Generic Written Scheme of Investigation (Document no. CR-PN-LWS-EN-SY-00001).
- Crossrail Whitechapel Station, Detailed Desk Based Assessment. Doc No. CR-SD-WHI-EN-SR-00001
- Crossrail Whitechapel Station, Site-Specific Archaeological Written Scheme of Investigation. (Document no. CR-SD-WHI-EN-SY-00001).
- *Standard* and Guidance for an archaeological watching brief (IfA 2008),
- *Management* of Archaeological Projects (EH 1991)
- Management of Research Projects in the Historic Environment (MORPHE) (EH 2006).
- GLAAS Archaeological Guidance Papers (EH 1998 and 2009 (Draft))

2 THE SITE, LOCATION, TOPOGRAPHY AND GEOLOGY

2.1.1 The Site fronts onto the Mile End Road, one of the principal routes eastwards out of London. The Site is located within the residential car park of the former entrance block to the former Albion Brewery, which was converted in to flats in the 1990s (**Figure1**)

2.1.2 Ground level across the Cambridge Heath Shaft area is consistent at around 111.50m Above Tunnel Datum (ATD) (11.50m above Ordnace Datum (aOD)) . The results of preliminary borehole data within the area indicated that varying degrees of truncation have occurred to archaeological deposits. 'Made ground' possibly consisting in part of archaeological deposits, was recorded to approximately 107.50m ATD (7.50m aOD) which overlay River Terrace Deposits (RTD) and residual pockets of alluvium, beneath which is the London Clay at 105.40m ATD (5.40m aOD).

3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

3.1.1 A Detailed Desk-based Assessment (DBA) of the Whitechapel Station site (Crossrail 2008) identified a potential for archaeological remains relating to the Albion Brewery within the area of the Cambridge Heath Shaft and worksite.

3.1.2 This brewery complex formerly extended across the majority of the area, beneath what is now the current Sainsbury's car park to the north of the Site. The brewery was closed in 1979 and the entrance block (333-335 Whitechapel Road) was converted into flats in the 1990s. The Site of the watching brief lies within the car park area of the flats and to the rear of the Blind Beggar public house (**Figure 1**). It was considered that the extensive basements of the brewery will have removed archaeological deposits predating the construction of the brewery, nevertheless areas of alluvium and RTD may survive below the level of the basement floors.

3.1.3 The DBA identified a number of areas of archaeological potential including:

- Archaeological remains from the Roman period relating to the London to Colchester Roman road to the south of the Site, which follows the line of the modern day Whitechapel Road. The potential however was considered to be low.
- Possible burials relating to the Great Plague of 1665, when the parish of St Dunstans Stepney acquired *c*.1.25 acres of waste land on the north side of Whitechapel Road near Stonebridge, for the use as an emergency burial ground.
- The remains of sunken gardens, which are indicated on historic mapping from 1703.
- Post-medieval remains relating to the urbanisation of the area along the line of Whitechapel Road and Cambridge Heath Road comprising housing and the Albion Brewery, which cartographic evidence indicates was in existence by at least 1819.

4 METHODOLOGY

4.1 Aims and scope

4.1.1 The overall objectives of the investigation were to establish the nature, extent and state of preservation of any surviving archaeological remains that may be impacted upon by the development.

4.1.2 These are detailed in the *Whitechapel Station Site-Specific Archaeological Written Scheme of Investigation* (Crossrail 2009), to which reference should be made.

5 WATCHING BRIEF RESULTS

5.1 Methodology

5.1.1 Prior to the commencement of fieldwork, a unique Site Code **CXC10** was obtained from London Archaeological Archive and Research Centre (LAARC) of the Museum of London (MoL) for the archaeological work at the Site.

5.2 General Watching Brief

5.2.1 The GWB was undertaken to monitor the excavation by EDF Energy of two trenches, one measuring 8m, the other 4 m long, each c.0.70-0.90m wide and a maximum 1.2 m deep. The trenches were necessary to evaluate the nature of subsurface deposits that would be excavated to divert existing services away from the site of the Cambridge Heath Road Shaft and worksite (**Figure 1**).

5.2.2 The archaeologist was charged to inspect all intrusive groundworks. Non-archaeologically significant deposits, including modern made ground and demolition deposits, were removed by the contractors under archaeological supervision.

5.2.3 All work was undertaken, under constant archaeological supervision, using a rubber tracked mini-digger fitted with a toothless grading bucket, 0.60 m wide. Surface tarmac was cut with a disc cutter and areas of concrete, where they were present at the southern end of trench 2, were broken using a standard concrete breaker.

5.2.4 Written descriptions of the work were maintained accompanied by a digital photographic record. The digital photographic record was maintained to document not only the nature of the individual trenches but also to place them in the general context of the Site as a whole.

5.2.5 Trench locations (**Figure 1**) were recorded on an annotated plan to place them in relation to more permanent topographical features.

5.2.6 On completion of the excavation both trenches were backfilled and fully reinstated by the groundwork contractors.

6 RESULTS

6.1 Trench 1

6.1.1 Trench 1 measured eight metres long, and was aligned north to south, approximately three metres east of an off-set in the rear, northern, boundary wall of the Blind Beggar public house (**Figure 1**).

6.1.2 The section (**Plate 1**) showed that the modern tarmac surface of the car park (**101**) overlay brick/demolition rubble (**102**) to a depth of approximately 0.85m, which in turn overlay a concrete floor (**103**).

6.1.3 The base of a modern single skin brick wall (**104**), aligned east to west, was noted at the north end, laid directly on the concrete. This wall probably formed part of a partition or boundary wall within the area/structure contained by the concrete wall.

6.1.4 The concrete was punctured in one place by a machine-dug test pit, to a further depth of 0.35m. The test pit demonstrated that the concrete floor overlay a dark grey clay-rich soil (**105**), mixed with some brick rubble.

6.1.5 This very disturbed deposit is most probably a post medieval soil horizon, but may also represent backfilled material. The results of the test pit excavation were sufficient to satisfy the aims of the ground investigation works but were of insufficient extent to provide informative results of any undisturbed archaeological deposits or features.

6.2 Trench 2

6.2.1 Trench 2 (**Plate 2**), which measured only four metres long, was aligned parallel to and approximately five metres west of Trench 1. It was also 'stepped-out' approximately 1 m north of the boundary wall of the 'Blind Beggar' public house (**Figure 1**).

6.2.2 The modern car park tarmac and concrete surface (**201**) overlay a deposit of brick rubble and modern refuse (**202**). The presence of relatively large quantities of modern refuse suggests that these deposits may relate to the redevelopment of the Albion Brewery in the 1990s.

6.2.3 The made-up ground overlay a concrete screed surface (**203**), with a man-hole cover, at a depth of approximately 0.78 m, thereby replicating almost exactly the sequence observed in Trench 1.

6.2.4 The concrete surface overlay an earlier phase of made-up ground (**204**), of similar composition to layer **202**, and approximately 0.34 m thick. This demolition deposit sealed an earlier concrete floor (**205**) onto which was fixed a cast iron pillar base, set on a raised slab, and which may well have formed an internal roof or basement support of an outbuilding related to the Albion Brewery.

7 FINDS

7.1.1 No artefacts were recovered from Trenches 1 and 2.

8 ENVIRONMENTAL

8.1.1 No archaeological deposits suitable for environmental sampling were identified.

9 CONCLUSIONS

9.1.1 The results of the excavations through the modern car park surface have demonstrated variations in the sequences of deposits between these two closely spaced trenches.

9.1.2 The deposits appear to document archaeological activity on the Site relating to the construction of the brewery in the early 19th century and to its redevelopment for residential purposes in the 1990s. The lower of the two concrete floor surfaces in Trench 2 contained a pillar base and probably lay within a building of the Albion Brewery.

9.1.3 This lower floor surface was absent in Trench 1, suggesting that the eastern wall of the building may have been aligned along the projected line of the eastern tenement boundary wall of the Blind Beggar public house.

9.1.4 It is probable that this floor surface, and that overlying it, were laid on, or close to the, former old ground surface and that the present surface represents subsequent build-up of the area using demolition rubble from the brewery to create the car park. In any event it seems possible that archaeological deposits, including post medieval soils are present in Trench 1 below the concrete floor.

9.1.5 The very limited extent of penetration through the concrete floor in Trench 1 suggests that, if these soil deposits are undisturbed and do not represent backfilled material, then basements of the former brewery are absent in this part of the Site. From this it remains a possibility that earlier undisturbed archaeological deposits may be preserved at a greater depth.

9.1.6 In summary the results of the archaeological work undertaken in conjunction with the ground investigation works at the Albion Yard Car Park have not ruled out the possibility that archaeological deposits may survive below the depths recorded; however at the present level of excavation it is unlikely that any significant archaeological deposits or features might be threatened by rerouting of services in the area of the Cambridge Heath Road Shaft and work site.

10 ARCHIVE

10.1 Preparation and Deposition

10.1.1 The complete project archive comprises an A4 ring bound folder with context record sheets, photographic register, Risk Assessment and various background documentation. There is an accompanying archive of photographs in colour digital format. The entire archive is currently held at the offices of Wessex Archaeology where they are held under the Museum of London Site Code **CXC10** and Wessex Archaeology project code 72214. The completed archive for all stages of work will be deposited with The Museum of London under Site Code **CXC10**

10.2 Copyright

10.2.1 Wessex Archaeology shall retain full copyright of any report under the Copyright, Designs and Patents Act 1988 with all rights reserved. Excepting that it hereby provides an exclusive licence to the client for the use of the report by the client in all matters directly relating to the project as described in the specification. Any document produced to meet planning requirements may be copied for planning purposes by the Local Planning Authority.

10.3 Security Copy

10.3.1 In line with current best practice, on completion of the project a security copy of the paper records will be prepared, in the form of microfilm. The master jackets and one diazo copy of the microfilm will be submitted to the National Monuments Record Centre (Swindon), a second diazo copy will be deposited with the paper records at the Museum, and a third diazo copy will be retained by Wessex Archaeology.

11 REFERENCES

Crossrail 2008, Whitechapel Station, Detailed Desk Based Assessment. Doc No. CR-SD-WHI-EN-SR-00001

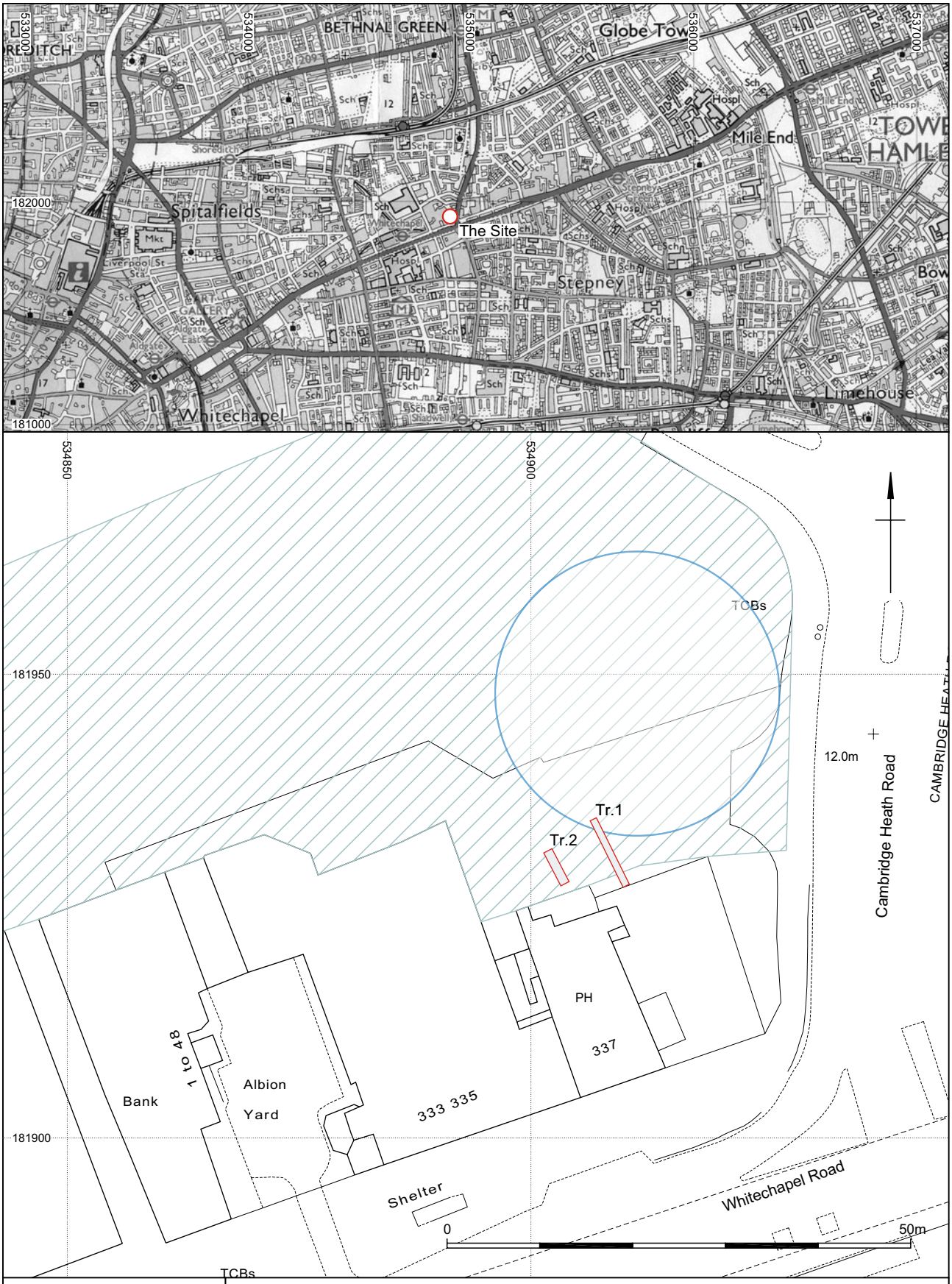
Crossrail, 2009, (Version 6) Whitechapel Station. Site Specific Archaeological Written Scheme of Investigation. Doc No.: CR-SD-WHI-EN-SY-00001

Wessex Archaeology 2010 *Crossrail, Albion Road Car Park (Whitechapel Station) Method Statement for a General Watching Brief*. WA Project No.: 72214.01 MoL Site Code: CXC10

Appendix 1- Table of trench context descriptions

Trench 1		
Context	**Description**	**Depth (m)**
101	Modern tarmac surface with thin layer of foundation material below.	0-0.10
102	Modern make-up, brick rubble demolition material, electricity cable, wood plastic etc.	0.10-0.85
103	Concrete floor/raft. Present across entire extent of trench	0.85-0.95
104	Single skin brick wall base, aligned E-W, laid directly on 103	
105	Dark grey silty clay with fragments of brick rubble. Material of uncertain origin, assumed post medieval soil horizon but could be backfilled deposit.	0.95-1.25+

Trench 2		
Context	**Description**	**Depth (m)**
201	Car park surface make-up. Northern end of trench has tarmac on top of concrete, southern end does not.	0-0.20
202	Made ground. Rubble deposit comprising of mainly broken bricks (London stock) and pieces of concrete. Modern refuse in deposit suggests this is only around 20-30 years old. Equivalent of 102	0.20-0.70
203	Pre existing surface. Screed slab with a man-hole cover located towards the centre of the trench. As 103	0.70-0.78
204	Made ground. Rubble deposit mixed with a small amount of soil. Similar to 202.	0.78-1.12
205	Pre existing surface. Screed slab (excavation halted at this point). Possibly floor of former brewery building.	1.12+
206	Pillar base. At north end of trench. Constructed on top of 205. Comprises a raised slab with an iron pillar base bolted onto it.	0.88-1.12



Watching Brief Trenches
Crossrail works area
Cambridge Heath Rd. Shaft

Wessex Archaeology

Date:	22/02/10	Revision Number:	0
Scale:	1:600	Illustrator:	WAF
Path:	Y:\PROJECTS\72214\Drawing Office\Report Figs\WB\10_02_22\72214_WB.dwg		

Site and Trench location

Figure 1

Plate 1: West face of Trench 1 showing general sequence of deposits with post medieval soil at the base

Plate 2: West face of Trench 2 showing pillar base of possibly related to Albion Brewery

Date:	22/02/10	Revision Number:	0
Scale:	N/A	Illustrator:	WAF
Path:	Y:\PROJECTS\72214\Drawing Office\Report Figs\WB\10_02_22\Plates.cdr		

Wessex Archaeology

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For more information visit **www.wessexarch.co.uk**

Annex 3: Plans and Illustrations

N

Location of Essex Wharf Well
Essex Wharf Worksite
Durward Street Shaft
North East Storm Relief Sewer Access Shaft
Cambridge Heath Road Shaft
Cambridge Heath Road Worksite
West Stair Shaft
Tunnel Access Shaft
Grout Shaft
Durward Street Worksite

SELBY STREET
SURMA CLOSE
GRANARY ROAD
HEADLAM STREET
WYLLEN CLOSE
MERCERON STREET
TRANMORN CLOSE
DARLING ROW
CAMBRIDGE HEATH ROAD
HINGARY CLOSE
KEY CLOSE
LOMAS STREET
CASTLEMAINE STREET
DURWARD STREET
BRADY STREET
MILE END ROAD
HALLAMSHIRE ROAD
WOODHAM GARDENS
WHITECHAPEL ROAD
EAST MOUNT STREET
PHILADELPHIA STREET
COURT ST
ADELINA GROVE
SIDNEY STREET
MARKET PLACE
RAVEN ROW
LINDLEY STREET
MELIARD STREET
CAVELL STREET
MOUNT TERRACE
BEGAL CLOSE

MLO63681 SEL92
MLO69014
MLO3961
MLO64323 ABR93
MLO3836
MLO67281 BDY95
MLO67466 DUR96
MLO25728
MLO73477 MAP98
MLO73308
MLO3985
MLO76258 WCA83
MLO64337 BSW94
MLO3929
MLO25727
MLO24982 DAV77
CCU05
MLO3941
MLO3956
MLO3974
MLO10343
MLO75409
MLO35401
RLP05
MLO10364
MLO23055 RLN05
MLO98022

Safety, Health and Environmental Information
Notes below are additional to hazards/risks normally associated with this type of work:
Construction
CI. N/A
Operations
OI. N/A
Maintenance
MI. N/A
Dismantling/Demolition (Future)
DI. N/A
These notes are based on the use of experienced and competent contractors carrying out the work using an approved safe method of working.

Rev.	Date	Description	By	Chkd	App	Auth
P01	01/03/2011	Updated for Written Scheme of Investigation v 4.0	IG	AT	JM	

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

Key
- MLO21941 Greater London Sites and Monuments record
- ATL89 Site Codes
- Archaeological Priority Zone
- Listed Building
- Albion Brewery Well
- Burial Ground
- Scheduled Ancient monuments
- Crossrail Worksite
- Basement

Scale 1:1000
20m 0 20m 40m 60m 80m 100m

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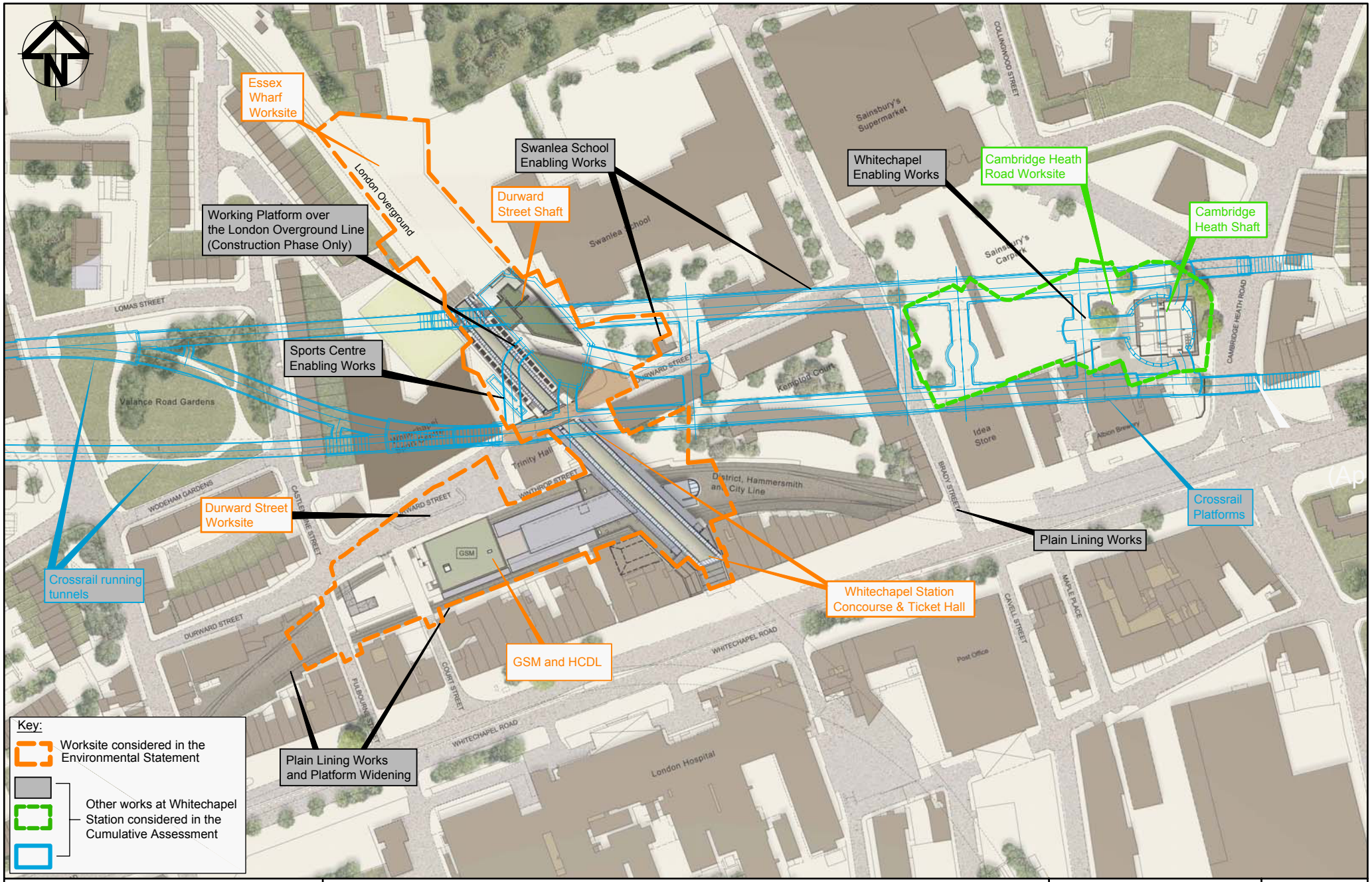
www.crossrail.co.uk

Contract: Whitechapel Station Design
Originator: Hyder
Location: Whitechapel Stn District Line Link Worksite
Title: Whitechapel Station
Arcgaeological Base Line
By: I.GUILFOYLE
Chk: A.TAYLOR
App: J.MCCARTHY
Auth:
Scale: 1:1000@ A1
Drawing and CAD file No.: C140-HYD-T1-DDA-D061_WS106-06000
Rev.: P01
Suitability: S4



Crossrail

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WHITECHAPEL STATION

ALL WORKS AT WHITECHAPEL

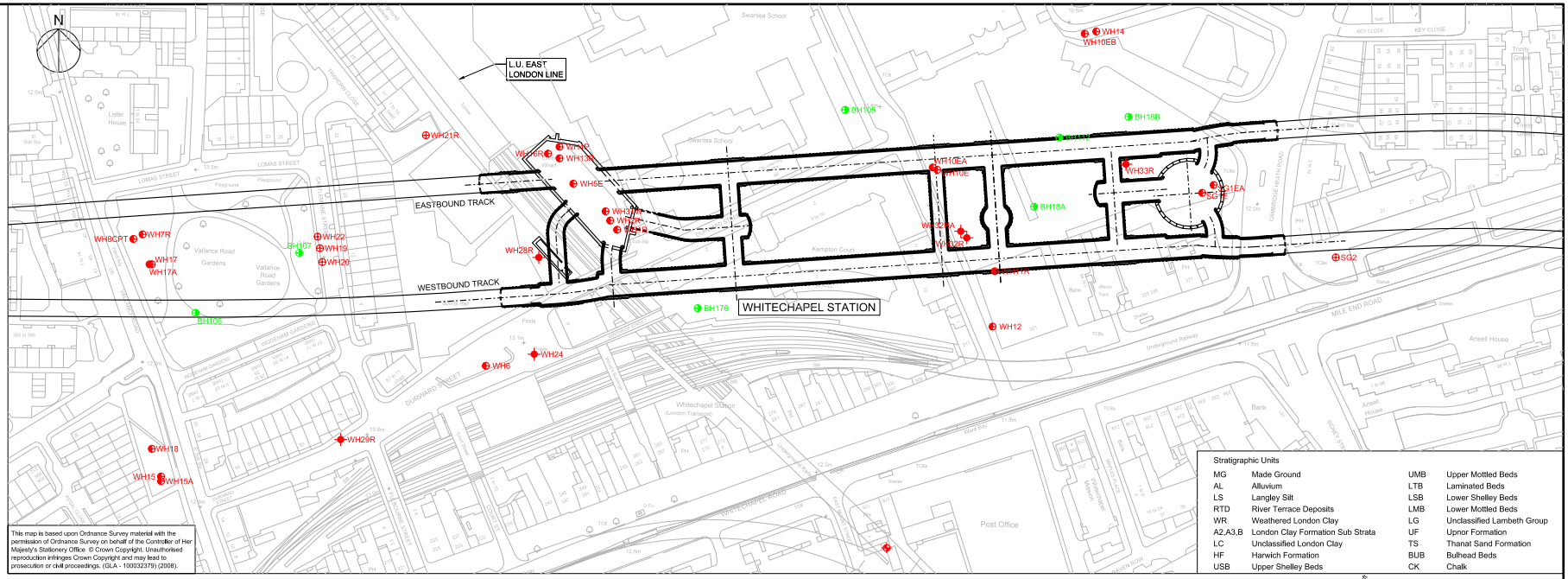
0 30 60m
1 : 1500

FIGURE 2

SCALE: 1:1500 @ A3

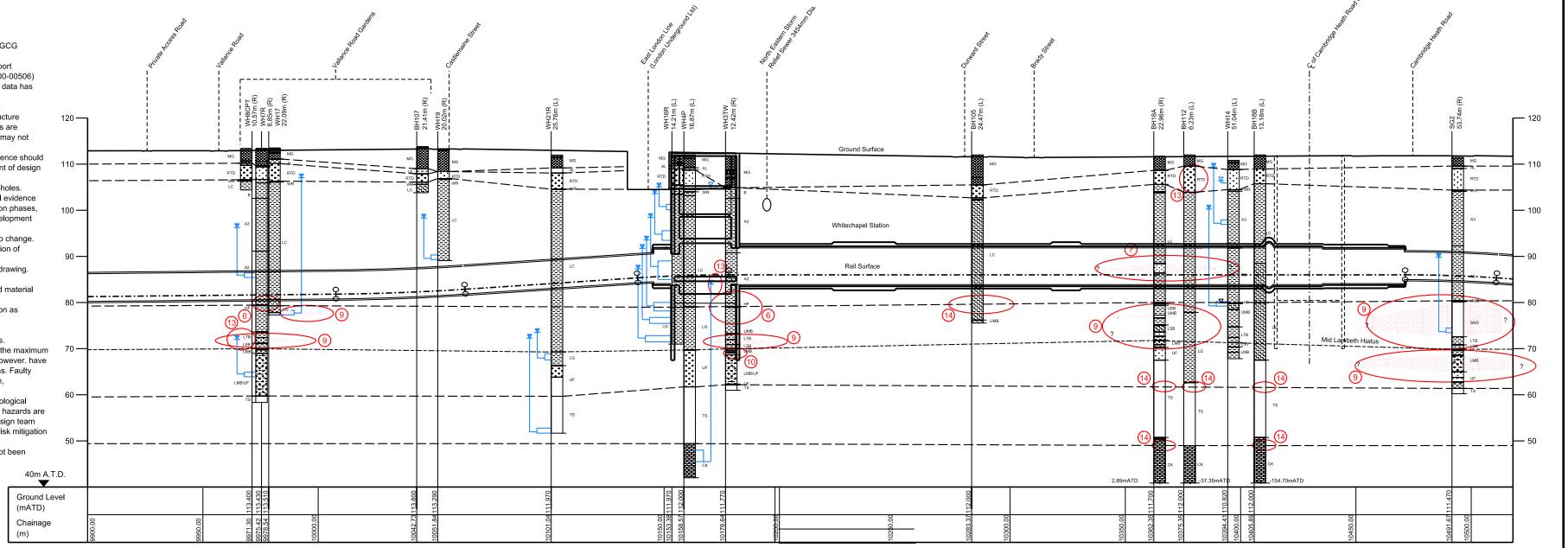
Geological and Hydrogeological Hazards Summary

No.	Hazard	Applicable (Y/N) (see note 6)	Potential Engineering Consequences
1	Potential for high degree of variability in ground and groundwater conditions within superficial deposits. Generic.	Y	Groundwater ingress to shallow structures through high permeability bands, settlement and ground movement.
2	Relic erosional features (scour hollows/ buried river channels) resulting in reduced thickness of underlying strata (London Clay) and increased thickness of overlying superficial deposits with potential for collection of groundwater in the hollow.	N	Groundwater inflow to shallow structures. Over-estimation of design parameters if full extent of scour feature not identified.
3	Periglacial features (i.e. pingos) which may have caused disturbance of the ground and a reduction in mass strength and potential stability.	N	Weakening of geological materials
4	Fissured London Clay resulting in a reduction of mass strength and potentially stability and creation of potential conduits for groundwater. Generic.	Y	Groundwater inflow. Reduction of mass strength.
5	Claystones in the London Clay (may be very hard/abrasive), predominantly found in division A3. Generic.	Y	Increased wear on tools
6	Abrasive pebble beds, flint gravel and sand which maybe present within the Harwich formation.	Y	Obstruction to excavation (pebble beds). Increased wear on tools. Groundwater inflow through high permeability bands and associated reduction in face stability
7	Localised water bearing granular horizons in the excavation (see note 6) within the London Clay and upper Lambeth Group. Associated with lateral variability in ground and groundwater conditions with potential for running sands.	Y	Collapse due to 'running sand'. Large groundwater inflow. Lost time due to dewatering.
8	Potentially large scale water bearing sand channels in the excavation (see note 6) within the upper Lambeth Group.	N	Collapse due to 'running sand'. Large groundwater inflow. Lost time due to dewatering.
9	Potential for isolated high pore water pressures in granular layers below or just above the excavation (see note 6).	Y	Collapse due to 'running sand'. Large water inflow. Lost time due to dewatering. Base heave/instability. Large scale movements.
10	Cemented hard bands , calcrete, silcrete, ferricrete, and calcareous nodules at the mid Lambeth Hiatus. Generic.	Y	None likely with current alignment. Obstruction to piling operations.
11	Lignite (tree and root fragments preserved in situ) may cause an obstruction to excavation Generic.	Y	Potential obstruction to excavation should major tree/root fragments be encountered.
12	Sulphuric acid, ceased by solution of the oxidation products of pyrite on rebound of groundwater. Generic.	Y	Hazardous/aggressive chemicals will impact on concrete dosing and metallic elements.
13	Anomalous groundwater observations (potentially spurious readings). See note 13.	Y	Readings may be real and indicative of actual conditions. See note 13.
14	Anomalous stratum boundaries (potentially inaccurate logging)	Y	Strata boundaries may represent geological anomalies (eg folds and/or faults)



Notes:

1. The scheme plan and vertical alignment is Revision N alignment.
2. This drawing presents the existing geotechnical information provided by GCG and third party information gained from other sources. This includes FES Factual Reports (1D0101-C1G00-00001, 00007) : GCG interpretative report (1D0101 C1G00-00007-GSIR3) : GCG monitoring report (1D0101 C1G00-00506) : GCG desk study (1D0101 G0G00-50003). Where required, the existing data has been re-interpreted for the purposes of the ground model construction.
3. The geotechnical long sections have been interpreted principally from the boreholes closest to the section line. However, the overall geological structure has been interpreted from all the data available. Where exploratory holes are offset from the section line, strata boundaries shown on the long section may not coincide with the strata boundaries within individual exploratory holes.
4. For detailed information regarding stratigraphical and material type, reference should be made to the individual factual exploratory hole records for development of design sections.
5. Most reliance has been placed on the crossrail ground investigation boreholes.
6. Applicability of ground hazards to the site location is based on the factual evidence to date and is subject to change following subsequent ground investigation phases, ongoing geotechnical Input and Interpretation throughout the design development phase.
7. Chainages shown on plan and sections are indicative only, and subject to change.
8. Excavation depths are subject to design change, hence the relative position of hazards to the excavation will change accordingly.
9. Contamination potential hazards are not included within the scope of this drawing.
10. Reference should be made to the Risk Register.
11. Some boreholes are not shown on the section due to absence of detailed material descriptions.
12. Examples of typical hazards (see table above) are indicated on the section as inferred by the borehole logs.
    Further hazards may be present including known generic hazards (eg Hazard Refs 1, 4, 5, 11-14) which are not shown at specific locations.
13. Where recorded piezometers readings appear erroneous, or anomalous the maximum recorded water level is shown within the "reliable data" set. Readings, however. have been recorded above this level and may be indicative of actual conditions. Faulty piezometers that have not produced any reliable readings are not shown, although the location of the response zone is indicated.
14. This drawing represents an inital identification of geological and hydrogeological hazards. The potential consequences and likelihood of occurence of the hazards are dependant ont heform/type of construction adopted by the team. The design team should use this drawing to develop the design, the risk register and the risk mitigation measures.
15. Locations of package 13 boreholes have been plotted but geology has not been interpreted since the information is currently in draft.



LONGITUDINAL SECTION
Scale (A1) H=1:1000, V=1:500

Crossrail

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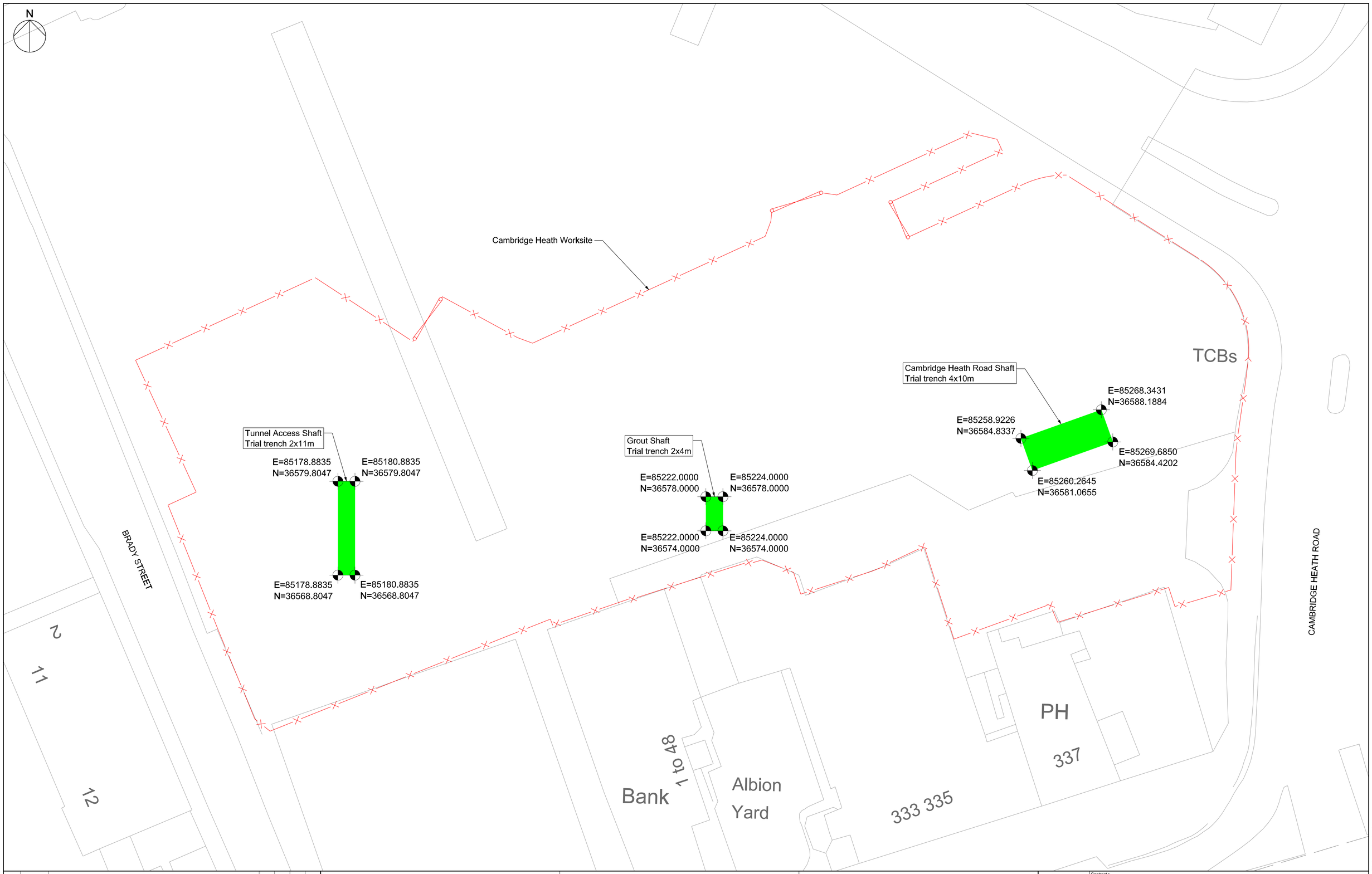
GEOLOGICAL CROSS SECTION, WHITECHAPEL STATION

Original Drawing No:
C140-HYD-C2-DDB-D061_WS106_Z-20300
Scale of this plan is different from scale of original

FIGURE 3

SCALE: N.T.S.



Rev.	Date	Description	By	Chkd	App	Auth
P01	01/03/2011	Updated for Written Scheme of Investigation v 4.0	IG	AT	JM	—

Notes

1. Confirmation of all survey data must be obtained from the Crossrail survey team.
2. Coordinates to the London Survey Grid. All levels to Ordnance Datum Newlyn. See Crossrail standard CR-STD-010.
3. All dimensions are in metres unless specified otherwise.
4. Note location of Albion Brewery Underground Basements.
5. Note location of Albion Brewery well.
6. There is potential for encountering undiscovered wells and human remains within the Whitechapel area.

Scale 1:200

4m 0 4m 8m 12m 16m 20m

Crossrail Limited
25 Canada Square
Canary Wharf
London
E14 5LQ

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Contract : Whitechapel Station Design
Originator : Hyder
Location : Whitechapel Stn Sainsburys Car Park Worksite
Title : Whitechapel Station Archaeology Layout of archaeological trenches
By : I.GUILFOYLE
Chk : A.TAYLOR
App : J.MCCARTHY
Auth : —
Scale : 1:200@ A1
Drawing and CAD file No : C140-HYD-T1-DDA-D061_WS107_Z-02010
Rev : P01
Suitability : S4

Fit for authorisation

RESTRICTED

N

Legend

- Route to platforms
- Route between platforms (via subway)
- Ticket barriers
- Whitechapel Market Conservation Area Boundary

Durward Street

London Overground

Kempton Court

Durward Street Bridge

Kempton Court Boundary Wall

Whitechapel Sports Centre

[5] [9]

Winthrop Street Bridge [10]

Trinity Hall

Winthrop Street [1]

Footbridge over HCDL [2]

Existing footbridge to London Overground

Gable

Existing Station Manager's office

Existing Ticket Hall [8]

Existing Entrance Hall

Wood's Building

HCDL

[3] [4]

GSM

Durward Street

Court Street Bridge

Fulbourne Street

Tunnels from HCDL to LO Platforms

MDR Hall

Ticket Office

Cafe

Stairs to solicitors office (above)

Main Entrance

Whitechapel Road

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WHITECHAPEL STATION

Location of whitechapel Station Assets

Figure 5

SCALE:

Annex 4: Health and Safety requirements

Designers Risk Assessment and CDM requirements

Health & Safety - Designer's Hazard Record

Project Title	Project Code
Whitechapel Station	

Assessment Coverage:

Works associated with the Archaeological Site Specific Written Scheme of Investigation

1. Scope of Commission and Assessment of Coverage:

Written Scheme of Investigation for all the archaeological works at Whitechapel Station

2. Brief Description of the Works:

Three trial trenches at Cambridge Heath Road Worksite. Targeted Watching Brief elsewhere. Historic Building Recording within existing underground station.

3. Key Risk Reduction measures taken during design process:

Position trenches to avoid services hazards. Specify supported trench sides to avoid collapse

4. Significant Project Specific Hazards Remaining:

Usual on-site hazards (tripping, falling objects, moving plant, collapsing trench sides, infection, toxic substances) to be mitigated through RAs and measures by the Principal Contractor and the Archaeological Contractor

5. Specific Construction Requirements

The Trial Trenches shall be supported by sheet piling and steel frames rather than by stepping or battering unless this can be shown by the excavating contractor to be safe.

6. Means by which significant hazards conveyed to contractors and others:

SS-WSI. Notes on Figure 4 Trench Plan of SS-WSI

Date of Review	

Assessed by:

Name	J Hunter	Signature		Date	4/3/2011

Reviewed by:

Name	John Haines	Signature		Date	

	Health & Safety - Designer's Hazard Record			Project Code/Doc No: C140/	
	Project Title: Whitechapel Station	Assessor (Name): Jim Hunter	Assessor (Signature): 	Date: 3/3/2011	Revision: A

Ref	Activity & Hazard	Level of Risk (optional)	Design Input to Eliminate or Reduce Hazards, and Hazards Remaining	Residual Hazard?
1	Live services (injury or death caused by hitting live services)		Trenches to be undertaken after service diversion. Principal contractor's H&S plan to be followed including routine scanning for live services prior to excavation. Archaeological contractor to undertake risk assessment and adhere to results.	Acceptable
2	Working at depth (trench collapse, poisonous gases or other substances)		Trenches will be shored with sheet piling and frames rather than battered or stepped. Principal contractor's H&S plan to be followed. Archaeological contractor to undertake risk assessment and adhere to results.	Acceptable
3	Usual hazards associated with archaeological watching briefs (tripping, falling objects, moving plant, collapsing trench sides, infection, toxic substances)		Usual RAs from the Principal and Archaeological Contractors to be undertaken and followed	Acceptable
4	Leptospirosis, contaminated material etc. -.		wear overalls and suitable gloves. Ensure facilities for changing and storage of PPE. Ensure good washing facilities available and are used	Acceptable

Ref	Activity & Hazard	Level of Risk (optional)	Design Input to Eliminate or Reduce Hazards, and Hazards Remaining	Residual Hazard?
5	Asbestos in ground.		ensure staff are aware of the signs that might indicate asbestos materials in the ground. Any such indication should be notified to the Principal Contractor immediately	Acceptable
6	Site vehicles and other operations. -		All activities to be co-ordinated through the Principal Contractor.	Acceptable
7	Work at height/depth. -		Excavations will be fenced. Access to excavations will be by ladder, secured at the top.	Acceptable
8				

Archaeological Contractors risk assessment and Health and Safety Plans

Archaeological Contractor to produce

Archaeological Contractors Safety Audits, Safety Inspections, reporting of Accidents

Archaeological Contractor to produce

Personal Protective Equipment (PPE)

Labelling of Hazardous Substances, Contaminated Land

Crossrail Health and Safety Management System, Crossrail Drugs and Alcohol Policy

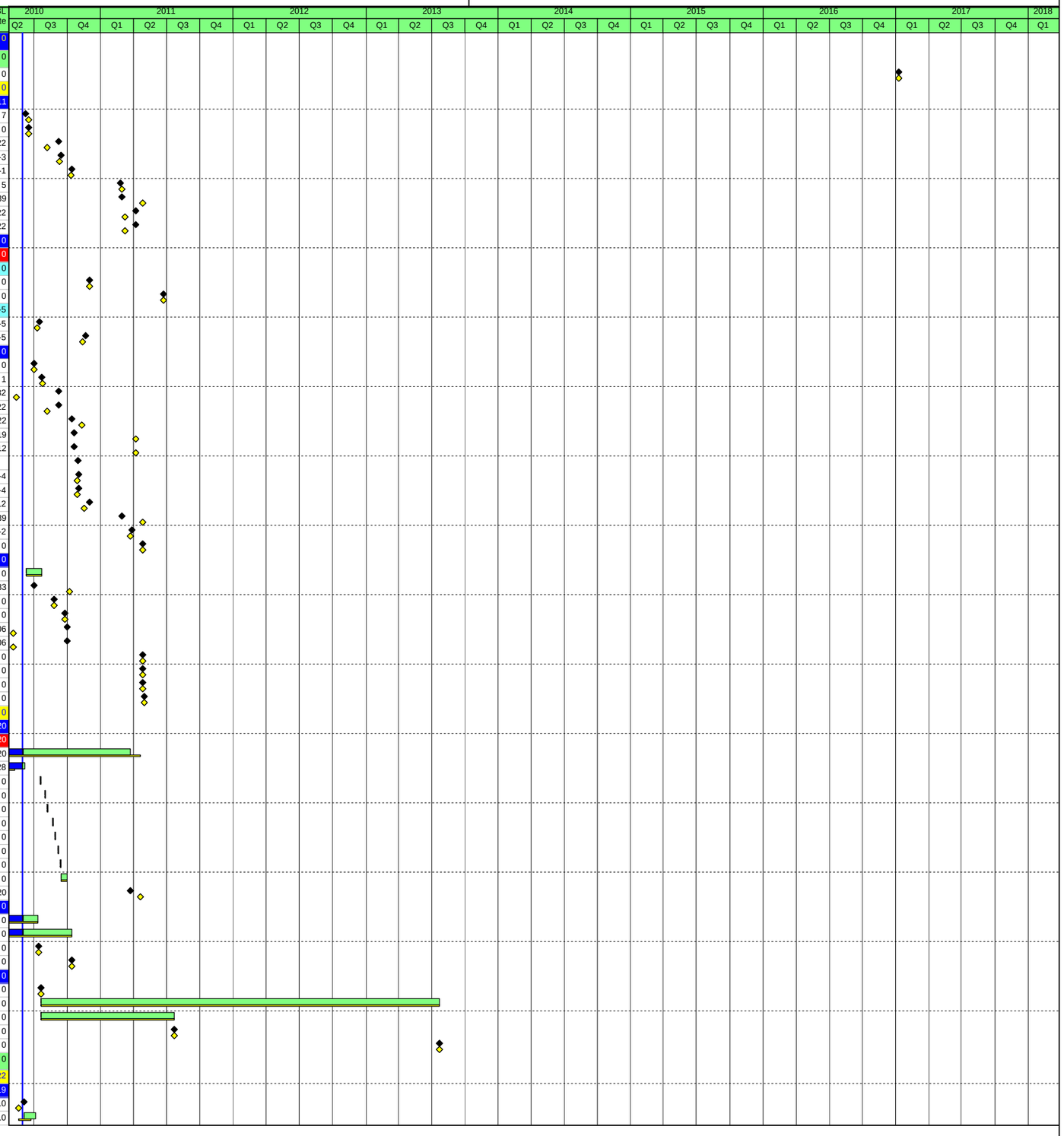
Annex 5: Environmental protection requirements

To be obtained from the PDP site manager and Principal Contractor

Annex 6: Programme and order of work for implementation of works and integration with other activities

PCSO4 - WBS P02 June 2010

Activity ID	Activity Name	Start	Finish	Total Float	Variance - BL Project Finish Date
Whitechapel Station		16-Jun-08 A	01-Feb-17	152	0
Project Level		19-Oct-09 A	09-Jan-17	169	0
WHI100010	Whitechapel Station Construction Complete		09-Jan-17*	0	0
Milestones		07-Jun-10	23-Jun-11	1572	0
WHI-01- Cambridge Heath Shaft/ Sainsbury's Car Park Area		07-Jun-10	07-Apr-11	1623	11
AA-PM-2470	C217 - Issue ITT	07-Jun-10		1761	7
AA-PM-2300	Early Works - Gate 3 (Excluding Swanlea School & ELL Working Platform)		16-Jun-10	1831	0
AA-PM-2480	C217 - Award Contract	07-Sep-10		1696	-22
AA-PM-2181	WHI-04 - Site Entry - Cambridge Heath Shaft/ Sainsbury's Car Park Area		14-Sep-10	2021	-3
AA-PM-2070	THA/3/12 - Cambridge Heath Rd CA - Consent Process Complete	12-Oct-10		1748	-1
AA-PM-2340	Cambridge Heath Shaft RIBA F Gate 3 Review (5.5 d)		23-Feb-11	2391	5
AA-PM-2140	THA/3/14 - Cambridge Heath Road P&S - Consent Process Complete	01-Mar-11		1651	39
AA-PM-2630	C217 - Albion Brewery / Cambridge Heath Works Complete		07-Apr-11	1623	-22
AA-PM-2640	C217 - Albion Brewery - Utility diversions complete		07-Apr-11	1623	-22
Procurement		16-Jul-10	23-Jun-11	1572	0
Main Works		16-Jul-10	23-Jun-11	1572	0
C512 - Whitechapel Station Cambridge Heath Shaft (Main Station Works, Fit Out + M&E)		01-Dec-10	23-Jun-11	1572	0
AA-PM-2450	C512 - Issue ITT		01-Dec-10	1711	0
AA-PM-2460	C512 - Award Contract		23-Jun-11	1572	0
C511 - Whitechapel Station (Pilling & Dwall) Contractor Procurement		16-Jul-10	19-Nov-10	1719	-5
AA-PM-2430	C511 - Issue ITT		16-Jul-10	1808	-5
AA-PM-2440	C511 - Award Contract		19-Nov-10	1719	-5
WHI-02 - Durward Street/ Whitechapel Sports Centre / Swanlea School		01-Jul-10	27-Apr-11	1612	0
AA-PM-2210	WHI-06 - Site Entry -Durward Street - Sports Centre		01-Jul-10	1819	0
AA-PM-2190	WHI-02 - Site Entry - Swanlea School (Sewer Strengthening Works)		23-Jul-10	2065	1
AA-PM-2490	C217 - North East Storm Relief Sewer -Issue ITT	07-Sep-10		1696	-82
AA-PM-2500	C217 - Contract Award	07-Sep-10		1696	-22
AA-PM-2580	C244 - Crash Deck Complete		12-Oct-10	1748	22
AA-PM-2620	C245 - Swanlea school Civil Works Complete		19-Oct-10	1742	119
AA-PM-2610	C245 - Caretakers house demolished		19-Oct-10	1665	112
AD2410	Construction of substation complete	29-Oct-10		1734	
AA-PM-2560	C245 - New Utility building - (Utilities installation complete - "Live")		02-Nov-10	1733	-4
AA-PM-2570	C245 - School utilities - switch over complete		02-Nov-10	1733	-4
AA-PM-2590	C217 - Sports Centre Works Complete		01-Dec-10	1711	-12
AA-PM-2130	THA/3/13 - Durward St/ Whitechapel Sports Centre/ Swanlea School P&S - Consent Process...	01-Mar-11		1651	39
AA-PM-2600	C217 - North East Storm Relief Sewer Work Complete		28-Mar-11	1631	-2
AA-PM-2180	THA/3/17 - Demolition od DS & WS D124 Bridges Part ELL Wall & Entract Conservation Ar...	27-Apr-11		1612	0
WHI-03 - Station Bridge		10-Jun-10	30-Apr-11	1609	0
AA-PM-2110	Public Information Period	10-Jun-10	21-Jul-10	1805	0
AA-PM-2230	WHI-03 - Site Entry - Kempton Court/ Fulbourne Street		01-Jul-10	2084	83
AA-PM-2100	Public Information Round - Scheme Complete		25-Aug-10	1780	0
AA-PM-2410	Station Bridge Concourse - RIBA E Gate 2 Review : All other Design Scope (5.7 c)		23-Sep-10	2544	0
AA-PM-2390	Station Bridge Concourse - RIBA E Gate 2 Review : Civil and Structural interfacing (5.7 a)		30-Sep-10*	1755	-106
AA-PM-2400	Station Bridge Concourse - RIBA E Gate 2 Review : Associated ITT Information (5.7 b)		30-Sep-10*	1755	-106
AA-PM-2120	THA/3/5 - Station Braidge CA - Consent Process Complete	27-Apr-11		1612	0
AA-PM-2150	THA/3/15 - Kempton Court Secondary Access - T&C PA Process Complete	27-Apr-11		1612	0
AA-PM-2170	THA/3/16 - Stopping Up of St - T&C PA Process Complete	27-Apr-11		1612	0
AA-PM-2420	Station Bridge Concourse - RIBA F Gate 3 Review (5.7 d)		30-Apr-11	2325	0
External Interfaces		19-Oct-09 A	22-Jul-13	1046	0
London Underground		19-Oct-09 A	23-Mar-11	1634	20
West Ham Reversal Facility (Turnback)		19-Oct-09 A	23-Mar-11	1634	20
WHI100340	Plain Line Track Works	19-Oct-09 A	23-Mar-11	126	20
M3WHIC3880	Lift redundant sth track & extend plat'm(EngHrs) (LU)	17-Jan-10 A	05-Jun-10	2653	-28
WHI100230	Stage 1	17-Jul-10*	19-Jul-10	358	0
WHI100240	Stage 2	31-Jul-10	01-Aug-10	358	0
WHI100250	Stage 3	07-Aug-10	08-Aug-10	358	0
WHI100260	Stage 4	21-Aug-10	23-Aug-10	358	0
WHI100270	Stage 5	28-Aug-10	30-Aug-10	358	0
WHI100280	Stage 6	04-Sep-10	06-Sep-10	358	0
WHI100290	Stage 7	11-Sep-10	13-Sep-10	358	0
WHI100300	Commission	14-Sep-10	29-Sep-10	358	0
WHI100320	Plain Line Track Works Complete		23-Mar-11	126	20
Sainsbury's Temporary Car Deck (Rev A)		11-Jan-10 A	12-Oct-10	1747	0
A1220	Phase 1	11-Jan-10 A	12-Jul-10	1747	0
A1230	Phase 2 & 3	11-Jan-10 A	12-Oct-10	1747	0
A1250	Open Phase 1 Deck		13-Jul-10	1811	0
A1240	Open Phase 2 Deck		12-Oct-10	1747	0
Swanlea School - 'British Schools for the Future'		20-Jul-10	22-Jul-13	1046	0
WHI102770	Start Swanlea School Redevelopment Works	20-Jul-10*		1046	0
WHI102780	Swanlea School Redevelopment Works	20-Jul-10	22-Jul-13	1046	0
WHI102800	Redevelop the City Learning Centre & Locate the Premises Manager's Building Above	20-Jul-10	22-Jul-11	1551	0
WHI102810	Redevelop the City Learning Centre & Reconstruction of Premises Manager's Building Comp...		22-Jul-11	1551	0
WHI102790	Complete Swanlea School Redevelopment Works		22-Jul-13	1046	0
Planning Consents		20-Oct-09 A	06-Nov-15	295	0
Enabling Works		20-Oct-09 A	01-Apr-11	668	-22
THA/3/7 - Swanlea School Schedule 7 Plans & Specification Application		04-Jun-10	26-Jul-10	280	-19
WHI106550	THA/3/7 - LPTH Approve (With Possible Conditions)	04-Jun-10*		294	-10
WHI106600	THA/3/7 - Resolve Conditions &/ or Apeal	04-Jun-10	05-Jul-10	294	-10



Remaining Level of Effort | Primary Baseline | Remaining Work | Baseline Milestone
Actual Level of Effort | Actual Work | Critical Remaining Work | Milestone

TASK filters: In Progress, Not Started.

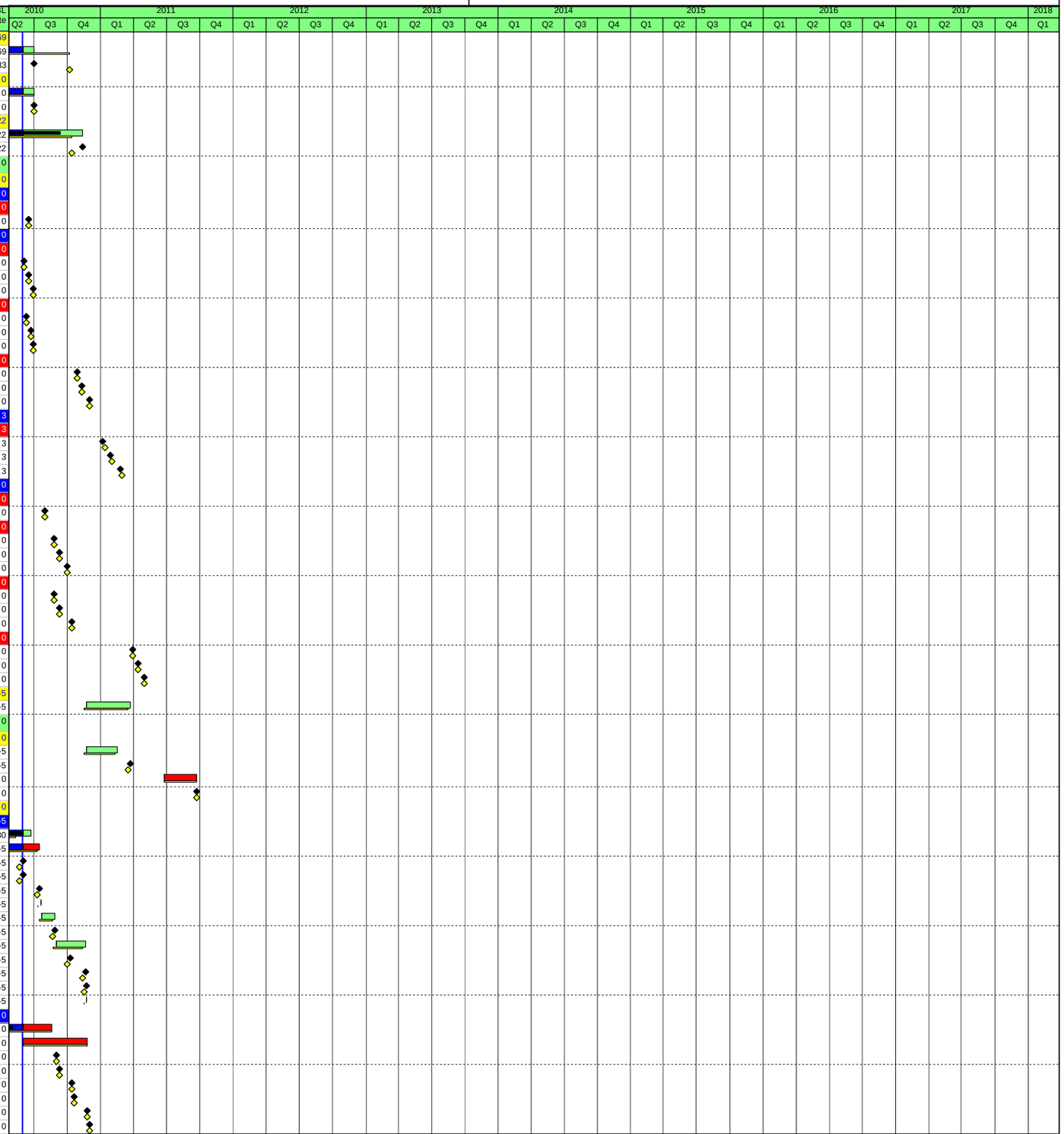
Activity ID	Activity Name	Start	Finish	Total Float	Variance - BL Project Finish Date
WHI106560	THA/3/7 - Consent Process Complete	06-Jul-10		294	-10
WHI106570	THA/3/7 - Required By C245 Commence Swanlea School Works	26-Jul-10		280	-19
THA/3/1/H1 - Infilling of Well, Albion Brewery - Appendix 2 Heritage Deed		14-Dec-09 A	01-Apr-11	668	-22
WHI106190	THA/3/1/H1 - Prepare Consent Package	14-Dec-09 A	09-Jun-10	794	-16
WHI106150	THA/3/1/1H1 - Submit Consent Application to LBTH	10-Jun-10		794	-16
WHI106200	THA/3/1/H1 - LBTH Review Consent Application	10-Jun-10	02-Sep-10	794	-13
WHI106160	THA/3/1/H1 - LPTH Approve (With Possible Conditiions)	03-Sep-10		794	-13
WHI106210	THA/3/1/H1 - Resolve Conditions &/ or Apeal	03-Sep-10	01-Oct-10	794	-13
WHI106170	THA/3/1/H1 - Consent Process Complete	04-Oct-10		794	-13
WHI106180	THA/3/3/H1 - Required By C217 Phase 2 Well Stabilisation Works	01-Apr-11		668	-22
THA/3/1/H2 - Strengthening to Basement - Appendix 2 Heritage Deed Submission		14-Dec-09 A	18-Mar-11	652	-22
WHI106340	THA/3/1/H2 - Prepare Consent Package	14-Dec-09 A	02-Aug-10	729	-11
WHI106300	THA/3/1/H2 - Submit Consent Application to LBTH	03-Aug-10		729	-11
WHI106350	THA/3/1/H2 - LBTH Review Consent Application	03-Aug-10	27-Sep-10	729	-11
WHI106310	THA/3/1/H2 - LPTH Approve (With Possible Conditiions)	28-Sep-10		729	-11
WHI106360	THA/3/1/H2 - Resolve Conditions &/ or Apeal	28-Sep-10	26-Nov-10	729	-10
WHI106320	THA/3/1/H2 - Consent Process Complete	29-Nov-10		729	-10
WHI106330	THA/3/1/H2 - Required By C217 Phase 2 Basement Strengthening Works	18-Mar-11		652	-22
THA/3/1/H3 - Infilling of Additional Wells - Appendix 2 Heritage Deed		26-Mar-10 A	25-Feb-11	658	-16
WHI106120	THA/3/1/H3 - Prepare Consent Package	26-Mar-10 A	28-Jul-10	727	-17
WHI106080	THA/3/1/H3 - Submit Consent Application to LBTH	29-Jul-10		727	-17
WHI106130	THA/3/1/H3 - LBTH Review Consent Application	29-Jul-10	29-Sep-10	727	-17
WHI106090	THA/3/1/H3 - LPTH Approve (With Possible Conditiions)	30-Sep-10		727	-17
WHI106140	THA/3/1/H3 - Resolve Conditions &/ or Apeal	30-Sep-10	16-Nov-10	727	-17
WHI106100	THA/3/1/H3 - Consent Process Complete	17-Nov-10		727	-17
WHI106110	THA/3/1/H3 - Required By C217 Phase 2 Install Well Strengthening Works	25-Feb-11		658	-16
THA/3/10 - Relocation of EDF Substation - Plans & Specifications Consent		20-Oct-09 A	25-Feb-11	658	-22
WHI106050	THA/3/10 - Prepare Consent Package	20-Oct-09 A	18-Jun-10	754	-19
WHI106010	THA/3/10 - Submit Consent Application to LBTH	21-Jun-10		754	-19
WHI106060	THA/3/10 - LBTH Review Consent Application	21-Jun-10	11-Aug-10	754	-19
WHI106020	THA/3/10 - LPTH Approve (With Possible Conditiions)	12-Aug-10		754	-19
WHI106070	THA/3/10 - Resolve Conditions &/ or Apeal	12-Aug-10	08-Oct-10	754	-19
WHI106030	THA/3/10 - Consent Process Complete	11-Oct-10		754	-19
WHI106040	THA/3/10 - Required By (WHAT SUBSTATION DO WE STILL NEED THIS CONSENT)	25-Feb-11		658	-22
WHI-01- Cambridge Heath Shaft/ Sainsbury's Car Park Area		11-Jan-10 A	22-Nov-10	287	-5
THA/3/12 - Cambridge Heath Road Construction Arrangements		11-Jan-10 A	22-Nov-10	287	-5
WHI106660	THA/3/12 - Prepare Consent Package	11-Jan-10 A	01-Jul-10	316	-9
WHI106620	THA/3/12 - Submit Consent Application to LBTH	02-Jul-10		316	-9
WHI106670	THA/3/12 - LBTH Review Consent Application	02-Jul-10	09-Sep-10	316	-9
WHI106630	THA/3/12 - LPTH Approve (With Possible Conditiions)	10-Sep-10		316	-9
WHI106680	THA/3/12 - Resolve Conditions &/ or Apeal	10-Sep-10	11-Oct-10	316	-1
WHI106640	THA/3/12 - Cambridge Heath Rd CA - Consent Process Complete	12-Oct-10		316	-1
WHI106650	THA/3/12 - Required By C511 Contract Award	22-Nov-10		287	-5
WHI-03 - Station Bridge & Shafts		04-Jan-10 A	24-Jun-11	0	0
Urban Realm		04-Jan-10 A	02-Jul-10	78	0
AA1120	prepare CABE Presentation Material	04-Jan-10 A	02-Jul-10	78	0
AA1100	Crossrail Sign Off Urban realm		02-Jul-10	78	0
Public Information Round		14-Jan-10 A	25-Aug-10	40	0
A4780	Prepare Public Consultation Materials	14-Jan-10 A	07-Jun-10	40	0
A4790	Public Information Period	10-Jun-10	21-Jul-10	40	0
A4800	Agree Scheme With CRL	22-Jul-10	04-Aug-10	40	0
A4810	Update Scheme Drawings	05-Aug-10	25-Aug-10	40	0
A4820	Public Information Round - Scheme Complete		25-Aug-10	40	0
THA/3/4 - Station Bridge - Plans & Specs		26-Aug-10	24-Jun-11	0	0
WHI107010	THA/3/4 - Kick Off	26-Aug-10		40	0
WHI107060	THA/3/4 - Prepare Consent Package	26-Aug-10	27-Oct-10	40	0
WHI107020	THA/3/4 - Submit Consent Application to LBTH	28-Oct-10		40	0
WHI107070	THA/3/4 - LBTH Review Consent Application	28-Oct-10	24-Jan-11	40	0
WHI107030	THA/3/4 - LPTH Approve (With Possible Conditiions)	25-Jan-11		40	0
WHI107080	THA/3/4 - Resolve Conditions &/ or Apeal	25-Jan-11	26-Apr-11	40	0
AA2090	THA/3/4 - Station Bridge P&S - Consent Process Complete	27-Apr-11		40	0
WHI107050	THA/3/4 - Required By C512 - Contract Award	24-Jun-11		0	0
THA/3/5 - Station Bridge & Durward Box - Construction Arrangements		26-Aug-10	24-Jun-11	0	0
WHI106930	THA/3/5 - Kick Off	26-Aug-10		40	0
WHI106980	THA/3/5 - Prepare Consent Package	26-Aug-10	27-Oct-10	40	0
WHI106940	THA/3/5 - Submit Consent Application to LBTH	28-Oct-10		40	0
WHI106990	THA/3/5 - LBTH Review Consent Application	28-Oct-10	24-Jan-11	40	0
WHI106950	THA/3/5 - LPTH Approve (With Possible Conditiions)	25-Jan-11		40	0
WHI107000	THA/3/5 - Resolve Conditions &/ or Apeal	25-Jan-11	26-Apr-11	40	0
WHI106960	THA/3/5 - Station Braidge CA - Consent Process Complete	27-Apr-11		40	0
WHI106970	THA/3/5 - Required By C512 - Contract Award	24-Jun-11		0	0
THA/3/13 - Durward Street - Plans & Specs		26-Aug-10	24-Jun-11	0	0
WHI106850	THA/3/13 - Kick Off	26-Aug-10		79	0
WHI106900	THA/3/13 - Prepare Consent Package	26-Aug-10	02-Sep-10	79	39
WHI106860	THA/3/13 - Submit Consent Application to LBTH	03-Sep-10		79	39
WHI106910	THA/3/13 - LBTH Review Consent Application	03-Sep-10	25-Nov-10	79	39
WHI106870	THA/3/13 - LPTH Approve (With Possible Conditiions)	26-Nov-10		79	39
WHI106920	THA/3/13 - Resolve Conditions &/ or Apeal	26-Nov-10	28-Feb-11	79	39
WHI106880	THA/3/13 - Durward St/ Whitechapel Sports Centre/ Swanlea School P&S - Consent Process...	01-Mar-11		79	39

Remaining Level of Effort | Primary Baseline | Remaining Work | Baseline Milestone
Actual Level of Effort | Actual Work | Critical Remaining Work | Milestone

Activity ID	Activity Name	Start	Finish	Total Float	Variance - BL Project Finish Date
WHI106890	THA/3/13 - Required By C512 - Contract Award	24-Jun-11		0	0
THA/3/14 - Cambridge Heath Road Plans & Specs		04-Mar-10 A	24-Jun-11	0	0
WHI106740	THA/3/14 - Prepare Consent Package	04-Mar-10 A	08-Jul-10	118	-19
WHI106700	THA/3/14 - Submit Consent Application to LBTH	03-Sep-10		79	39
WHI106750	THA/3/14 - LBTH Review Consent Application	03-Sep-10	25-Nov-10	79	39
WHI106710	THA/3/14 - LPTH Approve (With Possible Conditions)	26-Nov-10		79	39
WHI106760	THA/3/14 - Resolve Conditions &/ or Apeal	26-Nov-10	28-Feb-11	79	39
WHI106720	THA/3/14 - Cambridge Heath Road P&S - Consent Process Complete	01-Mar-11		79	39
WHI106730	THA/3/14 - Required By C512 - Contract Award	24-Jun-11		0	0
THA/3/15 - Kempton Court Secondary Access Town + Country Planning Application		26-Aug-10	24-Jun-11	0	0
AA1130	THA/3/15 - Kick Off	26-Aug-10		40	0
AA1180	THA/3/15 - Prepare Consent Package	26-Aug-10	27-Oct-10	40	0
AA1140	THA/3/15 - Submit Consent Application to LBTH	28-Oct-10		40	0
AA1190	THA/3/15 - LBTH Review Consent Application	28-Oct-10	24-Jan-11	40	0
AA1150	THA/3/15 - LPTH Approve (With Possible Conditiions)	25-Jan-11		40	0
AA1200	THA/3/15 - Resolve Conditions &/ or Apeal	25-Jan-11	26-Apr-11	40	0
AA2160	THA/3/15 - Kempton Court Secondary Access - T&C PA Process Complete	27-Apr-11		40	0
AA1170	THA/3/15 - Required By C512 - Contract Award	24-Jun-11		0	0
THA/3/16 - Stopping up of Street Access Town + Country Planning Application		26-Aug-10	24-Jun-11	0	0
AA1210	THA/3/16 - Kick Off	26-Aug-10		40	0
AA1260	THA/3/16 - Prepare Consent Package	26-Aug-10	27-Oct-10	40	0
AA1220	THA/3/16 - Submit Consent Application to LBTH	28-Oct-10		40	0
AA1270	THA/3/16 - LBTH Review Consent Application	28-Oct-10	24-Jan-11	40	0
AA1230	THA/3/16 - LPTH Approve (With Possible Conditiions)	25-Jan-11		40	0
AA1280	THA/3/16 - Resolve Conditions &/ or Apeal	25-Jan-11	26-Apr-11	40	0
AA1240	THA/3/16 - Stopping Up of St - T&C PA Process Complete	27-Apr-11		40	0
AA1250	THA/3/16 - Required By C512 - Contract Award	24-Jun-11		0	0
THA/3/17 - Demolition of DS & WS Part D124B Bridges Part ELL Wall & Conservation Area		26-Aug-10	24-Jun-11	0	0
AA1290	THA/3/17 - Kick Off	26-Aug-10		40	0
AA1340	THA/3/17 - Prepare Consent Package	26-Aug-10	27-Oct-10	40	0
AA1300	THA/3/17 - Submit Consent Application to LBTH	28-Oct-10		40	0
AA1350	THA/3/17 - LBTH Review Consent Application	28-Oct-10	24-Jan-11	40	0
AA1310	THA/3/17 - LPTH Approve (With Possible Conditiions)	25-Jan-11		40	0
AA1360	THA/3/17 - Resolve Conditions &/ or Apeal	25-Jan-11	26-Apr-11	40	0
AA1320	THA/3/17 - Demolition od DS & WS D124 Bridges Part ELL Wall & Entract Conservation Ar...	27-Apr-11		40	0
AA1330	THA/3/17 - Required By C512 - Contract Award	24-Jun-11		0	0
Bringing Into Use		05-Jan-15	06-Nov-15	295	0
WHI102690	THA/3/6 - Worksite Restoration Proposals	05-Jan-15	06-Nov-15	295	0
WHI102730	Start to Seek All Bringing into Use Consents	05-Jan-15*		295	0
WHI102720	All Bringing into use Consents Gained		06-Nov-15	295	0
Highways & Traffic Consents		30-Nov-09 A	01-Feb-17	152	-1651
Open Worksite Accesses onto Durward Street		19-Feb-10 A	26-Jul-10	280	-19
WHI107150	LBTH Review Consent Application	19-Feb-10 A	07-Jun-10	314	-13
WHI107110	LBTH Approve - Consent Process Complete	08-Jun-10		314	-13
WHI107130	Required By	26-Jul-10		280	-19
Open Worksite Accesses onto Brady Street		14-Dec-09 A	26-Jul-10	280	-19
WHI107400	Prepare Consent Package	14-Dec-09 A	18-Jun-10	284	-27
WHI107410	Submit Consent Application to LBTH	21-Jun-10		284	-27
WHI107420	LBTH Review Consent Application	21-Jun-10	19-Jul-10	284	-30
WHI107430	LBTH Approve - Consent Process Complete	20-Jul-10		284	-30
WHI107440	Required By	26-Jul-10		280	-19
Open New Swanlea School Access onto Durward Street		22-Feb-10 A	26-Jul-10	280	-19
WHI107360	LBTH Review Consent Application	22-Feb-10 A	07-Jun-10	314	-13
WHI107370	LBTH Approve - Consent Process Complete	08-Jun-10		314	-13
WHI107380	Required By	26-Jul-10		280	-19
Open Worksite Accesses onto Brady Street for Albion Yard Flats		30-Nov-09 A	26-Jul-10	280	-19
WHI107250	Prepare Consent Package	30-Nov-09 A	03-Jun-10	294	-16
WHI107220	Submit Consent Application to LBTH	04-Jun-10		294	-16
WHI107260	LBTH Review Consent Application	04-Jun-10	05-Jul-10	294	-19
WHI107230	LBTH Approve - Consent Process Complete	06-Jul-10		294	-19
WHI107240	Required By	26-Jul-10		280	-19
New Swanlea School Access - Suspend On-Street Parking Spaces		22-Feb-10 A	26-Jul-10	280	-19
WHI107480	LBTH Review Consent Application	22-Feb-10 A	07-Jun-10	314	-13
WHI107490	LBTH Approve - Consent Process Complete	08-Jun-10		314	-13
WHI107500	Required By	26-Jul-10		280	-19
New Swanlea School Access - Consent for Interference with LHA P		22-Feb-10 A	01-Feb-17	152	-1651
WHI107320	LBTH Review Consent Application	22-Feb-10 A	07-Jun-10	1837	-13
WHI107290	LBTH Approve - Consent Process Complete	08-Jun-10		1837	-13
WHI107300	Required By	01-Feb-17		152	-1651
Property Acquisition		16-Jun-08 A	11-Nov-10	1633	-22
WHI-01 / 04- Cambridge Heath Shaft/ Sainsbury's Car Park Area		16-Jun-08 A	14-Sep-10	369	-2
Sainsbury's Car Park - Partial WHI-01		14-Sep-10	14-Sep-10	369	-82
WHI105660	WHI-01 - Site Entry - Cambridge Heath Shaft/ Sainsbury's Car Park Area		14-Sep-10	419	-99
Sainsbury's Car Park - Full access WHI-04		16-Jun-08 A	14-Sep-10	369	-2
WHI105590	WHI-04 - Acquire &/or negotiate access for Cambridge Heath Shaft/ Sainsbury's Car Park Area	16-Jun-08 A	13-Sep-10	369	-2
WHI105591	WHI-04 - Site Entry - Cambridge Heath Shaft/ Sainsbury's Car Park Area		14-Sep-10	419	-3
WHI-02 - Durward Street / Swanlea School		17-Jun-08 A	23-Jul-10	281	1
WHI105600	WHI-02 - Acquire &/or negotiate access for Swanlea School (Sewer Strengthening Works)	17-Jun-08 A	22-Jul-10	281	1
WHI105580	WHI-02 - Site Entry - Swanlea School (Sewer Strengthening Works)		23-Jul-10	323	1

Remaining Level of Effort | Primary Baseline | Remaining Work | Baseline Milestone
Actual Level of Effort | Actual Work | Critical Remaining Work | Milestone

Activity ID	Activity Name	Start	Finish	Total Float	Variance - BL Project Finish Date
WHI-03 - Kempton Court/Fulbourne Street		16-Jun-08 A	01-Jul-10	312	69
WHI105610	WHI-03 - Acquire &/or negotiate access for Kempton Court/ Fulbourne Street	16-Jun-08 A	30-Jun-10	312	69
WHI105620	WHI-03 - Site Entry - Kempton Court/ Fulbourne Street		01-Jul-10	360	83
WHI-06- Durward St - Sports Centre		05-May-09 A	01-Jul-10	1727	0
WHI105770	WHI-06 - Acquire &/or negotiate access for Durward Street - Sports Centre	05-May-09 A	01-Jul-10	1727	0
WHI105780	WHI-06 - Site Entry -Durward Street - Sports Centre		01-Jul-10	1727	0
WHI-07 Whitechapel Station - Subsoil Acquisition		11-Jan-10 A	11-Nov-10	770	-22
A4840	WHI-07 - Whitechapel Station. Subsoil Acquisition	11-Jan-10 A	11-Nov-10	770	-22
XA4850	WHI-07 - Site Entry -Whitechapel Station. Subsoil		11-Nov-10	770	-22
Design		02-Jun-10	30-Apr-11	1609	0
Key Milestones		02-Jun-10	30-Apr-11	1609	0
Early Works		16-Jun-10	16-Jun-10	1831	0
All Others		16-Jun-10	16-Jun-10	1831	0
KM320	Early Works - Gate 3 (Excluding Swanlea School & ELL Working Platform)		16-Jun-10*	1831	0
C510 - Whitechapel Early Access Shaft, Compensation Grout Shafts & SCL Works		02-Jun-10	30-Nov-10	1712	0
RIBA E & Civils & Structural Works interfacing with DWalls & Piling		02-Jun-10	28-Jun-10	1822	0
AB1420	Access & Compensation Grout Shafts & SCL Works: RIBA E SDR		02-Jun-10	1715	0
AB1430	Access & Compensation Grout Shafts & SCL Works: RIBA E IDR		16-Jun-10	1822	0
AB1330	Access & Compensation Grout Shafts & SCL Works: RIBA E Gate 2 Review : (28Jun10)		28-Jun-10	1822	0
Issue Revised Works & Site Information Reflecting RIBA D+ to RIBA E		09-Jun-10	28-Jun-10	1715	0
AB1370	Access & Compensation Grout Shafts & SCL Works: RIBA D+ to RIBA E: Revised Works & ...		09-Jun-10	1715	0
AB1380	Access & Compensation Grout Shafts & SCL Works: RIBA D+ to RIBA E: Revised Works & ...		23-Jun-10	1715	0
AB1390	Access & Compensation Grout Shafts & SCL Works: RIBA D+ to RIBA E: Revised Works & ...		28-Jun-10	1767	0
RIBA F Whitechapel Early Access Shaft		27-Oct-10	30-Nov-10	1712	0
AB1400	Access & Compensation Grout Shafts & SCL Works: RIBA F SDR		27-Oct-10	1712	0
AB1410	Access & Compensation Grout Shafts & SCL Works: RIBA F IDR		10-Nov-10	1712	0
AB1320	Access & Compensation Grout Shafts & SCL Works: RIBA F (30Nov10)		30-Nov-10	2475	0
C511 - Whitechapel Station Pilling & Diaphram Wall		06-Jan-11	23-Feb-11	1655	3
RIBA F C511 - Whitechapel Station Pilling & Diaphram Wall		06-Jan-11	23-Feb-11	1655	3
AC1130	Diaphragm Wall & Pilling SDR : RIBA F & Associated ITT Information		06-Jan-11	1655	3
AC1140	Diaphragm Wall & Pilling IDR : RIBA F & Associated ITT Information		27-Jan-11	1655	3
AC1050	Diaphragm Wall & Pilling Gate 3 Review RIBA F & Associated ITT Information (28Feb11)		23-Feb-11	1708	3
C512 - Whitechapel Main Station Works Fit Out & M&E		30-Jul-10	30-Apr-11	37	0
CAG		30-Jul-10	30-Jul-10	226	0
KM1220	Station Bridge Concourse - CAG Acceptance of CDO & CDS by (14Apr10)		30-Jul-10*	226	0
RIBA E C512 - Complete Assurance Gate 2 - RIBA E		25-Aug-10	30-Sep-10	37	0
KM870	Station Bridge Concourse - RIBA E SDR : Works & Site Information		25-Aug-10*	35	0
KM880	Station Bridge Concourse - RIBA E IDR : Works & Site Information		08-Sep-10	37	0
AB1310	Station Bridge Concourse - RIBA E Gate 2 Review : : Works & Site Information (30Sep10)		30-Sep-10	37	0
RIBA E & Works & Site Information Associated ITT Information		25-Aug-10	13-Oct-10	35	0
AC1170	Station Bridge Concourse SDR : Associated ITT Information		25-Aug-10	35	0
AC1180	Station Bridge Concourse IDR : Associated ITT Information		08-Sep-10	35	0
AC1190	Station Bridge Concourse RIBA E Gate 2 Review : Associated ITT Information (13Oct10)		13-Oct-10	35	0
RIBA F C512 - Complete Assurance Gate 3 - RIBA F		30-Mar-11	30-Apr-11	37	0
KM910	Station Bridge Concourse SDR : RIBA F		30-Mar-11	37	0
KM920	Station Bridge Concourse IDR : RIBA F		13-Apr-11	37	0
KM930	Station Bridge Concourse Gate 3 Review : RIBA F (30Apr11)		30-Apr-11	55	0
C511 - Advanced Works Piling & D-Wall Constractor Design		22-Nov-10	23-Mar-11	287	-5
A4830	C511 - Contractor Completes Design RIBA-E to RIBA-F	22-Nov-10	23-Mar-11	287	-5
Procurement		29-Jan-10 A	22-Sep-11	1508	0
Procurement Level Milestones		22-Nov-10	22-Sep-11	161	0
AA1070	C511 - Contractor Mobilises	22-Nov-10	16-Feb-11	312	-5
WHI105170	C511 - Contractor Mobilised		23-Mar-11	287	-5
AA1080	C512 - Contractor Mobilises	24-Jun-11	22-Sep-11	0	0
WHI105160	C512 - Contractor Mobilised		22-Sep-11	0	0
Main Works Construction Procurement		29-Jan-10 A	24-Jun-11	1571	0
C511 - Whitechapel Station (Pilling & Dwall) Contractor Procurement		29-Jan-10 A	22-Nov-10	1718	-5
WHI100670	C511 - Pre - Qualification	29-Jan-10 A	23-Jun-10	1825	-30
WHI100990	C511 - Tender Planing & Preperartion	26-Feb-10 A	16-Jul-10	0	-5
AA1060	C511 - Receipt of Final Works and Site Information		01-Jun-10	0	-5
AB1000	C511 - Final Works and Site Information Required (26May10)		01-Jun-10*	0	-5
WHI100680	C511 - Issue ITT		16-Jul-10	287	-5
WHI100690	C511 - Issue ITT - cost curve	19-Jul-10	19-Jul-10	1807	-5
WHI100640	C511 - Tender Period	23-Jul-10	27-Aug-10	287	-5
AC1280	C511 - Tender Returned		27-Aug-10	1750	-5
WHI100650	C511 - Evaluation & Review Panel Sign-off	31-Aug-10	19-Nov-10	287	-5
AC1290	C511 - CRL receives PDP Recommendation	08-Oct-10		1750	-5
WHI100660	C511 - Award Contract		19-Nov-10	287	-5
WHI100600	C511 - Civil Contractor Ready to Mobilise	22-Nov-10		294	-5
WHI100700	C511 - Award Contract - cost curve	22-Nov-10	22-Nov-10	1718	-5
C512 - Whitechapel Station Cambridge Heath Shaft (Main Station Works, Fit Out + M&E)		06-Apr-10 A	24-Jun-11	1571	0
WHI100710	C512 - Pre - Qualification	06-Apr-10 A	18-Aug-10	0	0
AA1040	C512 - Tender Planing & Preperartion	01-Jun-10	24-Nov-10	0	0
AC1300	C512 - PSC approves procurement plan	01-Sep-10*		1777	0
AC1310	C512 - Issue OJEU Notice & Pre-Qual Documents	10-Sep-10*		1770	0
WHI101010	C512 - Receipt of Final Works and Site Information	14-Oct-10		35	0
AA1050	C512 - Final Works and Site Information Required (19Oct10)	19-Oct-10		32	0
AC1320	C512 - PSC Approves Tender List	24-Nov-10*		1717	0
WHI101900	C512 - Issue ITT		01-Dec-10	0	0



Remaining Level of Effort | Primary Baseline | Remaining Work | Baseline Milestone
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Activity ID	Activity Name	Start	Finish	Total Float	Variance - BL Project Finish Date
WHI101910	C512 - Issue ITT - cost curve	02-Dec-10	02-Dec-10	1710	0
WHI101860	C512 - Tender Period	03-Dec-10	01-Mar-11	0	0
AC1340	C512 - Tenders Returned		01-Mar-11	1650	0
WHI101870	C512 - Evaluation & Review Panel Sign-off	02-Mar-11	23-Jun-11	0	0
AC1330	C512 - CRL receives PDP Recommendation	12-May-11*		1602	0
WHI101880	C512 - Award Contract		23-Jun-11	0	0
WHI101820	C512 - Civil Contractor Ready to Mobilise	24-Jun-11		0	0
WHI101920	C512 - Award Contract - cost curve	24-Jun-11	24-Jun-11	1571	0
Enabling Works		17-Dec-09 A	11-Jan-12	1432	-26
Enabling Works Milestones		26-Jul-10	04-May-11	1607	-8
WHI103840	Crash Deck Complete		12-Oct-10	1748	22
WHI102450	Swanlea school Civil Works Complete		19-Oct-10	1742	119
EWWHIX0297	C245 - Caretakers house demolished		19-Oct-10	1665	112
AA1620	New Utility building - (Utilities installation complete - "Live")	02-Nov-10		1733	-4
AA2010	School utilities - switch over complete		02-Nov-10	1733	-4
WHI102470	Sports Centre Works Complete		01-Dec-10	1711	-12
WHI102410	Sainsbury Utility Diversions Complete		17-Mar-11	1638	-22
WHI102430	North East Storm Relief Sewer Work Complete		28-Mar-11	1631	-2
WHI102400	Albion Brewery / Cambridge Heath Works Complete		04-May-11	652	-8
Area Handover dates		26-Jul-10	04-May-11	1607	-8
EWWHIX0367	C245 Commence works	26-Jul-10		1803	-19
EWWHIX0357	C244 Works complete		12-Oct-10	1748	22
EWWHIX0417	C245 Relocate to Essex Wharf	12-Oct-10		1748	22
EWWHIX0377	C245 School works Phase 1 complete - Handover to C217		02-Nov-10	1733	-4
EWWHIX0397	C245 School Demolition complete		15-Nov-10	1723	100
EWWHIX0437	C217 Sports Centre works complete		01-Dec-10	1711	-12
EWWHIX0387	C217 NESR Works complete - Handover to C245 Demo phase		28-Mar-11	1631	-2
EWWHIX0407	C217 Works complete		04-May-11	1607	-8
Worksite - All Whitechapel		17-Dec-09 A	18-Mar-11	1637	-21
Site Power supplies		17-Dec-09 A	03-Mar-11	1639	-9
Durward Street (ELL Site compound) 70KVA		17-Dec-09 A	20-Jul-10	284	-20
Electrical Supply		17-Dec-09 A	20-Jul-10	284	-20
EWWHIX9374	EDF - Mobilise to Durward St 70KVA (ON HOLD)	17-Dec-09 A	15-Jul-10	272	-19
AC1030	Construct EDF meter housing (By C244 - tbc)	01-Jun-10	14-Jun-10	306	-10
AC1040	Issue contractor instruction for meter housing	01-Jun-10*		306	-10
EWWHIX9394	EDF - Install supply (Weekend 19-20 June 10).	16-Jul-10	17-Jul-10	384	-27
EWWHIX0474	EDF - Install meter	19-Jul-10	19-Jul-10	273	-20
EWWHIX0384	EDF - Supply available	20-Jul-10		273	-20
Cambridge Heath Road / Brady St. - (Main work site supply) 1.5 MVA		27-May-10 A	03-Mar-11	302	-9
Electrical Supply		27-May-10 A	03-Mar-11	302	-9
AA1900	Raise WIF	27-May-10 A	04-Jun-10	302	-9
AA1910	EDF Design	07-Jun-10	16-Jul-10	302	-9
AA1920	EDF Quote	19-Jul-10	13-Aug-10	302	-9
AA1930	CRL Internal approval	16-Aug-10	13-Sep-10	302	-9
AA1970	Raise WIF	14-Sep-10	27-Sep-10	302	-9
AA1940	EDF - Mobilise to Cambridge Heath 1.5 MVA	28-Sep-10	25-Oct-10	302	-9
AA1950	Install cable trench (By EDF or Other - TBC)	26-Oct-10	17-Feb-11	302	-9
AC1000	Install Bases (2No). by C217	17-Jan-11*	28-Jan-11	316	0
EWWHIX9206	EDF - Install supply at Cambridge Heath & Durward St (Total 2.5MVA)	18-Feb-11	24-Feb-11	302	-9
EWWHIX0226	EDF - Test & Commission	25-Feb-11	02-Mar-11	287	-9
WHI101430	Cambridge heath Road - Main Works Site Supply 1.5MVA - Site Power Supplies Available	03-Mar-11		287	-9
Durward Street / Essex Wharf (Main work site supply) 1MVA		03-Mar-11	03-Mar-11	302	-9
Electrical Supply		03-Mar-11	03-Mar-11	302	-9
WHI100980	EDF - Durward Street - Main Works Site Supply - Site Power Supplies Available	03-Mar-11		287	-9
Sainsbury Car Park (Site compound) 70KVA		23-Feb-10 A	13-Oct-10	1737	-77
Electrical Supply		23-Feb-10 A	13-Oct-10	1737	-77
AD1080	Raise WIF	23-Feb-10 A	02-Jun-10	1799	
AA1000	EDF Mobilise	31-Aug-10*	27-Sep-10	1737	-81
AC1020	Install Base by C244	14-Sep-10*	27-Sep-10	1737	-86
AA1010	EDF - Install supply	28-Sep-10	11-Oct-10	1737	-81
AA1020	EDF - Test & Commission	12-Oct-10	12-Oct-10	1737	-77
AA1030	EDF - Supply available	13-Oct-10		1737	-77
Temporary Water supplies		01-Jun-10	18-Oct-10	1744	-78
Durward Street		01-Jun-10	26-Jul-10	280	-19
AD1000	Raise WIF	01-Jun-10	21-Jun-10	280	
EWWHIX0826	TWUL - Mobilise & install supply	22-Jun-10	23-Jul-10	269	-19
EWWHIX9846	TWUL - Supply available	26-Jul-10		269	-19
Brady Street (Sainsbury car park) - Large supply		01-Jun-10	18-Oct-10	1744	-78
AD1010	TWUL return cost estimate	01-Jun-10		1803	
AD1020	Raise WIF	01-Jun-10	21-Jun-10	1803	
EWWHIX9916	TWUL - Mobilise & install supply	14-Sep-10	15-Oct-10	1744	-78
EWWHIX9926	TWUL - Supply available	18-Oct-10		1744	-78
Cambridge Heath		01-Jun-10	17-Aug-10	1787	
AD1030	TWUL return cost estimate	01-Jun-10	14-Jun-10	1787	
AD1070	Issue water supply application	01-Jun-10		1787	
AD1040	Raise WIF	15-Jun-10	05-Jul-10	1787	
AD1050	TWUL - Mobilise & install supply	06-Jul-10	16-Aug-10	1787	
AD1060	TWUL - Supply available	17-Aug-10		1787	
C261 - Archaeology		01-Jun-10	01-Jun-10	1842	-7

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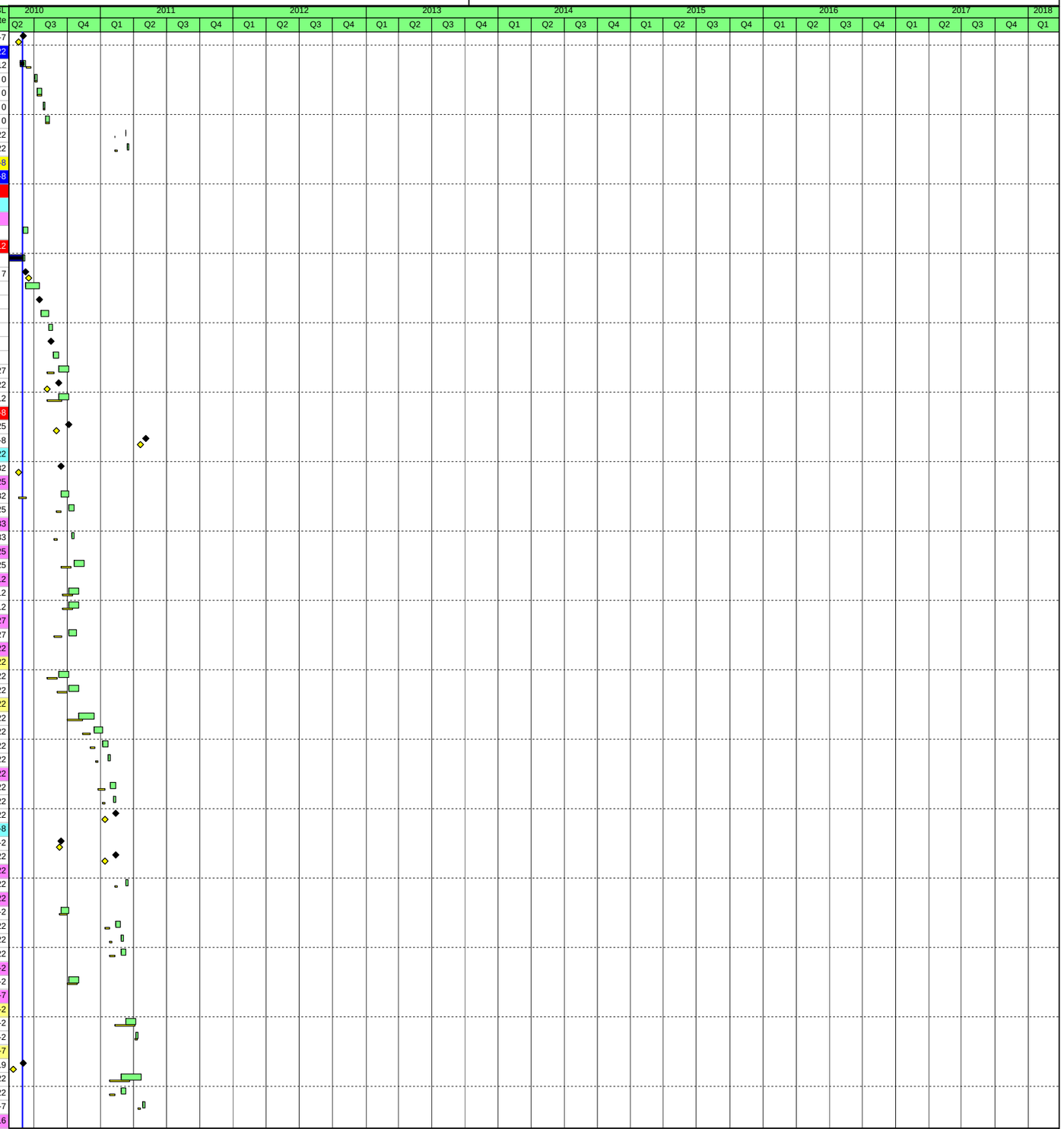
EWWHIX0305	C261 - Archaeology watching brief - Commence	01-Jun-10		1765	-7
C253 - Hazardous Material Surveys		24-May-10 A	18-Mar-11	1580	-22
EWWHIX0885	Prepare Report & Issue	24-May-10 A	07-Jun-10	480	12
EWWHIX0855	Carry out Hazmat Survey - Sports Centre	02-Jul-10	08-Jul-10	1747	0
EWWHIX0865	Prepare Report & Issue	09-Jul-10	22-Jul-10	1747	0
EWWHIX0825	Carry out Hazmat Survey - School Caretakers House (WHI-0203) / Utility Bld	26-Jul-10	30-Jul-10	435	0
EWWHIX0875	Prepare Report & Issue	02-Aug-10	13-Aug-10	435	0
EWWHIX0845	Carry out Hazmat Survey - Albion Brewery - West Basement	11-Mar-11	11-Mar-11	652	-22
EWWHIX0345	Prepare Report & Issue	14-Mar-11	18-Mar-11	626	-22
Worksite - 1 Cambridge Heath Rd Shaft		29-Mar-10 A	04-May-11	1607	-8
C217 - Albion Brewery & Sainsbury Car Park		29-Mar-10 A	04-May-11	1607	-8
Design Work to Support C217		01-Jun-10	14-Jun-10	847	
Albion Brewery / Cambridge Heath		01-Jun-10	14-Jun-10	847	
EDF Design (EDF-C4 WHI 01)		01-Jun-10	14-Jun-10	847	
AD1160	Raise WIF	01-Jun-10	14-Jun-10	847	
C217 - Procurement - Civil		29-Mar-10 A	04-Oct-10	1753	-12
AD1100	C217 - Compile final tender documents & issue	29-Mar-10 A	04-Jun-10	648	
EWWHIX2355	C217 - Issue ITT	07-Jun-10		626	7
AD1120	C217 - Tender process	07-Jun-10	16-Jul-10	649	
AD2220	C217 - Tender Returned		16-Jul-10	1788	
AD1130	C217 - Tender evaluation	19-Jul-10	10-Aug-10	649	
AD1140	C217 - Review panel sign-off	11-Aug-10	20-Aug-10	649	
AD2230	C217 - CRL receives PDP Recommendation	16-Aug-10		1788	
AD1150	C217 - Finalise Documentation	23-Aug-10	06-Sep-10	649	
EWWHIX1745	C217 - Mobilise	07-Sep-10	04-Oct-10	629	-27
EWWHIX3405	C217 - Award Contract	07-Sep-10		620	-22
AA1610	C217 - Section 61 approval	07-Sep-10	04-Oct-10	672	-12
C217 - Site Works		01-Jun-10	04-May-11	1607	-8
EWWHIX2015	C217 Commence works on site	04-Oct-10		662	-25
AB1260	C217 - Albion Brewery & Sainsbury Car Park Works Complete	04-May-11		1607	-8
Phase 1		07-Sep-10	11-Feb-11	1663	-22
EWWHIX1825	Site access available	14-Sep-10		677	-82
Hoardings		14-Sep-10	18-Oct-10	667	-25
EWWHIX1805	Install hoardings (C244 / C245). Sainsbury Car Park part area	14-Sep-10	04-Oct-10	677	-82
AA1390	Install protection to pavement utilities at access location. (On to Brady St.)	04-Oct-10	18-Oct-10	662	-25
Site Facilities		13-Oct-10	19-Oct-10	1737	-33
EWWHIX1775	Set up site facilities (Phase 1)	13-Oct-10	19-Oct-10	1737	-33
Tree Removal		18-Oct-10	15-Nov-10	1723	-25
AB1270	Remove 4No trees	18-Oct-10	15-Nov-10	1723	-25
Site Drainage		05-Oct-10	01-Nov-10	697	-12
AB1010	Install new drainage	05-Oct-10	01-Nov-10	697	-12
AB1020	Install interceptor	05-Oct-10	01-Nov-10	697	-12
Utility Diversion		05-Oct-10	25-Oct-10	1738	-27
EWWHIX2005	Carry out diversion works / Private Utility site clearance	05-Oct-10	25-Oct-10	1738	-27
Albion Brewery Alternative Access		07-Sep-10	27-Jan-11	652	-22
Temporary Works		07-Sep-10	01-Nov-10	652	-22
AB1240	Temporary Works design approval (Support to Idea Store wall)	07-Sep-10	04-Oct-10	652	-22
AB1250	Install Party wall support to Idea Store	05-Oct-10	01-Nov-10	652	-22
Site Works		02-Nov-10	27-Jan-11	652	-22
AA1650	Install foundations (Piles or deep concrete strip)	02-Nov-10	13-Dec-10	652	-22
AA1660	Erect steel portal	14-Dec-10	06-Jan-11	652	-22
AA1670	M&E Fit out	07-Jan-11	20-Jan-11	652	-22
AA1750	Car Park finishes	21-Jan-11	27-Jan-11	652	-22
Sainsbury / Albion Brewery Wall Demolition		28-Jan-11	11-Feb-11	652	-22
EWWHIX2035	Carry out demolition works (part)	28-Jan-11	10-Feb-11	652	-22
AA1440	Install new residents access gate	04-Feb-11	10-Feb-11	652	-22
AA1980	Handover alternative access to AB residents	11-Feb-11		652	-22
Phase 2		01-Jun-10	04-May-11	1607	-8
AA1420	Site Access available (Sainsbury Car Park - entire site area)	14-Sep-10		1728	-2
AA1430	Site Access available to AB car park (Following completion of alternative acess)	11-Feb-11		652	-22
Site Facilities		11-Mar-11	17-Mar-11	1638	-22
EWWHIX2155	Remove site facilities from phase 1 location	11-Mar-11	17-Mar-11	1638	-22
Hoardings		14-Sep-10	10-Mar-11	1638	-22
EWWHIX1895	Install hoardings. Sainsbury Car Park - full site area	14-Sep-10	04-Oct-10	1728	-2
EWWHIX2055	Install hoardings - Albion Brewery area	11-Feb-11	24-Feb-11	652	-22
AA1400	Remove section of wall	25-Feb-11	03-Mar-11	652	-22
AA1410	Install protection to pavement utilities at access location	25-Feb-11	10-Mar-11	1638	-22
Utility Diversion		05-Oct-10	01-Nov-10	1728	-2
EWWHIX2105	Car park drainage and electrical - Diversion works / Disconnection works	05-Oct-10	01-Nov-10	1728	-2
Sub Station Strengthening & EDF Cable Realignment		01-Jun-10	03-May-11	653	-7
EDF Works		11-Mar-11	14-Apr-11	658	-2
EWWHIX1885	Carry out cable realignment - (Access Shaft)	11-Mar-11	07-Apr-11	658	-2
AA1470	Reconnect cables	08-Apr-11	14-Apr-11	658	-2
C217 Works		01-Jun-10	03-May-11	653	-7
AA1760	Scope of works for strengthening - confirmed	01-Jun-10*		842	-19
EWWHIX1865	Install strengthening works	25-Feb-11	21-Apr-11	653	-22
AA1450	C217 - Install cable pits & ducts for EDF	25-Feb-11	10-Mar-11	658	-22
AA1460	Remove redundant cables	26-Apr-11	03-May-11	653	-7
Albion Brewery Basement Strengthening		25-Feb-11	21-Apr-11	658	-16



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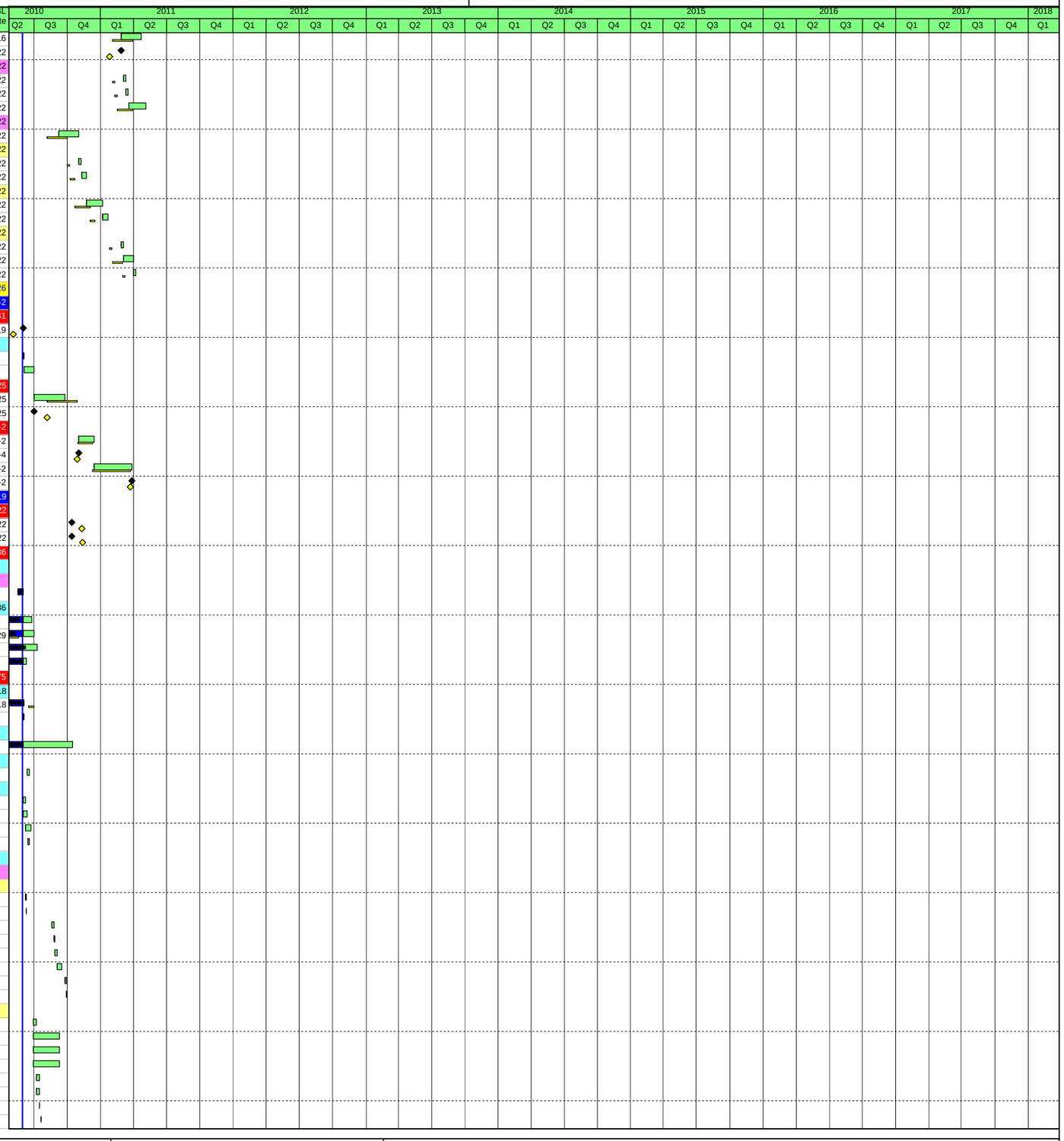
Activity ID	Activity Name	Start	Finish	Total Float	Variance - BL Project Finish Date
EWWHIX2065	Install strengthening works / Fill basement	25-Feb-11	21-Apr-11	658	-16
EWWHIX2075	Scope of works to be confirmed	25-Feb-11		658	-22
Basement Strengthening - (Under West Car Park)		04-Mar-11	04-May-11	652	-22
AA1740	Form access into basement	04-Mar-11	10-Mar-11	652	-22
AA1770	Site investigation works	11-Mar-11	17-Mar-11	653	-22
EWWHIX2085	Install strengthening works	18-Mar-11	04-May-11	652	-22
Albion Brewery - Well Stabilisation		07-Sep-10	07-Apr-11	668	-22
AB1040	C217 - Produce MS & EA docs + Approvals	07-Sep-10	01-Nov-10	693	-22
Survey		02-Nov-10	22-Nov-10	693	-22
AB1030	Carry out Remote Operated underwater Vehicle survey	02-Nov-10	08-Nov-10	693	-22
AB1130	Issue survey report	09-Nov-10	22-Nov-10	693	-22
Design		23-Nov-10	20-Jan-11	693	-22
AB1060	Design well stabilisation measures	23-Nov-10	06-Jan-11	693	-22
AB1070	Design approval	07-Jan-11	20-Jan-11	693	-22
Site Works		25-Feb-11	07-Apr-11	668	-22
AB1110	C217 - Excavate basement for cap installation	25-Feb-11	03-Mar-11	668	-22
AB1120	C217 - Well stabilisation works	04-Mar-11	31-Mar-11	668	-22
EWWHIX1755	C217 - Construct well cap	01-Apr-11	07-Apr-11	642	-22
Worksite - 2 Durward St - Box & West Stair Box		24-Feb-10 A	11-Jan-12	1432	-26
C217 - Advance Works - North East Storm Relief Sewer		01-Jun-10	28-Mar-11	284	-2
C217 - Advance Works - North East Storm Relief Sewer - Detailed Designs		01-Jun-10	30-Jun-10	307	-41
EWWHIX0203	C217 - North East Storm Relief Sewer - Engineering solution available for tender - (DATE TBC)	01-Jun-10*		329	-19
Thames Water (CE7)		01-Jun-10	30-Jun-10	307	
AD1180	C4 - Issue design to TWUL	01-Jun-10	02-Jun-10	307	
AD1190	Review design / Approve	03-Jun-10	30-Jun-10	307	
C217 - Advance Works - North East Storm Relief Sewer - Mobilisation		01-Jul-10	23-Sep-10	307	25
EWWHIX0242	C217 - TWUL - Contractor mobilisation	01-Jul-10	23-Sep-10	296	25
EWWHIX0252	C261 - Archaeologists mobilisation	01-Jul-10		356	25
C217 - Advance Works - North East Storm Relief Sewer - Site Works		02-Nov-10	28-Mar-11	284	-2
AWWHIC5055	C217 - Construct Access shaft	02-Nov-10	13-Dec-10	269	-2
AWWHIC5065	Handover - C245 handover site to C217	02-Nov-10		280	-4
AWWHIC5045	C217 - Protective Works to sewer (pre-constr)	14-Dec-10	28-Mar-11	269	-2
WHI100950	C217 - North East Storm Relief Sewer Work Complete		28-Mar-11	284	-2
C244 - East London Line Working Platform		29-Mar-10 A	14-Oct-10	1745	19
Key Dates		12-Oct-10	12-Oct-10	1014	22
A1140	C244 - Working Platform Complete		12-Oct-10	970	22
EWWHIX0758	East London Line Platform Complete - Temporary utility duct / Bridge available	12-Oct-10		970	22
Contractor Off-site Work - Documentation / Approvals		30-Mar-10 A	09-Jul-10	1813	-36
Construction Documentation		18-May-10 A	01-Jun-10	1841	
Method Statements		18-May-10 A	01-Jun-10	1841	
AD1430	Method statement approval	18-May-10 A	01-Jun-10	1841	
Material Procurement / Off-site Fabrication		30-Mar-10 A	09-Jul-10	1813	-36
AD1440	Manufacture Hollow concrete floor (Bison Planks)	30-Mar-10 A	25-Jun-10	1823	
OS0030	Fabricate Steel Work	08-Apr-10 A	30-Jun-10	1702	-29
AD1450	Fabricate Cladding	08-Apr-10 A	09-Jul-10	1813	
AD1460	Fabricate Lionweld decking	08-Apr-10 A	09-Jun-10	1835	
Site Work		29-Mar-10 A	14-Oct-10	1745	-75
Site Set-up		26-Apr-10 A	04-Jun-10	1775	18
SW0020	Erect Site Hoardings	26-Apr-10 A	04-Jun-10	1698	18
AD2170	Set up cranes	01-Jun-10	02-Jun-10	1777	
Construction Summary		29-Mar-10 A	14-Oct-10	1745	
AD1480	Construction Summary Bar	29-Mar-10 A	14-Oct-10	1668	
Preliminary Works		11-Jun-10	18-Jun-10	1828	
AD2110	Protect existing cables attached to site perimeter	11-Jun-10*	18-Jun-10	1828	
Preliminary Works - Possession Works - (Engineering hours)		01-Jun-10	21-Jun-10	1827	
AD2130	Lower & fix hoarding in position (Erect platform hoarding)	01-Jun-10	07-Jun-10	1770	
AD2140	Fix lighting to hoarding (Move & fix existing lighting to hoarding)	02-Jun-10	11-Jun-10	1770	
AD2150	Set out, diamond drill & fix holding down bolts.	08-Jun-10	21-Jun-10	1827	
AD2160	Protect existing services to platform walls	14-Jun-10	18-Jun-10	1828	
Construct ELL Working Platform		08-Jun-10	11-Oct-10	1748	
Vehicle Deck		08-Jun-10	30-Sep-10	1755	
Non Possession Works - (Days)		08-Jun-10	30-Sep-10	1755	
AD2000	Level shims & fix grout boxes to bolts (Grout up bolts to column bases)	08-Jun-10*	09-Jun-10	1834	
AD2010	Grout holding down bolts clusters 72 No	10-Jun-10	10-Jun-10	1834	
AD2020	Fix Keyklamp handrail	19-Aug-10	25-Aug-10	1760	
AD2030	Fix N2 Parapet 26m (Fix vechicle collission barriers)	26-Aug-10	26-Aug-10	1760	
AD2040	Seal up gaps in precast planks	27-Aug-10	02-Sep-10	1760	
AD2050	Rebar to Hollowcore voids & concrete	03-Sep-10	16-Sep-10	1760	
AD2060	Lay tarmac - Blacktop to vechicle	24-Sep-10*	27-Sep-10	1755	
AD2070	Lift in & fix stairs - Staircase from protection deck to vechicle deck	28-Sep-10	30-Sep-10	1755	
Possession Works - (Engineering hours)		28-Jun-10	09-Sep-10	1770	
AD1530	Lift assembled portal towers (16 No)	28-Jun-10*	07-Jul-10	1760	
AD1540	Summary Bar - Vehicle Deck	28-Jun-10	09-Sep-10	1770	
AD1550	Structural Steelwork Summary	28-Jun-10	09-Sep-10	1770	
AD1560	Scaffold Summary	28-Jun-10	09-Sep-10	1770	
AD1570	Lift in and fix single columns uprights 14 No	08-Jul-10	15-Jul-10	1760	
AD1580	Lift in and fix prefabricated beam sections 8 No	08-Jul-10	15-Jul-10	1760	
AD1590	Lift in and fix end beam sections 3 No.	16-Jul-10	16-Jul-10	1760	
AD1600	Lift in and fix end bracing 14 No.	19-Jul-10	20-Jul-10	1760	



Remaining Level of Effort | Primary Baseline | Remaining Work | Baseline Milestone
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Activity ID	Activity Name	Start	Finish	Total Float	Variance - BL Project Finish Date
AD1670	Fire protection to connections - area 1	19-Jul-10*	28-Jul-10	1036	
AD1680	Touch up paintwork (Fire protection)	19-Jul-10*	09-Sep-10	1770	
AD1610	Install & rig safety nets under platform level	21-Jul-10	22-Jul-10	1760	
AD1620	Lift in and fix precast concrete units 80 No. (Lift in & install precast units)	23-Jul-10	06-Aug-10	1760	
AD1630	Lift in and fix Heavy Mesh section 6 No. (Install open mesh decking to sectionbetween slabs ...	27-Jul-10	06-Aug-10	1793	
AD1700	Fire protection to connections - area 2	29-Jul-10	06-Aug-10	1036	
AD1640	Relocate lighting from platform hoarding	09-Aug-10	09-Aug-10	1760	
AD1710	Fire protection to connections - area 3	09-Aug-10	19-Aug-10	1036	
AD1650	Install vertical protection plates	10-Aug-10	18-Aug-10	1760	
AD1660	Demolish east section of parapet wall	19-Aug-10	27-Aug-10	1770	
AD1720	Fire protection to connections - area 4	20-Aug-10	31-Aug-10	1036	
AD1690	Demolish west section of parapet wall	31-Aug-10	09-Sep-10	1770	
AD1730	Fire protection to connections - area 5	01-Sep-10	09-Sep-10	1036	
Protection Deck		02-Jul-10	11-Oct-10	1748	
Non Possession Works - (Days)		26-Aug-10	13-Sep-10	1768	
AD2090	Grout up bolts to column bases	26-Aug-10	02-Sep-10	1770	
AD2080	Fix Keyklamp Handrail	07-Sep-10*	13-Sep-10	1768	
Possession Works - (Engineering hours)		02-Jul-10	11-Oct-10	1748	
AD1790	Erect framing SME to Durward Street	02-Jul-10*	08-Jul-10	1805	
AD1760	Erect columns & beams north end to SME	08-Jul-10*	21-Jul-10	1805	
AD1800	Install infill steelwork to north end to SME	09-Jul-10	21-Jul-10	1805	
AD1740	Summary Bar - Protection deck	16-Jul-10*	28-Sep-10	1757	
AD1750	Lift in and fix cladding to existing footbridge	16-Jul-10*	27-Jul-10	1780	
AD1870	Install infill steelwork south end to Durward St	22-Jul-10*	02-Aug-10	1778	
AD1930	Complete fire protection to connections - summary	27-Jul-10	11-Oct-10	1748	
AD1940	Fire protection to connections - area 1	27-Jul-10*	09-Aug-10	1014	
AD1770	Structural steelwork summary	28-Jul-10	25-Aug-10	1780	
AD1780	Lift in and fix Portal Columns 4 No.	28-Jul-10	09-Aug-10	1788	
AD1880	Erect safety nets	03-Aug-10	03-Aug-10	1778	
AD1890	Install decking plates	04-Aug-10	09-Aug-10	1778	
AD1810	Lift in and fix single columns uprights 6 No.	10-Aug-10	13-Aug-10	1788	
AD1910	Weld decking plates	10-Aug-10	20-Aug-10	1778	
AD1920	Install vertical protection plates	10-Aug-10	23-Aug-10	1782	
AD1950	Fire protection to connections - area 2	10-Aug-10	20-Aug-10	1014	
AD1820	Lift in and fix prefabricated beam sections 1 No.	13-Aug-10*	13-Aug-10	1770	
AD1840	Lift in and fix beam sections 914x305x201 UB 3 No.	16-Aug-10	19-Aug-10	1770	
AD1850	Lift in and fix beam sections 9686x254x140 UB 30m ave 8 No.	20-Aug-10	25-Aug-10	1770	
AD1860	Lift in & fix bracing 152x152x37 UC 7 No.	20-Aug-10	20-Aug-10	1783	
AD1900	Lift in and fix lionweld safgrid decking 430m2	20-Aug-10*	07-Sep-10	1772	
AD1960	Fire protection to connections - area 3	23-Aug-10	03-Sep-10	1014	
AD1970	Fire protection to connections - area 4	06-Sep-10	16-Sep-10	1014	
AD1980	Fire protection to connections - area 5	17-Sep-10	28-Sep-10	1014	
AD1990	Fire protection to connections - area 6	29-Sep-10	11-Oct-10	1014	
C245 - Whitechapel Station Civils, Demolition and Utilities		26-Apr-10 A	28-Mar-11	1631	8
School Holiday Periods		31-May-10	29-Oct-10	1734	0
A1320	Half Term	31-May-10*	04-Jun-10	1895	0
A1330	Summer	23-Jul-10*	03-Sep-10	1697	0
A1300	Half Term	25-Oct-10*	29-Oct-10	1657	0
Consents To Support Contract C245		01-Jun-10	28-Jun-10	299	-15
Section 61		01-Jun-10	28-Jun-10	299	-15
EWWHIX0295	Local Authority Approval	01-Jun-10	28-Jun-10	288	-15
Design Work to Support Public Utilities (Durward Box Area) C245		26-Apr-10 A	16-Jun-10	326	
Detailed Design		26-Apr-10 A	16-Jun-10	326	
Durward St		26-Apr-10 A	16-Jun-10	326	
EDF (EDF-C4 WHI 02)		01-Jun-10	14-Jun-10	308	
AD1220	Raise WIF for diversion works	01-Jun-10	14-Jun-10	308	
Thames Water (CE6)		26-Apr-10 A	16-Jun-10	326	
AD1200	Receive SU estimate / details	26-Apr-10 A	02-Jun-10	326	
AD1210	Raise WIF	03-Jun-10	16-Jun-10	326	
C245 Civil Works		20-May-10 A	15-Nov-10	1723	100
C245 Civil Works - Procurement		20-May-10 A	30-Jun-10	297	-7
EWWHIX1445	C245 - Mobilise	20-May-10 A	30-Jun-10	286	-7
WHI0550	C245 - Issue F10 to HSE (if Required)	11-Jun-10		300	-8
C245 - Swanlea School		23-Jul-10	15-Nov-10	1723	100
AWWHIC4555	Site access available	26-Jul-10		280	-19
AWWHIC4565	C245 start work on site	26-Jul-10*		280	-19
EWWHIX1645	Handover - C245 complete - Handover site to C217	02-Nov-10		280	-4
WHI100930	C245 - Swanlea school Civil Works Complete		15-Nov-10	376	100
Stage 1 - (School Holiday period - Works)		23-Jul-10	03-Sep-10	1774	31
AA1780	Start of school holiday	23-Jul-10		1774	0
AA2000	Forecast end of holiday works - (New term) 3rd Sept 10		03-Sep-10*	1774	31
Site setup		26-Jul-10	06-Aug-10	280	0
A1290	C245 - Install site facilities	26-Jul-10	06-Aug-10	269	0
AWWHIC3485	C245 - Erect phase 1 site hoardings	26-Jul-10	06-Aug-10	269	0
AWWHIC3495	C245 - Relocate existing containers	27-Jul-10	27-Jul-10	273	4
AWWHIC3525	C245 - Install new access gates x2	27-Jul-10	02-Aug-10	269	0
New Access Road		23-Jul-10	03-Sep-10	1774	26
AWWHIC3515	C245 - Install protection to services at pavement crossing locations x2	23-Jul-10	29-Jul-10	1700	6
EWWHIX0815	C245 - Install new access gate	28-Jul-10	03-Aug-10	1796	43

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Activity ID	Activity Name	Start	Finish	Total Float	Variance - BL Project Finish Date
AA1870	C245 - Realignment of existing road utilities	28-Jul-10	03-Aug-10	1774	43
EWWHIX0795	C245 - Construct new Access Rd	04-Aug-10	03-Sep-10	1774	26
Site Hoardings		23-Jul-10	30-Jul-10	1799	41
AD2260	C245 - Install site hoardings	23-Jul-10	29-Jul-10	1774	
AA1810	C245 - Fire escape route change over	30-Jul-10		1799	41
Canopy Works		26-Jul-10	18-Aug-10	1785	42
AD2270	C245 - Site setup - Hoarding / scaffold	26-Jul-10	28-Jul-10	1785	
EWWHIX0785	C245 - Remove section of school canopy	29-Jul-10	04-Aug-10	1785	52
EWWHIX0805	C245 - Install weather protection	05-Aug-10	11-Aug-10	1785	47
AD2280	C245 - Remove canopy foundation	12-Aug-10	18-Aug-10	1785	
C244 - Swanlea School Works		23-Jul-10	26-Aug-10	1779	
AD2350	C244 - Start work on site	23-Jul-10		1779	
AD2360	C244 - Install secondary glazing	23-Jul-10	26-Aug-10	1779	
AD2370	C244 - Install ventilation system	23-Jul-10	26-Aug-10	1779	
AD2380	C244 - School works complete		26-Aug-10	1779	
Stage 2		03-Aug-10	02-Nov-10	1733	-4
Utility trench		17-Aug-10	02-Nov-10	386	-4
EWWHIX0745	C245 - Excavate new service trench (New utility Bld to School Bld - Phase 1)	17-Aug-10	07-Sep-10	382	4
AWWHIC4515	C245 - Excavate new service trench (New utility Bld to School Bld)	07-Sep-10	21-Sep-10	400	14
EWWHIX4705	Install utilities to school	29-Sep-10	05-Oct-10	373	9
AA1880	Switch over School supply	02-Nov-10		386	-4
Site Works (Stage 1)		03-Aug-10	02-Nov-10	1733	-4
EDF Substation / Utilities Building		03-Aug-10	02-Nov-10	1733	-4
AWWHIC5465	Excavate & Construct Base slab for Substation / Utility Bld	03-Aug-10	16-Aug-10	289	4
EWWHIX0655	Blockwork / Brickwork to building	17-Aug-10	14-Sep-10	269	4
EWWHIX0665	Construct Roof to building	15-Sep-10	05-Oct-10	269	9
EWWHIX0675	M&E / Fit out Building	29-Sep-10	29-Oct-10	269	-4
AD2400	Construction of substation completed	29-Oct-10		1734	
AA1370	New Utility building switch over	01-Nov-10	01-Nov-10	280	-4
EWWHIX0735	New Sub Station & Utility building - Services - Live	02-Nov-10		280	-4
Stage 3		12-Oct-10	12-Oct-10	1748	22
EWWHIX0705	C245 - Relocate to Essex Wharf (Sports Centre)	12-Oct-10		1748	22
Utility Works Associated with Contract C245 - Worksite 2		01-Jul-10	28-Oct-10	381	8
Utility Services Connections		01-Jul-10	28-Oct-10	381	8
Disconnection		01-Jul-10	28-Oct-10	381	8
Disconnection - School Utility Building		01-Jul-10	28-Oct-10	378	8
Telecoms		01-Jul-10	28-Oct-10	378	8
EWWHIX0445	Acquire utility info	01-Jul-10	28-Jul-10	356	13
EWWHIX0495	Utility Company notice period	29-Jul-10	28-Oct-10	356	8
Electric		01-Jul-10	28-Oct-10	378	-2
EWWHIX0425	Draft disconnection application	01-Jul-10	14-Jul-10	356	-7
EWWHIX0465	Issue disconnection application	15-Jul-10		356	-7
EWWHIX0475	Utility Company notice period	15-Jul-10	28-Oct-10	356	-2
Gas		01-Jul-10	28-Oct-10	378	8
EWWHIX0435	Acquire utility meter info	01-Jul-10	28-Jul-10	356	13
EWWHIX0485	Utility Company notice period	29-Jul-10	28-Oct-10	356	8
Water		01-Jul-10	28-Oct-10	378	8
EWWHIX0455	Acquire utility meter info	01-Jul-10	28-Jul-10	356	13
EWWHIX0505	Utility Company notice period	29-Jul-10	28-Oct-10	356	8
Disconnection - Caretakers Building		01-Jul-10	07-Oct-10	396	23
Telecoms		01-Jul-10	07-Oct-10	396	23
EWWHIX0355	Acquire utility information	01-Jul-10	28-Jul-10	374	13
EWWHIX0405	Utility Company notice period	29-Jul-10	07-Oct-10	374	23
Water		01-Jul-10	07-Oct-10	396	23
EWWHIX0365	Acquire utility meter info	01-Jul-10	28-Jul-10	374	13
EWWHIX0415	Utility Company notice period	29-Jul-10	07-Oct-10	374	23
Electric		01-Jul-10	23-Sep-10	406	23
EWWHIX0325	Draft disconnection application	01-Jul-10	14-Jul-10	384	-7
EWWHIX0375	Issue disconnection application	15-Jul-10		384	-7
EWWHIX0385	Utility Company notice period	15-Jul-10	23-Sep-10	384	23
Gas		01-Jul-10	07-Oct-10	396	23
EWWHIX0335	Acquire utility meter info	01-Jul-10	28-Jul-10	374	13
EWWHIX0395	Utility Company notice period	29-Jul-10	07-Oct-10	374	23
Dismantle / Demolition of Existing Structures - Swanlea School		08-Oct-10	28-Mar-11	1631	8
Existing Utility Building		02-Nov-10	15-Nov-10	376	100
AWWHIC3434	C245 - Demolition of existing utility building	02-Nov-10	15-Nov-10	376	100
Caretakers Building		11-Oct-10	19-Oct-10	395	119
AWWHIC3424	C245 - Demolition of Caretakers house	11-Oct-10	19-Oct-10	409	122
Milestones		08-Oct-10	28-Mar-11	1631	-2
AWWHIC4484	C245 - Disconnect services in Caretakers house	08-Oct-10		374	110
EWWHIX4655	C245 - Commence demolition of existing utility bld	02-Nov-10		376	100
AWWHIC4494	C245 - Disconnect services in utility building	02-Nov-10		376	6
EWWHIX0715	C217 - NESR Works Complete - C245 Demolition works to commence	28-Mar-11		1631	-2
C217 - Sports Centre		01-Jun-10	29-Mar-11	1631	-92
Milestones		02-Jul-10	29-Mar-11	1631	-92
EWWHIX1565	Site access available - Sports Centre	02-Jul-10		1727	0
AB1140	C217 Commence on site	05-Oct-10		1681	-12
WHI102420	C217 - Sports Centre Works Complete		01-Dec-10	1711	-12
AD2330	ELL Working Platform - (Sports Centre & Essex Wharf access ramps Complete)		17-Jan-11	1681	

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Interface Milestones		12-Oct-10	29-Mar-11	1631	
AD2310	C244 - East London Line Working Platform Complete		12-Oct-10	1748	
AD2320	C511 - Commence Durward St. Box	29-Mar-11		1631	
Approvals		01-Jun-10	23-Aug-10	1710	-5
AB1150	Obtain approval / agreement with Sports Centre for proposed Fire escape works	01-Jun-10*	23-Aug-10	1710	-5
Mobilise		07-Sep-10	04-Oct-10	1681	-12
AB1160	C217 - Mobilise	07-Sep-10	04-Oct-10	1681	-12
Hoardings		02-Jul-10	01-Dec-10	1681	-37
AB1280	C245 - Erect hoarding adjacent to East London Line	02-Jul-10	29-Jul-10	1727	0
EWWHIX1615	C217 - Set up work site (Hoarding)	05-Oct-10	11-Oct-10	1681	-12
EWWHIX1475	C217 - Setup site hoardings (Internal)	26-Oct-10	27-Oct-10	1604	-12
AD2340	C217 - Install hoarding to form site compound adjacent to ELL	24-Nov-10	01-Dec-10	1681	
Survey		12-Oct-10	02-Nov-10	1733	-12
AB1090	Survey - Undertake 4No. trial trench surveys	12-Oct-10	25-Oct-10	1681	-12
AB1080	Issue survey report	26-Oct-10	01-Nov-10	1733	-12
AD2300	Confirm location of services in relation to hoarding line & piling work	02-Nov-10		1733	
Site Works		26-Oct-10	17-Jan-11	1681	-42
Sports Centre - Internal Works		28-Oct-10	03-Nov-10	1681	-12
EWWHIX1515	C217 - Modify existing M&E to suit revised fire escape route	28-Oct-10	03-Nov-10	1604	-12
Demolition Works		26-Oct-10	01-Dec-10	1681	-12
EWWHIX1465	C217 - Prepare for demolition works	26-Oct-10	27-Oct-10	1604	-12
EWWHIX1485	C217 - Relocate AHU in plantroom	27-Oct-10	24-Nov-10	1681	-12
AB1170	C217 - Carryout alterations to plantroom walls	27-Oct-10	24-Nov-10	1681	-12
EWWHIX1455	C217 - Carry out demolition of single storey building	25-Nov-10	01-Dec-10	1604	-12
Fire Escape Works		03-Nov-10	24-Nov-10	1681	-12
AB1180	C217 - Alter existing fire door (1No).	03-Nov-10	24-Nov-10	1681	-12
AB1190	C217 - Widen (2No) internal doors	03-Nov-10	24-Nov-10	1681	-12
AB1200	C217 - Install external hoarding to new fire escape route	03-Nov-10	24-Nov-10	1681	-12
AB1210	C217 - Install security gate	03-Nov-10	24-Nov-10	1681	-12
AB1220	C217 - Install new fire escape via Trahorn Close.	03-Nov-10	24-Nov-10	1681	-12
EWWHIX1495	C217 - Convert existing door into fire escape door (Front door)	04-Nov-10	24-Nov-10	1604	-12
AB1230	Fire escape works complete	24-Nov-10		1681	-12
Access to ELL Working platform		01-Dec-10	17-Jan-11	1681	
AD2290	Construct access ramps	01-Dec-10	17-Jan-11	1681	
Durward St Utility Works		24-Feb-10 A	11-Jan-12	849	-26
Phase 1 - Utilities to School Buildings		24-Feb-10 A	01-Nov-10	387	-4
Works by C245		01-Jun-10	20-Aug-10	436	-19
Gas		01-Jun-10	20-Aug-10	436	-19
EWWHIX1038	Issue drawing to C245 via PMI	01-Jun-10*	07-Jun-10	332	-15
EWWHIX1048	C245 produce Detailed design	08-Jun-10	05-Jul-10	332	-15
EWWHIX1058	NGG approval of C245 design (NGG-C4 WHI 01)	06-Jul-10	19-Jul-10	332	-15
EWWHIX0688	Install new supply	26-Jul-10	06-Aug-10	328	-19
AA1380	Install extra ducts	26-Jul-10	06-Aug-10	436	-19
EWWHIX0748	Cut & cap existing supply	09-Aug-10	20-Aug-10	414	-19
Works by Utility Companies		24-Feb-10 A	01-Nov-10	280	-4
EDF		24-Feb-10 A	01-Nov-10	280	-4
EWWHIX0628	Issue new supply / (Meter relocation) Application	24-Feb-10 A	16-Jun-10	275	-19
AC1210	Receive SU estimate	16-Jun-10	30-Jun-10	286	-9
EWWHIX0638	Raise WIF for diversion works	01-Jul-10	14-Jul-10	275	-9
EWWHIX0648	Mobilise - Elec.	15-Jul-10	23-Sep-10	275	1
EWWHIX0658	Carry out diversion	24-Sep-10	21-Oct-10	275	1
EWWHIX0668	EDF Diversion works complete	01-Nov-10		269	-4
Water		17-Jun-10	05-Oct-10	298	4
EWWHIX0478	SU notice period	17-Jun-10	11-Aug-10	315	-6
EWWHIX0698	Install new supply	22-Sep-10	05-Oct-10	287	4
Phase 2 - Diversion of Utilities to enable bridge demolition works		01-Jun-10	11-Jan-12	849	-26
AA1490	FDC provide ELL platform cable diversion details (Date TBC)	01-Jun-10*		572	-19
Winthorp Bridge		06-May-11	08-Jul-11	572	-19
Sewer		06-May-11	08-Jul-11	572	-19
EWWHIX0838	Construct new manhole	06-May-11	17-Jun-11	560	-19
EWWHIX1078	Cap existing sewer	04-Jul-11	08-Jul-11	550	-19
Durward St Bridge		01-Jun-10	11-Jan-12	849	-26
Civils - For utility diversions via ELL platform		30-Jun-10	25-Aug-10	1133	-7
AA1500	C245 / C244 - Carry out civils works - Telecom inspection pits	30-Jun-10	25-Aug-10	1113	-7
AA1510	C245 / C244 - Carry out civils works	30-Jun-10	25-Aug-10	1133	-7
Water		29-Jun-10	29-Jul-11	963	-19
EWWHIX0778	Issue C4 request	29-Jun-10	12-Jul-10	919	-19
EWWHIX0788	C4 estimate received from SU	13-Jul-10	23-Aug-10	919	-19
EWWHIX0798	Raise WIF	24-Aug-10	05-Oct-10	919	-19
EWWHIX0808	SU carry out detailed design	06-Oct-10	02-Nov-10	919	-19
EWWHIX0818	Confirm scope of Civils / SU water	03-Nov-10	09-Nov-10	919	-19
EWWHIX0828	Raise WIF - TWUL	10-Nov-10	21-Dec-10	919	-19
EWWHIX0488	Mobilise - TWUL	22-Dec-10	05-May-11	919	-19
EWWHIX0868	Carry out diversion via ELL platform - Water	06-May-11	29-Jul-11	919	-19
EWWHIX0878	Carry out diversion via Kempton Court - Water	06-May-11	29-Jul-11	919	-19
EWWHIX0888	Carry out disconnection - Water	06-May-11	19-May-11	969	-19
EDF		12-Oct-10	14-Feb-11	1014	22
EWWHIX0768	Carry out diversion via ELL Platform	12-Oct-10	14-Feb-11	970	22
Sewer		29-Jun-10	01-Jul-11	572	-19

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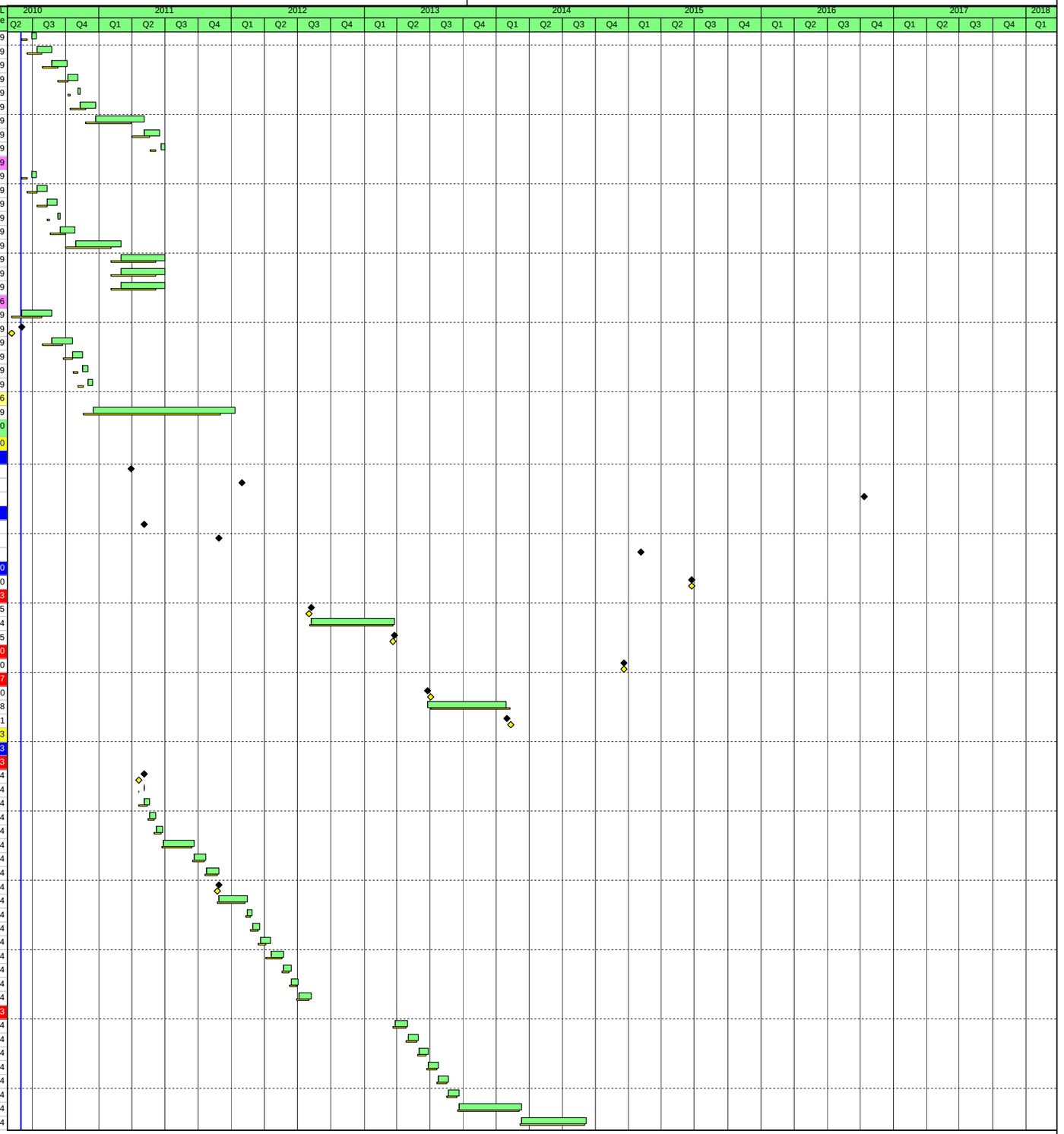
EWWHIX1088	Issue C4 request	29-Jun-10	12-Jul-10	550	-19
EWWHIX1098	C4 estimate received from SU	13-Jul-10	23-Aug-10	550	-19
EWWHIX1108	Raise WIF	24-Aug-10	05-Oct-10	550	-19
EWWHIX1118	SU carry out detailed design	06-Oct-10	02-Nov-10	550	-19
EWWHIX1128	Confirm scope of Civils / SU sewer	03-Nov-10	09-Nov-10	550	-19
EWWHIX1138	Raise WIF - TWUL	10-Nov-10	21-Dec-10	550	-19
EWWHIX1148	Mobilise - TWUL	22-Dec-10	05-May-11	550	-19
EWWHIX1158	Install new manholes / sewer	06-May-11	17-Jun-11	550	-19
EWWHIX1168	Connect into existing run	20-Jun-11	01-Jul-11	550	-19
Telecoms		29-Jun-10	01-Jul-11	983	-19
EWWHIX0938	Issue C4 request	29-Jun-10	12-Jul-10	939	-19
EWWHIX0948	C4 estimate received from SU	13-Jul-10	09-Aug-10	939	-19
EWWHIX0958	SU carry out detailed design	10-Aug-10	07-Sep-10	939	-19
EWWHIX0968	Confirm scope of Civils / SU Telecoms	08-Sep-10	14-Sep-10	939	-19
EWWHIX0978	Raise WIF - Telecoms	15-Sep-10	26-Oct-10	939	-19
EWWHIX0498	Mobilise - Telecoms	27-Oct-10	01-Mar-11	939	-19
EWWHIX0508	Carry out diversion - Telia	02-Mar-11	01-Jul-11	939	-19
EWWHIX0518	Carry out diversion - Virgin Media	02-Mar-11	01-Jul-11	939	-19
EWWHIX0988	Carry out diversion - BT	02-Mar-11	01-Jul-11	939	-19
Survey		01-Jun-10	11-Jan-12	409	-26
AA1530	Procure trial trenches	01-Jun-10	23-Aug-10	416	-19
AC1200	Confirm budget in place for survey	01-Jun-10		416	-19
AA1540	Mobilise	24-Aug-10	19-Oct-10	416	-19
AA1550	Carry out survey (WHI-0221)	20-Oct-10	16-Nov-10	416	-19
AA1560	Prepare Report & Issue	17-Nov-10	30-Nov-10	416	-19
AA1570	Review survey results & confirm scope for additional diversion works - (If required)	01-Dec-10	14-Dec-10	416	-19
Unconfirmed diversion works		15-Dec-10	11-Jan-12	409	-26
EWWHIX0168	Additional utility diversion works - (If Required) Inc C4,WIF,Design,WIF,Mob, Works	15-Dec-10	11-Jan-12	394	-19
Construction		28-Mar-11	01-Feb-17	152	0
Construction Works Milestones		29-Mar-11	11-Oct-16	230	-330
Durward Box		29-Mar-11	11-Oct-16	230	
AD2190	C511 - Commence Durward Street Box & West Stair Shaft	29-Mar-11		1631	
AD2210	C511 - Works complete - Handover to C512		30-Jan-12	1419	
AD2250	C512 - Complete Durward St Shaft		11-Oct-16	230	
Cambridge Heath Shaft		05-May-11	03-Feb-15	657	
AD2180	C511 - Commence Cambridge Heath Rd Shaft	05-May-11		1607	
AD2200	C511 - Works complete - Handover to C512		28-Nov-11	1462	
AD2240	C512 - Complete Cambridge Heath Rd Shaft		03-Feb-15	657	
Summary SCL Interface		07-Aug-12	24-Jun-15	91	0
AC1240	C510 All SCL Works Complete		24-Jun-15*	3	0
Cambridge Heath Shaft		07-Aug-12	26-Mar-13	657	-3
WS1300x	C512 - Handover Cambridge Heath Work Site to C510 SCL contractor		07-Aug-12	952	-5
WS1308	C510 - Undertake SCL works at Cambridge Heath Shaft	08-Aug-12	26-Mar-13	754	-4
xWS1309	C510 - SCL Hand back Cambridge Heath Work Site to C512		26-Mar-13	948	-5
Platform Tunnels		18-Dec-14	18-Dec-14	130	0
AC1230	C510 - Complete Platfom Tunnels - Hand to C512		18-Dec-14*	130	0
Durward Box		24-Jun-13	30-Jan-14	311	7
A1030x	C512 - Hand over Durward St. Shaft to C510 SCL Contractor		24-Jun-13	450	10
AB1450	C510 Undertake SCL Works at Durward Box	24-Jun-13	28-Jan-14	313	8
xA1450	C510 - Hand Over North side of Durward St. Shaft to C512		30-Jan-14	449	11
Cambridge Heath Rd Shaft		05-May-11	03-Feb-15	657	-3
Cambridge Heath Shaft		05-May-11	03-Feb-15	657	-3
Cambridge Heath Shaft - Phase 1		05-May-11	07-Aug-12	660	-3
MS0010	C511 - Commence Cambridge Heath Rd Shaft	05-May-11		754	-4
WS1010	C511 - Mobilise ground works contractor	05-May-11	05-May-11	754	-4
WS1020	C511 - Pile probe around D-wall	06-May-11	19-May-11	754	-4
WS1030	C511 - Create piling mat	20-May-11	06-Jun-11	754	-4
WS1040	C511 - Moblise D-wall contractor	07-Jun-11	25-Jun-11	754	-4
WS1050	C511 - 30 x D-wall panels @ 2.5 panels/wk	27-Jun-11	19-Sep-11	754	-4
WS1060	C511 - 9 x Barrette Panels	20-Sep-11	22-Oct-11	754	-4
WS1070	C511 - Capping beam construction	24-Oct-11	26-Nov-11	754	-4
WS1090	C512 - Set up tower crane base & crane	28-Nov-11		754	-4
WS1100	C512 - Bulk Excavation to +106m	28-Nov-11	13-Feb-12	754	-4
WS1210	C512 - Bulk Excavation to +101m	14-Feb-12	27-Feb-12	754	-4
WS1230	C512 - Bulk Excavation to +96m	28-Feb-12	19-Mar-12	754	-4
WS1250	C512 - Bulk Excavation to +86m	20-Mar-12	18-Apr-12	754	-4
WS1260	C512 - Concrete Waling @+86m	19-Apr-12	23-May-12	754	-4
WS1270	C512 - Bulk Excavation to +81m & Blinding	24-May-12	13-Jun-12	754	-4
WS1280	C512 - Cast base slab	14-Jun-12	03-Jul-12	754	-4
WS1290	C512 - Cast lining walls up to +91m	04-Jul-12	07-Aug-12	754	-4
Cambridge Heath Shaft - Phase 2		27-Mar-13	03-Feb-15	657	-3
WS1310	C512 - Install slab +86m	27-Mar-13	01-May-13	754	-4
WS1320	C512 - Install slab +91m	02-May-13	31-May-13	754	-4
WS1330	C512 - Install slab +96m	01-Jun-13	26-Jun-13	754	-4
WS1340	C512 - Install slab +101m	27-Jun-13	24-Jul-13	754	-4
WS1350	C512 - Install slab +106m	25-Jul-13	21-Aug-13	754	-4
WS1360	C512 - Install slab +112m	22-Aug-13	19-Sep-13	754	-4
WS1370	C512 - Head house structure Shell and Core	20-Sep-13	10-Mar-14	754	-4
WS1380	C512 - M&E	11-Mar-14	06-Sep-14	754	-4



Remaining Level of Effort | Primary Baseline | Remaining Work | Baseline Milestone
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Activity ID	Activity Name	Start	Finish	Total Float	Variance - BL Project Finish Date
WS1390	C512 - Fit Out	08-Sep-14	03-Feb-15	754	-4
WS1400	C512 - Complete Cambridge Heath Rd Shaft		03-Feb-15	754	-4
SCL		08-Aug-12	26-Mar-13	1126	
AD2390	C510 - Undertake SCL works at Cambridge Heath Shaft	08-Aug-12	26-Mar-13	1289	
Durward St - Box & West Stair Shaft		28-Mar-11	11-Oct-16	230	0
MS0090	C511 - All Durward St Utility Enabling Works Complete		28-Mar-11	321	9
MS0080	C511 - Commence Durward Street Box & West Stair Shaft	29-Mar-11		321	9
Durward Street Shaft - Phase 1		29-Mar-11	24-Jun-13	280	8
WS2010	C511 - D-walls Top Level, incl. piling	29-Mar-11	15-Aug-11	321	9
WS2020	C511 - Excavate to +105m, remove gravity wall	16-Aug-11	10-Oct-11	321	9
WS2030	C511 - D-walls Low Level	11-Oct-11	19-Dec-11	321	9
WS2040	C511 - Build up new ELL side wall to ground level	20-Dec-11	30-Jan-12	321	9
WS2050	C512 - "Bottom-up" excavate to formation level	31-Jan-12	23-Jul-12	321	9
WS2060	C512 - Base slab (level -5)	24-Jul-12	17-Sep-12	321	9
WS2070	C512 - Intermediate slabs (level -4)	18-Sep-12	12-Nov-12	321	9
WS2080	C512 - Intermediate slabs (level -3)	13-Nov-12	18-Jan-13	321	9
WS2090	C512 - Intermediate slabs (level -2)	19-Jan-13	04-Mar-13	321	9
WS2100	C512 - Intermediate slabs (level -1)	05-Mar-13	29-Apr-13	321	9
WS2105	C512 - Install slabs (level 0)	30-Apr-13	24-Jun-13	321	9
West Stair Shaft		25-Jun-13	30-Jan-14	279	7
WS2260	C512 - Mobilise groud work contractor	25-Jun-13	08-Jul-13	321	9
WS2270	C512 - Pile probing & ground works	09-Jul-13	29-Jul-13	321	9
WS2280	C512 - Mobilise piling contractor	30-Jul-13	12-Aug-13	321	9
WS2290	C512 - Secant pile walls to 3 sides (3 piles per day, 63 piles)	13-Aug-13	13-Sep-13	321	9
WS2300	C512 - Capping beam to 3 sides	14-Sep-13	04-Oct-13	321	9
WS2310	C512 - Prop and excavate to +105m	05-Oct-13	08-Nov-13	321	9
WS2320	C512 - Remove gravity wall	09-Nov-13	06-Dec-13	321	9
WS2350	C512 - Construct base slab	07-Dec-13	20-Dec-13	321	9
WS2360	C512 - Concrete to ground level	06-Jan-14	30-Jan-14	321	9
SCL/TBM		01-Aug-13	30-Jan-14	311	7
A1460	C510 - TBM/SCL Contractor Hands back base Site / East Access to C512		30-Jan-14	353	9
TBM		01-Aug-13	06-Dec-13	347	0
A1150	Pull TBM EB through WHI	01-Aug-13*	06-Sep-13	434	0
A1440	Pull TBM WB through WHI	01-Nov-13*	06-Dec-13	387	0
Durward Street Shaft - Phase 2		31-Jan-14	11-Oct-16	230	0
WS2115	C512 - Complete Headhse Structure from west side only	31-Jan-14	27-Sep-14	784	9
WS2370	C512 - Complete Durward St. Structure : both accesses returned	31-Jan-14	01-Apr-14	353	9
WS2380	C512 - Escalator to Duward St. Shaft	02-Apr-14	26-Jun-14	353	9
WS2390	C512 - Final Prep for Concourse Foundations -East & West Side	27-Jun-14	29-Aug-14	353	9
WS2395	C512 - Remove SME	30-Aug-14	28-Oct-14	353	9
WS2400	C512 - Remove Vehicle Deck - Engineering Hours	29-Oct-14	10-Jan-15	353	9
WS2410	C512 - New Concourse Installed	12-Jan-15	25-Feb-15	353	9
WS2420	C512 - All structures complete		25-Jun-15	261	0
WS2430	C512 - DSS Shaft & Concourse M&E	25-Jun-15	29-Feb-16	261	0
WS2440	C512 - DSS Shaft & Concourse Fit Out	01-Mar-16	23-Jul-16	261	0
WS2450	C512 - Headhouse ME&P	01-Mar-16	23-Jul-16	261	0
WS2460	C512 - Headhouse Fit Out	25-Jul-16	11-Oct-16	261	0
WS2470	C512 - Complete Durward St Shaft		11-Oct-16	261	0
Crossrail Platform Tunnels, Escalators & Passages		24-Jun-15	19-Oct-15	4	0
Concrete works to tunnel		24-Jun-15	19-Oct-15	4	0
AB1440	C512 - Gain Access To Platform Declines & Adits		24-Jun-15	3	0
AA3220	WB Platform structure	25-Jun-15	14-Sep-15	4	0
AA3230	EB Platform structure	25-Jun-15	14-Sep-15	21	0
AA3200	Internal Structure Western Escalator Shafts	15-Sep-15	19-Oct-15	4	0
Station Bridge Works		23-Sep-11	09-Jan-17	169	0
MS0070	C512 - Commence Station Bridge Ticket Office	23-Sep-11		0	0
MS0240	C512 - Complete Commission & Handover WHI Station		09-Jan-17	0	0
Phase 1A		23-Sep-11	02-Mar-12	1395	0
WS3010	C512 - Receive Site & high level boundaries, mobilise Contractor after Plain Lining	23-Sep-11	13-Oct-11	0	0
WS3020	C512 - Mobilise Groundworks Contractor & set up hoardings on platforms	14-Oct-11	27-Oct-11	0	0
WS3640	C512 - Construct tower crane adjacent GSM	28-Oct-11	07-Feb-12	1619	0
WS3022	C512 - Build new cross-platform connection	28-Oct-11	25-Nov-11	0	0
WS3025	C512 - Construct new staircase from existing footbridge, foundations and structures	26-Nov-11	09-Jan-12	0	0
WS3030	C512 - Build Crash Deck over Eastbound District Line	10-Jan-12	02-Mar-12	0	0
Phase 1B		26-Nov-11	02-Dec-13	319	0
WS3650	C512 - Renew hoarding on DL platforms	26-Nov-11	06-Dec-11	284	0
WS3670	C512 - Build new SME	07-Dec-11	20-Jan-12	908	0
South of Wintrop Street		03-Mar-12	02-Dec-13	35	0
West side platform		03-Mar-12	18-Sep-13	53	0
WS3035	C512 - Demolition Northern arm of footbridge	03-Mar-12	30-Mar-12	64	0
WS3040	C512 - Platform demo & create working platform	31-Mar-12	11-May-12	64	0
WS3050	C512 - Mobilise piling contractor	12-May-12	01-Jun-12	64	0
WS3055	C512 - Pile probe & infill subways	02-Jun-12	13-Jul-12	64	0
WS3060	C512 - Piling for box walls	14-Jul-12	07-Sep-12	64	0
WS3070	C512 - Capping beam for box	08-Sep-12	28-Sep-12	64	0
WS3080	C512 - Prop & excavate & install structural lining wall to base	29-Sep-12	26-Jan-13	64	0
WS3090	C512 - Base slab: staircase to box	28-Jan-13	27-Mar-13	64	0
WS3100	C512 - Build west side lower slab to access box	28-Mar-13	17-Apr-13	64	0
WS3120	C512 - Cut new access through ELL gravity wall	18-Apr-13	15-May-13	64	0

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WS3130	C512 - Piles & Caps for new truss foundations	16-May-13	10-Jul-13	64	0
WS3680	C512 - Install new columns and transfer beams for concourse	11-Jul-13	24-Jul-13	64	0
WS3690	C512 - Install north side truss in 2 parts & deck out for pedestrian corridor	25-Jul-13	18-Sep-13	64	0
East side platform		03-Mar-12	02-Dec-13	0	0
WS3140	C512 - Create working platform over and beyond bridge D124	03-Mar-12	16-Apr-12	0	0
WS3150	C512 - Piling for future foundations & staircase walls (after West side platform: pile tower cra...	17-Apr-12	12-Jul-12	0	0
WS3160	C512 - Capping beam for piled wall	13-Jul-12	10-Sep-12	0	0
WS3170	C512 - Excavation & lining wall for piled wall	11-Sep-12	17-Dec-12	0	0
WS3175	C512 - Remove D124 bridge	18-Dec-12	11-Feb-13	0	0
WS3180	C512 - Cut access through ELL gravity wall for southbound ELL	12-Feb-13	11-Mar-13	0	0
WS3190	C512 - Construct lift shaft with base able to take tower crane	12-Mar-13	20-May-13	0	0
WS3200	C512 - Install tower crane in lift shaft	21-May-13	25-May-13	0	0
WS3210	C512 - Install staircase structure within box around lift shaft	28-May-13	26-Jul-13	0	0
WS3215	C512 - Build high level walls	27-Jul-13	23-Sep-13	0	0
WS3220	C512 - Install covering structure to staircase	24-Sep-13	02-Dec-13	0	0
GSM		03-Mar-12	20-Apr-13	193	0
WS3240	C512 - Create new stair access from GSM to LUL platforms	03-Mar-12	16-Apr-12	222	0
WS3250	C512 - Soft strip GSM stucture	17-Apr-12	25-May-12	222	0
WS3260	C512 - Refurb GSM as TTH	26-May-12	22-Sep-12	222	0
WS3270	C512 - Install new M&E for GSM as temporary ticket hall	24-Sep-12	19-Feb-13	222	0
WS3280	C512 - Fit out GSM structure for use as temporary ticket hall	20-Feb-13	20-Apr-13	222	0
Phase 2		03-Dec-13	09-Jan-17	0	0
WS3300	C512 - Remove remaining footbridge structure	03-Dec-13	14-Dec-13	0	0
WS3315	C512 - Pile probing	16-Dec-13	06-Jan-14	0	0
WS3325	C512 - Lift pit: piling, cap & excavation & concreting	07-Jan-14	31-Mar-14	0	0
WS3335	C512 - New foundations for large Southern truss	01-Apr-14	21-Jun-14	0	0
WS3345	C512 - Install low level concourse south side to ticket hall	23-Jun-14	02-Aug-14	0	0
WS3355	C512 - Install low level concourse north side to Winthrop St.	04-Aug-14	13-Sep-14	177	0
WS3365	C512 - Install high level concourse and roof	15-Sep-14	11-Feb-15	177	0
New Ticket Hall		03-Dec-13	09-Jan-17	0	0
WS3310	C512 - Commission temporary ticket hall & decommission existing ticket hall	03-Dec-13	30-Jan-14	32	0
WS3330	C512 - Soft strip existing ticket hall	31-Jan-14	13-Mar-14	32	0
WS3340	C512 - Dismantle existing ticket hall canopy structure	14-Mar-14	10-Apr-14	32	0
WS3350	C512 - Demolish of the samll room structures and stair cases at the end of the ELL platforms	11-Apr-14	08-May-14	32	0
WS3360	C512 - Lifting in a minipiling rig onto the ends of the ELL platforms and construct new conco...	09-May-14	12-Jun-14	32	0
WS3370	C512 - Install the columns for the end sections of the new Concourse structure	13-Jun-14	26-Jun-14	32	0
WS3380	C512 - Remove roof sections of the existing ticket hall	04-Aug-14	27-Sep-14	0	0
WS3390	C512 - Demolition of the internal structure of the ticket hall from within and above the ELL bri...	29-Sep-14	25-Feb-15	0	0
WS3400	C512 - Construct new ticket hall area	26-Feb-15	23-Oct-15	0	0
WS3410	C512 - Escalators and M&E for new ticket hall structure	19-Sep-15	27-May-16	0	0
WS3405	C512 - Structure Complete		23-Oct-15	0	0
WS3415	C512 - Fit out new ticket hall structure	18-Jan-16	08-Nov-16	0	0
WS3420	C512 - Decommission temporary ticket hall and commission new ticket hall	09-Nov-16	09-Jan-17	0	0
Central Area between Winthrop & Durward Bridges incl Bridges		12-Jan-12	01-Feb-17	152	0
Winthorp Bridge Demolition		12-Jan-12	03-May-12	404	-23
WS3660	C512 - Probe	12-Jan-12	26-Jan-12	471	-22
WS3700	C512 - Pile	27-Jan-12	02-Feb-12	471	-22
WS3710	C512 - Cap / Connect	03-Feb-12	16-Feb-12	471	-22
WS3720	C512 - Crash Deck & Trusses	17-Feb-12	28-Feb-12	471	-22
WS3730	C512 - First Stage Removal	29-Feb-12	03-Apr-12	471	-22
WS3740	C512 - 5 Slices 0.8m wide	04-Apr-12	03-May-12	471	-22
Durward St. Demolition		31-Jan-14	12-Jun-14	279	7
WS3750	C512 - Probe	31-Jan-14	14-Feb-14	321	9
WS3760	C512 - Pile	15-Feb-14	20-Feb-14	321	9
WS3770	C512 - Cap / Connect	21-Feb-14	20-Mar-14	321	9
WS3780	C512 - Crash Deck & Trusses	21-Mar-14	03-Apr-14	321	9
WS3790	C512 - First Stage Removal	04-Apr-14	09-May-14	321	9
WS3800	C512 - 8 Slices 0.8m wide	10-May-14	12-Jun-14	321	9
New Works		04-May-12	01-Feb-17	152	0
WS3440	C512 - Build Foundations at bridge abutments	04-May-12	24-Jan-13	471	-22
WS3600	C512 - New Concourse sections up to Durawrd Street Bridge	25-Jan-13	23-Jul-13	471	-22
WS3620	C512 - New Durward Street Bridge / Concourse	13-Jun-14	11-Aug-14	321	9
WS3630	C512 - M&E and Fit out	19-Sep-15	08-Nov-16	0	0
Phase 3 - Reinstate of utilities following new bridge installation		29-Jan-16	01-Feb-17	152	0
AA2170	Utility diversion works via new bridge - Complete		01-Feb-17	152	0
EDF		29-Jan-16	01-Feb-17	152	0
EWWHIX0528	Mobilise - EDF	29-Jan-16	29-Apr-16	253	0
EWWHIX0908	Carry out diversion via new bridge	29-Sep-16	01-Feb-17	148	0
Water		29-Jan-16	01-Feb-17	152	0
EWWHIX0538	Mobilise - Thames Water	29-Jan-16	29-Apr-16	253	0
EWWHIX0918	Carry out diversion via new bridge	29-Sep-16	01-Feb-17	148	0
Telecoms		29-Jan-16	01-Feb-17	152	0
EWWHIX0548	Mobilise - Telecoms	29-Jan-16	29-Apr-16	253	0
EWWHIX0928	Carry out diversion via new bridge	29-Sep-16	01-Feb-17	148	0
Whitechapel Station Platform Tunnels		28-May-10 A	24-Jun-15	0	0
C140 Contraints		01-Feb-11	21-Jan-14	359	0
xC140DRS1000	Access Shaft Access for SCL Contractor	01-Feb-11*		367	0
xC140CHS1000	Cambridge Heath Road Shaft Access for SCL Contractor	08-Aug-12		975	-5
C140CHS1010x	Cambridge Heath Road Shaft SCL Contractor Handover to Station Contractor		25-Feb-13*	789	0

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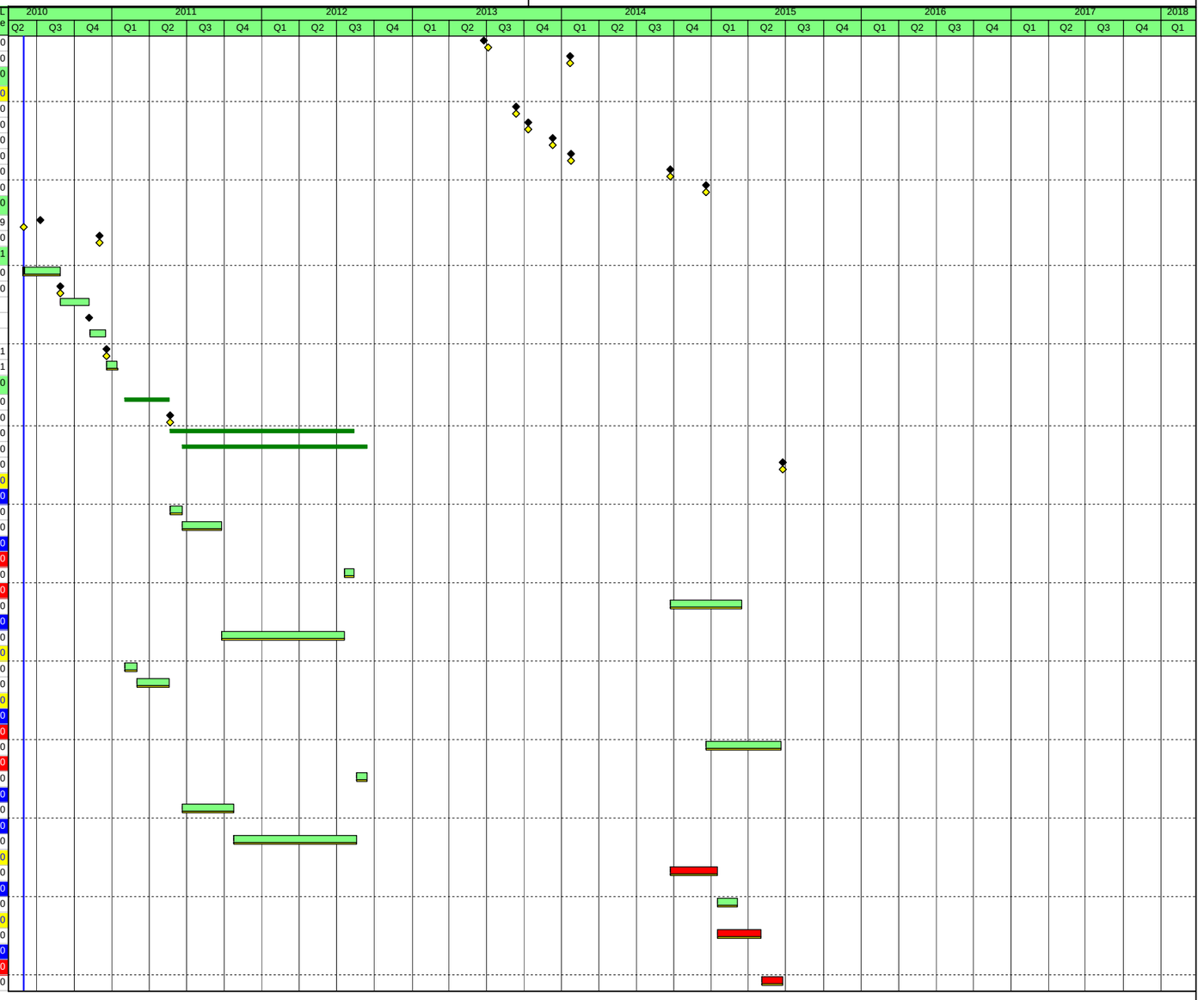
Activity ID	Activity Name	Start	Finish	Total Float	Variance - BL Project Finish Date
xC140DSS1000	Durward Street Shaft Access for SCL Contractor	25-Jun-13		679	10
C140DSS1010x	Durward Street Shaft Access SCL Contractor Handover to Station Contractor		21-Jan-14*	0	0
PDP Constraints		11-Sep-13	19-Dec-14	8	0
TBM Activities		11-Sep-13	19-Dec-14	8	0
PDPTBM1000	E/B TBM Arrival at Whitechapel	11-Sep-13*		0	0
PDPTBM1020	E/B TBM RE-Launch	12-Oct-13*		0	0
PDPTBM1010	W/B TBM Arrival at Whitechapel	10-Dec-13*		0	0
PDPTBM1030	W/B TBM Re-Launch	24-Jan-14*		0	0
PDPTBM1050	E/B Y Drive TBM and Dismantle at Farringdon		23-Sep-14	0	0
PDPTBM1040	W/B Y Drive TBM and Dismantle at Farringdon		19-Dec-14	3	0
C510 Design		08-Jul-10	30-Nov-10	1151	0
A1010	C121 - SCL Design - RIBA E		08-Jul-10*	1293	-29
A1020	C121 - SCL Design - RIBA F		30-Nov-10*	324	0
C510 Procurement		28-May-10 A	13-Jan-11	284	1
C420A000160	C510 - Tender Period	28-May-10 A	26-Aug-10	281	0
A1040	C510 - Tenders Returned		27-Aug-10	406	0
A6290	C510 - Tender Evaluation and Submit Recommendation to CRL	27-Aug-10	05-Nov-10	281	
A6300	C510 - CRL receives PDP Recommendation		05-Nov-10	281	
A5830	C510 - CRL approval of Recommendation	08-Nov-10	16-Dec-10	281	
A1050	C510 - Award/Execute Contract	17-Dec-10		410	1
AC1040	Contract Mobilisation	17-Dec-10	13-Jan-11	292	1
Construction		01-Feb-11	24-Jun-15	0	0
AC1030	SCL Access Shaft - Whitechapel - Timechainage	01-Feb-11	20-May-11	271	0
WHI1000	SCL CONSTRUCTION START	21-May-11		1394	0
TC1010	Eastbound Platform Tunnel - Whitechapel - Timechainage	23-May-11	13-Aug-12	272	0
TC1020	Westbound Platform Tunnel - Whitechapel - Timechainage	21-Jun-11	13-Sep-12	314	0
WHI1010	SCL CONSTRUCTION COMPLETE	24-Jun-15		0	0
Eastbound Station Tunnel		21-May-11	15-Mar-15	68	0
Pilot Tunnels		21-May-11	24-Sep-11	272	0
WHIEBP1020	EB Pilot Tunnel Stage 1	21-May-11	20-Jun-11	367	0
WHIEBP1030	EB Pilot Tunnel Stage 2	21-Jun-11	24-Sep-11	367	0
Secondary Lining		20-Jul-12	15-Mar-15	68	0
Invert		20-Jul-12	13-Aug-12	272	0
WHIEIL1030	EB Station Tunnel Invert	20-Jul-12	13-Aug-12	367	0
Enlargement		23-Sep-14	15-Mar-15	68	0
WHIEEL1060	EB Station Tunnel Secondary Lining	23-Sep-14	15-Mar-15	90	0
Enlargement		25-Sep-11	19-Jul-12	272	0
WHIEBE1080	EB Platform Tunnel - Excavation & Primary Lining	25-Sep-11	19-Jul-12	367	0
Shafts		01-Feb-11	20-May-11	271	0
WHISFT1000	Site Mobilisation for Construction	01-Feb-11	01-Mar-11	312	0
WHISFT1010	Shaft Construction	02-Mar-11	20-May-11	312	0
Westbound Station Tunnel		21-Jun-11	20-Jun-15	2	0
Secondary Lining		19-Aug-12	20-Jun-15	2	0
Enlargement		19-Dec-14	20-Jun-15	2	0
WHIWEL1060	WB Station Tunnel Secondary Lining	19-Dec-14	20-Jun-15	3	0
Invert		19-Aug-12	13-Sep-12	314	0
WHIWIL1000	WB Station Tunnel Invert	19-Aug-12	13-Sep-12	427	0
Pilot Tunnels		21-Jun-11	24-Oct-11	323	0
WHIWPD0990	WB Pilot Tunnel	21-Jun-11	24-Oct-11	427	0
Enlargement		25-Oct-11	18-Aug-12	315	0
WHIWBE1080	WB Platform Tunnel - Excavation & Primary Lining	25-Oct-11	18-Aug-12	427	0
Cross Passages, Adits & Ducts		23-Sep-14	05-Mar-15	39	0
WHIEPD1040	Cross Passages, Adits and Ducts - Excavation and Primary Lining	23-Sep-14	14-Jan-15	0	0
Secondary Linings		15-Jan-15	05-Mar-15	39	0
WHIECL1040	Cross Passages, Adits and Ducts Secondary Lining	15-Jan-15	05-Mar-15	50	0
Concourse and DeclineTunnels		15-Jan-15	23-Jun-15	0	0
WHICEW1000	Concourse & decline Tunnels - Excavation & Primary Lining	15-Jan-15	02-May-15	0	0
Secondary Lining		03-May-15	23-Jun-15	0	0
Western Concourse, Decline and Passages		03-May-15	23-Jun-15	0	0
WHICWL1000	Western Concourse, Decline and Passages	03-May-15	23-Jun-15	0	0



Remaining Level of Effort | Primary Baseline | Remaining Work | Baseline Milestone
Actual Level of Effort | Actual Work | Critical Remaining Work | Milestone

Annex 7: Enabling and temporary works design requirements, attendances and implementation

C217, C510, C511 and C512- Watching Briefs

All archaeological works associated with (see Annex 6 above) will require office and welfare accommodation as well as secure site storage facilities as specified.

C217 Field Evaluation

The archaeological evaluation will consist of three trial trenches. One trial trench will be located in the Tunnel Access shaft, orientated north-south (2m by 11m). The second trial trench will be located across the Grout shaft, orientated north-south (2m by 4m). The final trail trench will be located within the Cambridge Heath Road Shaft, orientated south-east to north-west (4m by 10m, c.4% area). Borehole information (WH 32R and WH33R) indicates that made ground is present between 3.5m and 4.5m below ground level. RTDs are present below the made ground. The depth of the made ground means that it is likely the trial trenches will be excavated to 4.5m to reach archaeological deposits. This will require one office-based archaeologist and eight site-based archaeologists. They will require office and welfare facilities and secure storage for tools.

C217 should design and provide support for the sides (sheet piling of similar) such that excavations can proceed to the required depth. There will also be requirement for access and egress, lighting and the safe removal of spoil.

Annex 8: Security requirements

Any security requirement will be communicated to the Archaeology Contractor by the PDP Site Manager and/or the Principal Contractor