

# Mount Pleasant, London

Remediation Strategy

Taylor Wimpey

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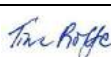
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# 1. INTRODUCTION

## 1.1 Objectives

AECOM has been commissioned by Taylor Wimpey to develop a Remediation Strategy for the purpose of discharging Planning Condition 6, parts C and D in relation to Phases 1 and 2 of the proposed re-development of the land adjacent to, and forming part of, the existing Mount Pleasant Sorting Office located in Farringdon. A site location plan is presented in **Figure 1** and a site layout plan is presented as **Figure 2**. The wording from Condition 6 is presented below:

*“SITE/LAND CONTAMINATION - Prior to the commencement of work for each Section of development or such other date, or stage in development as may be agreed in writing by the Local Planning Authority, a scheme including the following components to address the risks associated with site contamination shall each be submitted to and approved in writing by the Local Planning Authority:*

- a) a preliminary risk assessment which has identified all previous uses; potential contaminants associated with those uses (including asbestos, landfill gas, groundwater contamination); a conceptual model of the site indicating sources, pathways and receptors; and potentially unacceptable risks arising from contamination at the site;*
- b) a site investigation scheme based on (a) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site;*
- c) the results of the site investigation and detailed risk assessment referred to in (b) and, based on these, in the event that remediation measures are identified to be necessary, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken;*
- d) a verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in (c) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.*

*Each Section of the development shall be carried out strictly in accordance with the relevant risk assessment, site investigation, options appraisal, remediation strategy and verification plan so approved, and no change therefrom shall take place without the prior written consent of the Local Planning Authority.*

*Any investigation and risk assessment must be undertaken in accordance with the requirements of the Environment Agency's Model Procedures for the Management of Contamination (CLR11). In the event that additional significant contamination is found at any time when carrying out the approved development it must be reported in writing immediately to the local planning authority*

*For the avoidance of doubt, this condition can be discharged on a Section by Section basis.”*

Parts A and B have been discharged by permission ref. 2016/6535/P which approved a Preliminary Environmental Risk Assessment (September 2016), a Site Investigation Strategy (May 2017) and a Written Scheme of Investigation (June 2017) prepared by Waterman.

This Report and the accompanying documents listed below have been prepared to discharge Parts C and D of the Condition. Sections 2 and 3 of this report addresses Part C, and Section 4 addresses Part D. Further supporting information for these sections is presented in Sections 5 to 7

The documents listed below have been used to discharge part C of Condition 6:

Ref. 1 RSK (2017) Royal Mail Mount Pleasant Sorting Office – Calthorpe Site – Interpretative Geotechnical Report; February 2017, Report No 28549-01 (00) prepared for Royal Mail Group Limited;

Ref. 2 RSK (2017) Royal Mail Mount Pleasant Sorting Office – Phoenix Place Site – Ground Investigation and Interpretative Geotechnical Report; June 2017, Report No 28549-02 (00) prepared for Royal Mail Group Limited;

Ref. 3 RSK (2017) Mount Pleasant – Phoenix Place Site – Desk Based Review and Supplementary Investigation; November 2017, Report No 28518-01 (00) prepared for Taylor Wimpey Central London; and

Ref. 4 Waterman (2017) Generic Quantitative Risk Assessment – Phoenix Place Site, Mount Pleasant, London; April 2017, Report Ref WIB13235-102-R-7-1-8-BG prepared for Royal Mail Group.

Assessment and control of potential risks from unexploded ordnance (UXO) is outside the scope of this report and the Condition and will be covered separately.

## 1.2 Brief Description of the Development

The Phoenix Place Development is split into two areas, Plot P1 and Plot P2, which will comprise four separate buildings known as Buildings A, B, C and D. A representation of the Phoenix Place Development (Plot P1 and Plot P2) is given in **Figure 3**.

Building A, located in the southern part of the Phoenix Place Development forms Plot P1, which closely follows the alignment of Gough Street, Mount Pleasant and Phoenix Place. Building A is proposed to be between 5 and 15 storeys in height, would accommodate residential, retail and community uses. The two-storey basement beneath Building A, which also extends under a proposed public area, would provide Royal Mail staff parking, residential car parking, bike storage, water storage and plant rooms.

The northern part of the Phoenix Place Development, which forms Plot P2, would comprise Buildings B, C and D separated above ground by a communal garden, a courtyard and public open space. Buildings B, C and D, which would be between 5 and 10 storeys in height, would accommodate residential, retail and community uses. A separate basement would be created beneath Buildings B and C, and below the courtyard to accommodate car parking, plant rooms, lobby, residential and commercial uses.

Public and private communal amenity space provided within the Phoenix Place Development at ground level would comprise a combination of hard and soft landscaped areas. Soft landscaped areas within public open space would comprise lawn, planting and raised planting beds. Trees would be planted throughout the Phoenix Place Development and within public open spaces.

In general, soft landscaping will be underlain by basements, with a few trees and small areas of soft landscaping at ground level.

## 1.3 Scope of this Document

This document has been prepared in general accordance with CLR11 Model Procedures for the Management of Land Contamination (Defra & Environment Agency, 2004). It deals with the following:

- Summary of the site and its geo-environmental setting;
- General requirements relevant to this document, including health and safety and environmental management;
- Remediation objectives and remediation criteria;
- Verification of the works, as they relate to the remediation objectives and criteria for soils and groundwater, including any site won and imported soil, including topsoil, for use within areas of landscaping;
- Outline strategy for identifying and dealing with previously undiscovered contamination;
- Requirements for collating evidence to demonstrate the activities carried out; and
- Contact details for principal stakeholders.

It should be noted that this Remediation Strategy should not be implemented until such time as its content and scope receives written approval from the London Borough of Camden

The Contractor appointed to carry out the groundworks will be responsible for implementing the procedures and actions outlined in this document. It is the Contractor's responsibility to collate all the necessary evidence to demonstrate that the works have been carried out in accordance with this document and provide the same to the Client's consultant so a Verification Report can be produced in response to Condition 6d. Failure to provide requisite evidence may compromise regulatory signoff of the remaining parts of the planning condition.

This Remediation Strategy should be treated as a working document. The Contractor should consult the Client's consultant in the event that suspect or otherwise previously unidentified ground conditions are uncovered. There may be a requirement to review the procedures and consult with regulatory authorities in the event that unforeseen conditions are encountered. Revised or new procedures to deal with such ground conditions may require regulatory approval before works can proceed.

The materials observed and tested during the site investigations represent only a small proportion of the materials present on-site. There may be other ground conditions at the site that have not been revealed by these investigations, and which have therefore not been taken into account when developing the scope of this document. The Discovery Strategy (Section 6) is designed to address this issue.



## 2. RESULTS OF SITE INVESTIGATION AND DETAILED RISK ASSESSMENT

### 2.1 Site Location

The Royal Mail Mount Pleasant Sorting Office is located in Clerkenwell, London, at National Grid Reference 530945, 182264 and comprises two sites separated by Phoenix Place (street). The western site, Phoenix Place Site is the subject of this strategy. The Calthorpe Street Site is not included in this strategy.

The information below has been summarised from References 1 – 4.

### 2.2 Site History

Since the late 1800's the Site has been in use by various industrial processes, which remained on-site up until the 1970's. Industries identified included a foundry, works garages, food factory, printing works and joinery works. On detailed Goad fire insurance plans several tanks are located on-site predominately associated with former garages. Several changes to the Site layout and purpose of buildings occurred between the late 1800's and 1970's. By 1974 most of the structures on-site had been demolished or were disused. Mail Rail house was constructed on the Site centre during the early 1990's and demolished post 2010.

### 2.3 Geology

Published records (British Geological Survey) for the area indicate that the superficial geology of the central and southern part of the site is characterised by the presence of alluvial deposits associated with the historical course of the River Fleet. The Hackney Gravel Member of the River Terrace Deposits feathering margin is also shown on the northern site boundary. The underlying solid geology comprises a sequence of the London Clay formation, which outcrops in the northern portion of the site, the Harwich Formation, the Lambeth Group and the Thanet Sand Formation, with the White Chalk Subgroup at depth. It should be noted that in the London area, the Woolwich Formation typically replaces the Reading Formation in the Lambeth Group. However, in central and south east London, the two formations interdigitate and both are present in the site area.

Information from the investigation conducted by RSK in 2016 (Ref 28549-02) confirms the succession, revealing that the site underlain by a variable thickness of made ground over the Alluvium and Hackney Gravel Member (River Terrace Deposits). The solid geology was encountered as a succession comprising the London Clay Formation, the Harwich Formation, the Lambeth Group and the Thanet Sand Formation, with the White Chalk Sub-group encountered at depth. Further details of the geology encountered, including thicknesses are presented below.

### 2.4 Ground Investigation

Ground investigations completed on site are summarised below and figures summarising contamination identified are presented in **Figure 4** and **Figure 5**:

#### Watermans Generic Quantitative Risk Assessment, April 2017

The report provides interpretation of environmental risk from site investigation data collected by RSK in October 2016 (further details are presented in the RSK reports below). In addition gas monitoring was completed by Watermans in six visits between December 2017 and March 2016.

- Ground gas monitoring was carried out by Waterman (WIB13325-102-R-7-1-8-BG), they identified the site as Characteristic Situation 1, therefore, they concluded no ground gas protection are required on site, based on GSV given as 0.0043 l/hr as maximum.
- Ground gas monitoring confirmed the relatively low ground gas concentrations and flow rates reported by Watermans. The maximum concentration of carbon dioxide in one well WS17 was 5.6% and therefore marginally exceeded the trigger level of 5.0% at which consideration should be given to increasing the Characteristic Situation (CS) from CS1 to CS2. However, given the low concentrations and flows recorded across the site and in previous monitoring of this well, CS1 is considered to be appropriate



### RSK Ground Investigation and Interpretative Geotechnical Report, June 2017

The report interprets data collected by RSK in October 2016. The intrusive investigation findings are reported within a factual report (Royal Mail Mount Pleasant Sorting Office – Phoenix Place Site – Ground Investigation and Interpretative Geotechnical Report; Report No 28549-02 (00), June 2017) Works undertaken included the following:

- Twelve boreholes to maximum depth of between 35.0m bgl and 50.1m bgl (BH11-23). Refusal on BH15 and BH15A at 2.6m bgl due to concrete obstruction.
- Ten trial pits (TP1-TP10) to depths between 2.30m bgl and 4.40m bgl;
- Six window sample boreholes (WS13 to WS18) to a maximum depth of 5.0m bgl;
- Groundwater level monitoring visits in nine occasions; and
- In-situ and ex-situ geotechnical testing and ex-situ contamination testing.

### RSK, Desk Based Review and Supplementary Investigation, November 2017

The additional intrusive investigation findings are reported within a factual report (Mount Pleasant – Phoenix Place Site – Desk Based Review and Supplementary Investigation; Report No 28518-01 (00), November 2017). Works undertaken included the following:

- Ten Trial Pit (TP101 to TP110) to depths between 2.30m bgl and 4.40m bgl.
- Four Window sample boreholes (WS19 to WS22) to a maximum depth of 5.0m bgl;
- Groundwater level and ground gas monitoring visits on one occasion in October 2017; and,
- In-situ and ex-situ geotechnical testing and ex-situ contamination testing.

The ground conditions and hydrogeology encountered during these investigations are detailed in Table 1 below.

**Table 1:** Phoenix Place geology and hydrogeology

Stratum	Area Covered	Estimated Thickness	Typical Description	Aquifer Designation
Made Ground	Entire Site	1.5m to 5.2m	Clayey sandy gravelly material with fragments of brick, concrete, oyster shells, ceramic, ash.	Unproductive Strata
Alluvium	The former River Fleet courses	1m to 2m	Sandy silty clay, with organic matter present	Secondary A Aquifer
Hackney Gravel Member	Majority of Phoenix Place site	0.9m to 1.2m	Sand gravels with rare clay	Secondary A Aquifer
London Clay Formation	Entire site	5.4m to 9.4m	Silty clay	Unproductive Strata
Harwich Formation	North West Corner	1.5 to 4.5m	Sandy silty coarse to medium and fine gravel	Secondary A Aquifer
Lambeth Group	Entire Site	15.5m to 15.8m	Mottled sandy clay containing shell fragments	Secondary A Aquifer
Thanet Formation	Entire Site	7.0m	Fine grained sand with rare clay	Secondary A Aquifer
Upper Chalk Formation	Entire Site	>13.0m (not proven)	White chalk with flints	Principal Aquifer

## 2.5 Hydrogeology

Based on the published geological information and Waterman's Preliminary Environmental Risk Assessment, referred to above, the hydrogeology of the site is likely to be characterised by the presence of an unconfined shallow Secondary A Aquifer comprising the Alluvium and the Hackney Gravel Member, overlying the London Clay Formation, which is classified as an Unproductive Strata.

Confined by the London Clay Formation, are deep Secondary A Aquifers comprising the Harwich Formation, Lambeth Group and the Thanet Sand Formation, with the White Chalk Sub-group (Principal Aquifer), at depth. These units are expected to be in hydraulic continuity.

## 2.6 Groundwater Levels

The site lies at 11.8m to 18.7m AOD. Groundwater levels on-site were recorded in the Made Ground and Alluvium. Groundwater on site flows towards the south east in direction of the River Fleet Sewer.

## 2.7 Hydrology

Reference to '*The Lost Rivers of London*' (Barton 1992) and '*London's Lost Rivers*' (Talling, 2011), indicates that the River Fleet historically flowed southwards (just to the east of the northern part of the site and through the south-eastern section of the site). The current information confirms that the watercourse has been culverted in a sewer. The River Fleet Sewer flows within the site boundary beneath Phoenix Place, near the eastern Site Boundary. The alluvial tract of the original watercourse is also expected to extend beneath the footprint of the site.

There are no ponds, streams or drainage ditches on or adjacent to the site. The nearest identified open surface feature to the site is the Regents Canal, located approximately 1.1km to the north of the site. The River Thames is some 1.6km to the south and will receive water from the River Fleet sewer.

## 2.8 Flooding

Rising groundwater levels can result in flooding if not properly controlled. In certain areas groundwater levels are rising owing to reduced groundwater abstraction by industry, with London being at particular risk. The rise in groundwater levels started during the mid-1960s as a result of a significant reduction in groundwater abstraction from the chalk aquifer.

As defined within CIRIA Special Publication 69 (Simpson et al., 1989), the site lies within the 'Critical Area' of the London Basin in which deep structures are potentially at risk from the rising groundwater levels in the deep aquifer. Deep structures include basements deeper than 20 m and other structures whose foundations extend to between 30m and 50m below ground level.

The Environment Agency (EA) status report issued in 2016 'Management of the London Basin Chalk Aquifer' indicates that the piezometric surface of the groundwater in the deep aquifer in the site area in January 2016 was at approximately -35 mAOD.

## 2.9 Sensitive Land Uses

Information on nearby sensitive landuses was not provided in previous reports. therefore it is assumed that none are present.

## 2.10 Archaeology

No archaeological consultation has been undertaken as part of the RSK and Waterman investigations. The Watermans report refers to an archaeology report referenced as 'CAL16, MOLA 2016' and says that recommendations should be followed, but no details are supplied.

## 2.11 Part 2a, Landfill/Waste Sites

According to the Waterman report there are no sites determined as Contaminated Land under Part 2a EPA 1990 within 500m of the site.

## 2.12 Potential Sources of Contamination

Contaminants of concern associated with the sites former uses include heavy metals, total petroleum hydrocarbon (TPH), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), semi-volatile organic compounds (VOCs), phenols, chlorinated solvents, and asbestos.

Soil and groundwater samples taken as part of RSK site investigation works in completed in October 2016 and reported by Waterman in April 2017, were compared to thresholds protective of human health and below ground structures. No unacceptable risks to future site users were identified other than potential aggressive ground (DS and ACEC-AC Concrete Classification AC-2 in made ground and superficial deposits, and AC-3 in London Clay), although it is acknowledged that there is potential for deep soil contamination that could be present that has not been identified during the site investigation works. A 'medium' risk was identified to construction workers on the project if no mitigation measures were implemented.

Groundwater samples from the Made Ground and Alluvium were assessed against the Environment Agency (EA) derived Environmental Quality Standards (EQS) and those from the Lambeth Group, Thanet Formation, and Upper Chalk Formation were assessed against the Drinking Water Standards (DWS). The Water Framework Directive (WFD) (2000/60/EC), to date, has not set threshold values for groundwater on a river basin basis. Following Stage 2 assessment, including assessment of values that exceeded screening criteria, the Watermans 2017 report concluded that identified soil and groundwater concentrations did not present unacceptable risk to controlled waters.

Ground gas results for monitoring completed by Watermans were classified as Characteristic Situation 1 and therefore no mitigation measures were proposed. Subsequent monitoring by RSK was not classified but identified similar gas concentrations and flow rates.

Details of potential sources of contamination from historical uses of the site with risk assessment and recommendations for further work are contained within Waterman's Preliminary Risk Assessment, referred to above. A detailed environmental assessment of the Phoenix Place site has been conducted by Waterman Infrastructure & Environment Limited in 2016/2017.

## 2.13 Potential Pathways and Receptors

Potential pathways and receptors have been identified at the Site and are summarized in Table 2.

**Table 2:** Potential Pathways and Receptors

Pathway Number	Pathway	Receptor
<b>WATERMAN QRA (April 2017)</b>		
P1	Direct contact with soil and groundwater	Existing Site Users, Future site users, including commercial / residential workers, residents and visitors.
P2	Inhalation / ingestion of airborne dust and vapours	
P3	Vapour or gas migration to buildings	
P4	Migration of leachate through soil	Off –site residents, Controlled Waters – River Thames (Secondary A aquifer), Secondary A Aquifer within the Hackney Gravel Formation, Secondary A Aquifer within Lambeth Group and Thanet Formation and Principal Aquifer within Upper Chalk Formation.
P5	Lateral and vertical migration of groundwater	

## 2.14 Conceptual Site Model (CSM)

The CSM presented in Table 3 summarizes the relevant pollutant linkages that are deemed to be present at the Site and the steps and measures to be deployed within the remedial strategy (Section 3).

**Table 3:** AECOM Revised Conceptual Site Model

Source	Pathway	Receptor
<b>S1:</b> Contaminated Soils	Direct contact, inhalation of dust or asbestos fibres, ingestion and dermal contact potentially for unidentified deep contamination to be brought to the surface during piling and other earthworks.	Future Site Users of the proposed development Construction workers
<b>S1:</b> Contaminated Soils	Windblown dust or asbestos fibres	Site neighbours during construction
<b>S1:</b> Contaminated Soils	Direct contact with made ground	Foundations of current and future site buildings
<b>S1:</b> Contaminated Soils	Direct contact	Vegetation
<b>S1:</b> Contaminated Soils	Leaching followed by vertical migration through Made Ground	Secondary A Aquifer (Hackney Gravel Member)
<b>S2:</b> Contaminated Water	Leaching followed by vertical migration through overlying deposits within groundwater.  Potential vertical migration from through London Clay if it is removed by structures e.g. two storey basement	Secondary A Aquifer (Harwich Formation, Lambeth group, Thanet Formation)  Principal Aquifer (Upper Chalk Formation)
<b>S2:</b> Contaminated Water	Lateral migration through the River Fleet Sewer	Culverted River Fleet, River Thames
<b>S3:</b> Ground Gas	Vertical and lateral migration through granular soil matrix	On and off-site structures Future Site users Construction workers
<b>S4:</b> Vapour		On and off-site structures Construction workers
<b>S5:</b> Contaminated soils and groundwater	Direct Contact	New water supply pipes

## 3. GENERAL REMEDIAL STRATEGY

### 3.1 Remedial Strategy

The Remediation Strategy presented below is intended to fulfil the requirements of Planning Condition 6 Part C by breaking or mitigating relevant pollutant linkages and risks identified in the conceptual site model developed from the Waterman Detailed Quantitative Risk Assessment, April 2017 (WIB13235-102-R-7-1-8-BG). The completion of such requirements and recommendations will allow the site to be carried forward for its intended redevelopment purpose. This document has been prepared by a 'Contaminated Land Professional' as defined by BREEM.

In the absence of identified specific risks to future site users which require mitigation beyond normal good building practice and control of materials used, a Remedial Options Appraisal has not been completed. Should unexpected contamination be identified during the works that requires extensive remediation, then a remedial approach including remedial options appraisal will be prepared and submitted to the Local Planning Authority for approval before commencement.

### 3.2 Supervision of the Works

The Contractor will supply a suitably qualified person to direct and supervise the verification and discovery exercises. The competency of the suitably qualified person in respect of the duties required shall be demonstrated to the satisfaction of the Contractor (and third party Consultant) prior to commencement of the works by provision of record of suitable experience and qualifications.

### 3.3 Watching brief

During the course of the groundworks it will be the responsibility of the on-site manager to ensure watching briefs are kept. A watching brief consists of a record of:

- Any observations of contamination (potential or otherwise) made during the course of development by any member of site staff, contractor or visitor; and
- A photographic record of the key stages of development and key occurrences including any contamination found during the course of the development, the formation levels of excavations, any reduced level dig/mass excavation, piling arisings below the bulk dig depth or other earthworks, formation of landscaped or garden areas, etc.

Examples of observations that should be recorded as part of a watching brief are included within Section 6 (Discovery Strategy).

In areas of the site where there is a greater chance of finding contaminated soil and/or water, such as locations of former tanks and the more elevated areas of contamination shown on **Figure 4** and **Figure 5** an area-specific watching brief will need to be kept. Such a brief will need to be completed by an appropriately qualified site manager and/or an environmental consultant. A watching brief table example is presented in Appendix A.

Upon completion of associated works, a written and signed statement will be obtained by the following parties:

- Archaeology contractor upon completion of archaeological investigations;
- Site Preparation contractor upon completion of site preparation works
- Ground works contractor(s) upon completion of foundations and ground works; On site manager upon completion of groundworks and landscaping work; and,
- Environmental Consultant upon completion of groundworks and landscaping works.

The written statement must clearly state whether or not evidence of contamination was identified during the course of the development and the action that was taken. An example statement is provided in Appendix B.

The on site manager statement must include confirmation of whether all site staff and contractors received an appropriate brief regarding the potential presence of contamination.

### 3.4 Staff training/brief

All site staff, site contractors and, where significant contamination is expected site visitors, will be briefed on the potential presence of land, water or air borne contamination before commencing work on the site. Apart from any standard Health & Safety practices this will include the following information:

- Site Health & Safety considerations and protocols;
- The type of land, water or air borne contamination expected at the development site based on previous use and available site investigation information;
- Any particular areas of the site which are likely to be affected; and
- Staff responsibilities under the Discovery Strategy (see Section 6).

Examples of observations that should be recorded as part of a watching brief are included within Section 6 (Discovery Strategy).

The on-site manager will need to provide written confirmation that site staff was briefed about contaminated land in line with these recommendations.

### 3.5 Tracking Material Movements – Materials Management Plan (CL:AIRE CoP)

The Contractor shall adopt a means, such as a tracking spreadsheet, to record the outgoing and incoming movements of surface and subsurface materials (soil, stones, aggregate, broken out hardcover etc.). It is suggested that the following details are recorded as a minimum:

<b>Exported from site</b>	<b>Imported to soil</b>
Date	Date
Brief description of material	Brief description of material
Depth to top and base of soil before excavation	Depth to top and base of soil when laid down
Waste transfer document number	Laboratory certificate number
Name and address of destination	Name and address of source

Each movement should be assigned its own unique identification number.

The Contractor shall maintain a plan which will be handed over to the Client's Consultant when each phase of earthworks has been completed showing the locations where material has been removed and placed down. The as dug and as built plans shall correspond to the tracking spreadsheet.

Soils to be used in areas of soft landscaping shall not be imported to site until verification testing has taken place, the results have been screened against the Acceptance Criteria presented in Table 5.1 of Section 5 and forwarded to the Local Authority for approval. The Contractor should make an allowance for this in the construction programme.

### 3.6 Management of Impacted Soils

The Discovery Strategy (Section 6) is to be used to identify materials that are characteristically different from the surrounding bulk material. In the event that impacted soil is uncovered it shall be chased out laterally and vertically, where practicable, by mechanical excavation until visual and or olfactory inspection suggests impacted material no longer remains in-situ. Vertical excavation should proceed progressively with the objective being to separate the potentially unacceptable material from that above, thus initially helping to minimize the generation of unacceptable material.

The discovery and management of potentially impacted soils should be dealt with on a case-by-case basis in order to address the specific nature of the ground conditions uncovered. In the event that management of such soils is considered required then it is expected that the excavation works could proceed using a conventional delineation exercise. It should be noted however that the ground conditions uncovered could require additional health and safety and environmental control measures before the works can proceed.

Advice on sampling and testing requirements for a suspected contamination hotspot is given in this document. The exercise typically comprises two elements:

- Characterise 'hotspot' and assess suitability for reuse by sampling and testing the impacted soil, and screening the results against the Acceptance Criteria presented in Table 5.2 of Section 5; and
- Demonstrate that impacted soils have been removed from the surrounding 'clean' soil by sampling and testing the sides and base of the excavation i.e. the soil that appears to be not impacted by means of inspection.

Arisings from the 'hotspot' should be excavated (providing that in doing so no unacceptable risks would be posed) and temporarily stored in an on-site 'quarantine' area whilst verification testing is carried out. Any stockpiled soil should be placed on bounded hardstanding surfaces or over bounded plastic sheeting to prevent cross contamination with surface soils and run-off of potentially contaminated surface water. Potentially impacted soil should be kept physically separate from soil that is considered to be "clean". Temporary storage areas shall be clearly demarcated and have appropriate signage.

Arisings that are considered potentially unacceptable for reuse at site by visual or olfactory inspection alone (and without treatment) should be excavated (providing that in doing so would not give rise to potentially unacceptable risks) and temporarily stockpiled in a separate 'quarantine' area. Sampling and testing should be carried out to satisfy the requirements of the waste management facility that will be accepting the material. Any arisings emitting strong odours or suspected Asbestos Containing Material (ACM) should be removed from site as soon as possible by appropriately controlled means and if necessary licensed contractors.

In the event that reuse of site won material is not possible (e.g. it is surplus or unsuitable due to chemical or geotechnical properties) then opportunities for treatment and or use on alternative sites should be sought prior to resorting to landfill disposal.

In the event that chasing out impacted soil results in over-excavation the excess void shall be backfilled with clean 'uncontaminated' material either generated on site or imported (and verified beforehand that it is so).

All natural soils must be kept separate from topsoil, Made Ground and any materials that are considered to be impacted. The Contractor will ensure that organic materials such as trunks, roots and other vegetation are removed and organic materials are not incorporated into fill material.

### 3.7 Importing Clean Material

Before importing materials to site it shall be demonstrated to the satisfaction of the Local Authority that such materials are free from elevated concentrations of contaminants. This shall be achieved by carrying out the verification testing and assessment detailed in this document (see Section 5).

The Contractor should be aware that there may be a requirement by others to confirm that such materials are also suitable from an engineering perspective. This is beyond the scope of this document.

Any material to be imported to site shall be obtained from a reputable supply. There would be a requirement to obtain an exemption under the Environmental Permitting (England and Wales) Regulations 2010 if non site-won materials that have been classified as a waste are imported.

### 3.8 Disposal of Soils

In the event that there is a requirement to dispose of material off-site the Contractor is required to ensure 'treatment' of the material, which should satisfy the 'three-point test' below:

1. It must be a physical, thermal, chemical or biological process, and includes sorting.
2. It must change the characteristics of the waste.
3. It must do so in order to:
  - a) Reduce its volume; or
  - b) Reduce its hazardous nature; or
  - c) Facilitate its handling; or
  - d) Enhance recovery.



Surplus soil would be considered a 'waste' and should be removed from site.

Characterisation of waste soils is the responsibility of the Contractor. As noted above, it is recommended that the waste management facility is consulted to ascertain their testing requirements. Analytical data shall be made available to that facility and the haulier. Copies of all test certificates shall be passed over to the Client's Consultant for inclusion in the Verification Report (see Section 4.3).

All materials removed from site shall be transported in vehicles, under appropriate duty of care, to a waste management facility permitted to accept the category of waste being disposed. The haulier will be a permitted waste carrier and will provide evidence of registration before removal of any consignment. A record of all vehicle movements and consignments are to be kept and retained by the Contractor for a minimum of two years. This will comprise date of transport, vehicle registration, duty of care number, load weight, references to corresponding analytical results and any other data required by the Environmental Protection Act 1990 and all subsequent amendments. A summary of all waste transfer records together with sample records shall be provided to the Client's Consultant as part of the package of information required to prepare a Verification Report (Section 4.3).

### 3.9 Managing Health and Safety

The Contractor is expected to employ appropriate site management practices during the remedial works to fulfil obligations under and not limited to, current legislation, planning restrictions and industry best practice.

#### 3.9.1 Risk Mitigation, Enabling Works and Construction

The Contractor shall be responsible for measures considered appropriate for the protection of human health and other local sensitive receptors. Members of the public shall be excluded from areas where ground works are being carried out.

Risk assessments and method statements will be prepared by the Contractor for the work tasks to be undertaken. Data contained in Material Safety Data Sheets can be used for any suspect materials identified at site.

All machine drivers shall hold the appropriate certification to demonstrate their level of competence to the satisfaction of the Contractor. During excavations all operatives and groundworkers will utilize PPE appropriate for the ground conditions being worked and the associated potential risks of exposure. It is expected that the minimum level of PPE will comprise a hard hat, reflective vest, protective gloves and eyewear, and hard toe footwear.

Confined or poorly ventilated areas shall be monitored to confirm that hazardous gases and or vapours are not present (in relation to Workplace Exposure Limits). It is recommended that all such areas are monitored before entry. Vigilance shall be maintained for the presence of any ACM or fibrous material.

In the event of uncovering suspected ACM during the earthworks the material shall be immediately recovered with soil and specialist advice sought from the Client's Consultant.

Should gas or significant volumes of suspected ACM be identified, the works must stop and appropriate measures be implemented prior to continuation (e.g. personal monitoring for asbestos fibres in accordance with MHDS 39/4 and EH10, static monitoring for asbestos fibres as required by the HSE).

Provision of a decontamination unit for use by site personnel may be necessary in the event that significant contamination is identified.

If required, all excavations will be well battered back with entry and exit points with appropriate barriers and signage to inform of the dangers of working with or close to potentially hazardous materials.

If required, precautions should be put in place for any buried services that are to be retained or kept live during the works.

### 3.9.2 Occupiers and Maintenance Workers

The Principal Designer is to ensure a copy of the Verification Report and ground investigation reports are included in the Health and Safety File, which all maintenance workers should consult prior to undertaking any works which could bring them into contact with the ground. The Health and Safety File should also contain a complete set of as-built drawings.

### 3.10 Control of Fugitive Emissions

#### 3.10.1 Procedures

A project specific Environmental Management Plan, or equivalent, shall be implemented to control effluvia. Although a significant environmental impact event is not expected to occur during the works the Contractor should ensure there are procedures in place to deal with emergencies or incidents.

#### 3.10.2 Control of Dusts, Fibres, Odours, Noise and Vibration

Means to control dust and odours may comprise one or more of the following:

- Regular damping down especially during warm and sunny weather;
- Deploy dust screens adjacent to sensitive receptors such as neighbouring residences;
- Local exhaust ventilation with filters;
- Minimise drop heights;
- Limit vehicle speeds;
- Cover the loads of vehicles;
- Use road cleaning plant or similar at the site exit;
- All vehicle entry and exit movements will be via specified routes;
- Add or replace mufflers on motorized equipment;
- Add mufflers to air exhausts on pneumatic equipment;
- Follow equipment maintenance procedures to lubricate dry bearings; and
- Isolate loud equipment with newer and quieter models.

#### 3.10.3 Prevention of Contamination Entering the River Fleet Sewer

At the start of works any on-site drains that flow to the river should be identified and stanked off or appropriately protected to prevent them from acting as preferential pathways to the site.

Potential sources of contamination such as stockpiles that could leach contamination or fuel stores will be banded and stored at least 10m from the edge of the culvert footprint to reduce risks of a spill from entering the river.

#### 3.10.4 Control of Silt and Surface Water Runoff

Means to control silt and surface water runoff may comprise one or more of the following:

- Run temporary drainage away from occupied buildings and waterways;
- Use of silt traps within road gullies;
- Use of drip trays below plant;
- Selective "bounding" of areas as required; and
- Carry out regular monitoring and measurements.

Primary treatment prior to discharge to remove sediment and fines may be required.

### 3.11 Protecting the Natural and Built Environments

The Contractor is to ensure that any work which is subject to the scope of this Remediation Strategy shall not be detrimental to the natural and built environments. The Contractor shall confirm with the Client if any site specific protection measures need to be taken in advance of works commencing.

### 3.12 Protecting or Decommissioning Redundant Monitoring Wells

Long-term groundwater monitoring for geo-environmental assessment purposes is not currently proposed. The Contractor is expected to take all reasonable precautions to protect the existing monitoring wells unless it is confirmed to them in writing that no other use for them has been identified and they are redundant.

Protection measures could comprise:

- Issuing a well layout plan during site induction;
- Using coloured fencing to demarcate each position at a reasonable standoff distance;
- Using banksmen during vehicles movements near to positions; and
- Locating storage compounds away from well positions.
- 

If the wells are now redundant the Contractor shall decommission the wells in accordance with the Environment Agency guidance on decommissioning redundant boreholes and monitoring wells (available online). Decommissioning records to demonstrate that the works have been carried out shall be provided to the Client's Consultant for inclusion in the Verification Report.

## 4. VERIFICATION SAMPLING PLAN

### 4.1 Verification Sampling

Sampling requirements are based on current understanding of the ground conditions and are presented in Sections 4, 5 and 6. In the event that unexpected or suspicious ground conditions are encountered the Contractor will seek further guidance from the Client's Consultant, as required by the Discovery Strategy (Section 6). The Client's Consultant will the BREEAM definition of a 'Contaminated Land Professional'.

If non-targeted sampling is required, the non-targeted samples shall be collected, mixed together then the soil sample quartered down to form a composite sample of sufficient quantity for testing. Targeted sampling will be required in other instances and in the event that visual or olfactory evidence of possible contamination is identified. These should not be incorporated into any composite sample and be separately labelled and tested.

The suitably qualified person supervising the works is responsible for ensuring a sufficient quantity of soil is collected for each sample to enable analysis of all parameters.

Soil samples should be collected using a shovel, spade or trowel. The tool used should be made of a material that is compatible with the material(s) to be sampled and the purpose of the testing in order to avoid cross-contamination of the sample during collection (i.e. stainless steel or PTFE-coated tools). Sample containers shall be compatible with the material sampled and the planned analyses to avoid cross-contamination or loss of contaminants after collection. Preservatives should be included where necessary.

It is expected that each soil sample should comprise, as a minimum:

- 1no. 1l (or 2no. 500ml) amber glass jar;
- 2no. 1l air tight plastic tub;
- 1no. 60ml amber glass vial;
- 1 bulk bag (for asbestos screen)

Samples shall be clearly labelled in accordance with BS 5930. Once taken, samples shall be stored in the dark between 2°C and 4°C and shall be couriered together with ice packs inside cool boxes to the analytical laboratory within 24 hours.

Measures shall be taken to ensure that all sampling equipment is decontaminated at the start and end of the works and between sample locations. This will involve washing sampling equipment between samples with detergent solution followed by deionised water rinse. If particularly oily or tarry soils are encountered more stringent decontamination procedures will be required i.e. use of a stronger detergent solution followed by drying with prepared wipes. Where it is necessary to obtain samples directly from an excavator bucket, all traces of existing material shall be removed from the bucket by high pressure hosing prior to excavation of material for sampling.

### 4.2 Verification Testing

Testing requirements are based on current understanding of the ground conditions and are presented in Sections 5 and 6. In the event that unexpected or suspect ground conditions are encountered the Contractor will seek further guidance from the Client's Consultant, as required by the Discovery Strategy (Section 6).

All laboratory testing shall hold MCERTS accreditation where available otherwise UKAS accreditation is required. Copies of all laboratory test certificates shall be provided to the Client's Consultant as part of the package of information required to prepare a Verification Report (Section 4.3).

It should be noted that most laboratories operate a standard turnaround time of 7 to 10 working days. Some analyses can be reported on a faster turnaround, however these will be subject to a surcharge depending on the service requested and availability can depend on the laboratory workload at the time.

### 4.3 Verification / Close-Out Report

A Verification Report shall be completed at the end of the works and submitted to the Local Planning Authority. A Verification Report is prepared to demonstrate compliance with the remediation objectives and that control measures and due care were adopted during development.

The Contractor is responsible for collating the necessary factual records to show that the works have been carried out. These shall be supplied to the Client's Consultant who may then prepare the Verification Report. In broad terms the evidence typically included in a Verification Report consists of:

- Analytical data obtained from verification tests;
- Records of quantities (and chain of custody documents) for materials removed from and imported to site (see Section 3.5);
- Engineer's field notes and photographs of contamination encountered during the works (if applicable);
- Datasheets, specification sheets, "as-built" drawings or similar for building materials or systems that have been specified to mitigate the effects of the ground conditions;
- Records of any impacted groundwater treated and disposed (including permits);
- evidence of compliance with consents, licenses, permits or other authorisations using monitoring data or other records;
- Evidence of correspondence with the regulatory authorities;
- Drawings showing the vertical and lateral extents of contamination encountered, positions of stockpiles, buried obstructions removed, verification sampling positions, vertical and lateral extents of imported and reused material;
- Exploratory hole records for excavations made as part of the works; and
- Copies of correspondence with regulatory authorities.

The following key records shall be provided by the Contractor:

- Location, extent and depth of all excavations and contaminant 'hotspots', if encountered;
- Location, extent and depth of all substructures encountered and grubbed out;
- Location(s) of all temporary stockpiles;
- Positions and depths of all verification sampling points;
- Materials tracking spreadsheet;
- Chain of custody documents and laboratory certificates records corresponding to the materials tracking spreadsheet; and
- Plan accompanying the materials tracking spreadsheet.

It is expected that:

- Records should be dated, legible and supplied in electronic (PDF) format, with original hard copies retained by the Contractor for viewing upon request;
- Plans have a north arrow and are drawn to scale with dimensions;
- Photographs of site arrangements, excavations, stockpiles, protection measures etc. are taken in colour using a digital camera;
- Photographs are annotated and accompanied by a site plan showing vantage points; and
- Measurements are recorded in SI units. The vertical extent of any excavations should be recorded as both depth below original ground level and elevation relative to Ordnance Datum.

## 5. SPECIFIC REMEDIAL OBJECTIVES FOR IDENTIFIED ISSUES

### 5.1 Objective 1: Suitability for Use – Soft landscaping

<i>Issues Identified</i>	Soft landscaped areas are proposed, therefore, they will need to be validated; therefore soil data should be reassessed on the basis of an appropriate end use. The chemical quality of material imported to site should be verified before import takes place as a measure to control the potential introduction of new risks to site.
<i>Commentary</i>	<p>This remediation strategy is to be adopted for (a) site won soil (if found to be suitable) and (b) topsoil to be imported to site for use, within areas of soft landscaping and placed within the top 500mm.</p> <p>For material being imported, tests should be carried out and the results assessed <u>before</u> the material is brought on to site.</p> <p>For material being imported but to be placed beyond areas of soft landscaping, refer to Objective 2.</p>
<i>Remediation Objective</i>	Ensure soils used in the new soft landscaping do not pose a risk to long-term human health.
<i>Action</i>	<p>Areas of soft landscaping to be built up to finished level using a minimum of 400mm thick layer of verified soil. A geomembrane should be laid between on any existing Made Ground and the verified soil.</p> <p>Soil (site won and to be imported) to be sampled at the rates detailed under General Approach directly below. Each sample to be tested for the list of analyses in Table 4.1. Topsoil samples to be additionally tested for suite of parameters in accordance with BS 3882:2015.</p> <p>Generic topsoil quality certificates from the topsoil supplier will not be acceptable.</p>
<i>General Approach</i>	<p>The following steps could be carried out to address the issue identified:</p> <ol style="list-style-type: none"> <li>(1) The works should follow the adopted material tracking system.</li> <li>(2) Consistent with best practice sampling methods for site won and imported fill materials collect 1no. discrete sample (bulk), to be analysed against Acceptance Criteria (Table 4.1) at a rate of: <ul style="list-style-type: none"> <li>• 1no. sample every 50m<sup>3</sup> for potentially contaminated site won material (but with a minimum of 3no. per source);</li> <li>• 1no. sample every 250m<sup>3</sup> for site won general fill (but with a minimum of 3no. per source); and</li> <li>• 1no. sample every 500m<sup>3</sup> for clean imported fill, (but with a minimum of 3no. per source).</li> </ul> </li> <li>(3) Submit the sample to a chemical laboratory for testing of the list of parameters in Table 4.1.</li> <li>(4) Compare the laboratory results with the derived Acceptance Criteria in Table 4.1.</li> <li>(5) If the results exceed the remediation criterion, then an alternative source or further risk assessment may need to be considered. Consult the Client's Consultant.</li> <li>(6) If the results are below the remediation criterion and fulfil the requirements of all other relevant specifications then the material should be considered suitable for use.</li> </ol>

	<p>(7) If any of the material fails the Acceptance Criteria, the London Borough of Camden should be consulted prior to usage.</p> <p>(8) When material being imported arrives at site a suitably qualified person should make a visual and olfactory inspection to verify the material imported is characteristic of that originally sampled.</p> <p>(9) Implement the Discovery Strategy as the material is laid.</p> <p>(10) The Contractor should make a photographic record for each area of soft landscaping. Photographs shall include a survey staff to demonstrate the thickness to which the material is being laid. Photographs shall be accompanied by a plan showing where the photographs were taken.</p> <p>(11) Collate evidence of the work carried out for inclusion in the Verification Report.</p>
<i>Remediation Criteria</i>	Refer to Table 4.1 for chemical quality for residential use without plant uptake for human health. Imported topsoil should be compliant with BS 3882:2015 for multipurpose topsoil grade unless specified otherwise in the Landscape Specification.

## 5.2 Objective 2: Suitability for Use – Materials imported for uses other than soft landscaping

<i>Issue Identified</i>	The chemical quality of material (soil, stones, aggregate) imported to site should be verified before import takes place as a measure to control the potential introduction of new risks to site.
<i>Commentary</i>	<p>For material being imported, tests should be carried out and the results assessed <u>before</u> the material is brought on to site.</p> <p>Due to the design of the development it is accepted that material used beyond areas of soft landscaping will eventually lie beneath hardcover. Nevertheless, the chemical quality of imported material should be verified for control purposes.</p> <p>For material being imported but to be placed in areas of soft landscaping, refer to the Objective 1, above.</p>
<i>Remediation Objective</i>	Ensure material placed beyond areas of soft landscaping do not pose a significant risk to the development.
<i>Action</i>	Soil (site won and to be imported) to be sampled at the rates detailed under General Approach directly below. Each sample to be tested for the list of analyses in Table 4.2.
<i>General Approach</i>	<p>The following steps could be carried out to address the issue identified:</p> <ol style="list-style-type: none"> <li>(1) The works should follow the adopted material tracking system.</li> <li>(2) Consistent with best practice sampling methods for site won and imported fill materials collect 1no. discrete sample (bulk), to be analysed against acceptance criteria. <ul style="list-style-type: none"> <li>• At a rate of 1no. sample every 250m<sup>3</sup> (but with a minimum of 3no. per source).</li> <li>• 1no. sample every 500m<sup>3</sup> for clean imported fill, (but with a minimum of 3no. per source).</li> </ul> </li> <li>(3) Submit the sample to a chemical laboratory for testing of the list of parameters in Table 4.2.</li> <li>(4) Compare the laboratory results with the Acceptance Criteria in Table 4.2.</li> <li>(5) If the results exceed the remediation criterion, then an alternative source may need to be considered. Consult the Client's Consultant.</li> <li>(6) If the results are below the remediation criterion and fulfil the requirements</li> </ol>



	<p>of all other relevant specifications then the material should be considered suitable for use.</p> <p>(7) If any of the material fails the Acceptance Criteria, the London Borough of Camden should be consulted prior to usage.</p> <p>(8) When material being imported arrives at site a suitably qualified person should make a visual and olfactory inspection to verify the material imported is characteristic of that originally sampled.</p> <p>(9) Implement the Discovery Strategy as the material is laid.</p> <p>(10) Collate evidence of the work carried out for inclusion in the Verification Report.</p>
<i>Remediation Criteria</i>	Refer to Table 4.2 for chemical quality for human health.

### 5.3 Objective 3: Protection of water supplies or buried assets

<i>Issue Identified</i>	The UKWIR project steering group decided that barrier pipes would provide sufficient protection for the supply of drinking water in all Brownfield site conditions. However, this approach needs to be agreed with Thames Water.
<i>Commentary</i>	<p>Where mains water pipes are laid, a precautionary approach will be taken. This precautionary approach will also be taken where any unexpected observations of contamination are made during excavation of service trenches for potable water supply pipes. For unexpected contamination the contractor is responsible for implementing the Discovery Strategy (<b>Section 6</b>).</p> <p>A record of the construction-type of any mains water supply pipes laid through the site will be kept by the building Contractor and provided for inclusion in the Verification Report.</p>
<i>Remediation Objective</i>	Ensure that any organic contaminants will not significantly impact on proposed water supplies or buried assets over the lifetime of the assets.
<i>Action</i>	Where polyethylene, ductile iron, steel or copper pipes are to be laid the Contractor shall provide suitable pipe materials an engineering solution to protect the pipe work backed up by an adequate assessment of the risk.
<i>General Approach</i>	<p>The Contractor will select the appropriate material for potentially toxic and organic contaminants in accordance with the 2011, UK Water Industry Research (UKWIR) Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (Ref 10/WM/03/21; the 'UKWIR Guidance').</p> <p>(1) If pipe material selection is compromised by the levels of contamination and/or cost implications, remove contaminated soil and backfill the excavation with imported and verified material. All imported materials to classify as clean Inert engineered fill. Imported materials to be derived from a verified source and tested for Inert WAC at a frequency of 1 test per 250m<sup>3</sup> prior to importation to site;</p> <p>(2) Submit the sample to a chemical laboratory for testing of the list of parameters in Table 4.1.</p> <p>(3) Compare the laboratory results with the threshold limits published by the UKWIR Guidance 10/WM/03/21.</p> <p>(4) If the results exceed the remediation criterion, then an alternative source may need to be considered. Consult the Client's Consultant.</p> <p>(5) If the results are below the remediation criterion and fulfil the requirements of UKWIR Guidance, then submit results to the Water Company.</p> <p>(6) Agree with the Water Company that pipe material meets their requirements.</p>

	<p>(7) Commence pipe laying.</p> <p>(8) Implement the Discovery Strategy as the material is laid.</p> <p>(9) The Contractor should make a photographic record for each area of soft landscaping. Photographs shall include a survey staff to demonstrate the thickness to which the material is being laid. Photographs shall be accompanied by a plan showing where the photographs were taken.</p> <p>(10) Collate evidence of the work carried out for inclusion in the Verification Report.</p>
<i>Remediation Criteria</i>	<p>Threshold levels threshold limits published by the UKWIR Guidance 10/WM/03/21.</p> <p>Where such soils are within soft landscaped areas Refer to Table 4.1 for chemical parameters. Imported topsoil should be compliant with BS 3882:2015 for multipurpose topsoil grade unless specified otherwise in the Landscape Specification.</p>

#### 5.4 Objective 4: Protection from ground gases

<i>Issue Identified</i>	Based on the completed ground gas monitoring carried out by Waterman a maximum GSV of 0.0043 l/hr would be calculated based on the peak carbon dioxide level recorded (4.3%).
<i>Commentary</i>	Due to this maximum carbon dioxide concentration, the gas regime at the site is considered as Characteristic Situation 1 (after CIRIA C665, 2007).
<i>Remediation Objective</i>	As it has been deemed as Characteristic 1 (CS1) no ground gas protection measures would be required.
<i>Action</i>	As it has been deemed as Characteristic 1 (CS1) no ground gas protection measures would be required.
<i>General Approach</i>	As it has been deemed as Characteristic 1 (CS1) no ground gas protection measures would be required.
<i>Remediation Criteria</i>	As it has been deemed as Characteristic 1 (CS1) no ground gas protection measures would be required.

#### 5.5 Objective 5: Decommissioning Redundant Monitoring Wells

<i>Issue Identified</i>	Long-term groundwater monitoring for geo-environmental assessment purposes is not currently proposed for this site.
<i>Commentary</i>	The existing monitoring wells on site will become redundant and need to be decommissioned ahead of groundworks
<i>Remediation Objective</i>	Ensure that all monitoring wells that are not required to be retained are decommissioned correctly, in line with current best practice, to ensure that they do not represent a potential contaminant pathway to controlled waters.
<i>Action</i>	<p>The Environment Agency guidance on decommissioning redundant boreholes and monitoring wells details several different methods for decommissioning. The chosen method is stated as depending on the location, geological setting, borehole construction, and site after use amongst others.</p> <p>In this instance it is assumed that backfilling with low permeability materials as well as the removal of headworks would be the most appropriate course of action.</p>
<i>General</i>	As described in the Environment Agency guidance on decommissioning

<i>Approach</i>	redundant boreholes and monitoring wells (available online).  Particular care should be taken when decommissioning the deeper boreholes which penetrate the London Clay to ensure that no residual preferential pathway to the deeper aquifer.
<i>Remediation Criteria</i>	Decommissioning records to demonstrate that the works have been carried out shall be provided to the Client's Consultant for inclusion in the Verification Report.

**Table 5.1:** Acceptance Criteria for imported material for use on soft landscaping areas

Determinand	Generic Assessment Criterion (GAC) [mg/kg]	Determinand	Generic Assessment Criterion (GAC) [mg/kg]
<b>Metals &amp; semi- metals</b>		<b>Total Petroleum Hydrocarbons</b>	
Arsenic	40	TPH >C08-C10	65
Barium <sup>1</sup>	1300	TPH >C10-C12	330
Beryllium	1.7	TPH >C12-C16	2300
Cadmium	85	TPH >C16-C21	1900
Chromium III	910	TPH >C21-C35	1900
Chromium VI	6	<b>Other Compounds</b>	
Copper	7100	Benzene <sup>2</sup>	3.3
Lead <sup>2</sup>	310	Asbestos	No fibres detected
Mercury	1.2	Cyanide (total) <sup>3</sup>	78
Nickel	180	Phenol (total)	690
Selenium	430	PCBs (non-dioxin like)	< Limit of detection
Vanadium	1200	<b>Notes:</b>	
Zinc	40000	<sup>1</sup> EIC/AGS/CL:AIRE	
<b>Polycyclic Aromatic Hydrocarbons</b>		<sup>2</sup> Defra C4SL 12/2014	
Acenaphthene	4700	<sup>3</sup> USEPA RSL (May 2016)	
Acenaphthylene	4600	<sup>2</sup> Defra C4SL 12/2014	
Anthracene	35000	<sup>3</sup> USEPA RSL (May 2016)	
Benzo(a)anthracene	14	GACs protective of human health receptors for residential without plant up-take scenario, sandy loam soil type and Total Organic Carbon between 1.45% and 3.45%. Source: LQM/CIEH S4ULs 2014 with the exception of 1, 2 and 3 listed above.	
Benzo(a)pyrene	3.2	GACs protective of human health receptors for residential without plant up-take scenario, sandy loam soil type and Total Organic Carbon between 1.45% and 3.45%. Source: LQM/CIEH S4ULs 2014 with the exception of 1, 2 and 3 listed above.	
Benzo(b)fluoranthene	4		
Benzo(g,h,i)perylene	360		
Benzo(k)fluoranthene	110		
Chrysene	31		
Dibenzo(a,h)anthracene	0.32		
Fluoranthene	1600		
Fluorene	3800		
Indeno(1,2,3,c,d)pyrene	46		
Naphthalene	5.6		
Phenanthrene	1500		
Pyrene	3800		

Table 5.2

**Table 5.2:** Acceptance Criteria for imported material and site won material for uses other than soft landscaping

Determinand	Generic Assessment Criterion (GAC) [mg/kg]
<b>Metals &amp; semi- metals</b>	
Arsenic	640
Barium	22,000
Beryllium	420
Cadmium	230
Chromium III	8,400
Chromium VI	35
Copper	72,000
Lead <sup>1</sup>	2,330
Mercury	3,600
Nickel	1,800
Selenium	13,000
Vanadium	3,200
Zinc	660,000
<b>Polycyclic Aromatic Hydrocarbons</b>	
Acenaphthene	85,000
Acenaphthylene	84,000
Anthracene	520,000
Benzo(a)anthracene	130
Benzo(a)pyrene	14
Benzo(b)fluoranthene	140
Benzo(g,h,i)perylene	1,400
Benzo(k)fluoranthene	140
Chrysene	1,400
Dibenzo(a,h)anthracene	14
Fluoranthene	23,000
Fluorene	64,000
Indeno(1,2,3,c,d)pyrene	140
Naphthalene	980
Phenanthrene	22,000
Pyrene	54,000

Determinand	Generic Assessment Criterion (GAC) [mg/kg]
<b>Total Petroleum Hydrocarbons</b>	
TPH >C08-C10	2,100
TPH >C10-C12	9,100
TPH >C12-C16	34,000
TPH >C16-C21	27,000
TPH >C21-C35	28,000
<b>Other Compounds</b>	
Benzene <sup>1</sup>	3
Asbestos	presence of fibres
Cyanide (total)	1,200 <sup>2</sup>
Phenol (total)	32,000 <sup>3</sup>
PCBs (non-dioxin like)	9.0

**Notes:**

<sup>1</sup> C4 Screening Level.

<sup>2</sup> GAC based on calculated minimum concentration of CN to produce enough toxic gas to classify as hazardous by H12.

<sup>2</sup> GAC based on calculated minimum concentration of CN to produce enough toxic gas to classify as hazardous by H12.

<sup>3</sup> GAC for other land uses based on a threshold of direct skin contact with phenol; for this pathway, based on calculated health effects of long term exposure.

## 6. SPECIFIC REMEDIAL OBJECTIVES FOR DISCOVERY STRATEGY

### 6.1 Introduction

Soil arisings shall be continuously inspected by competent persons to assess suitability for reuse in accordance with this document and all other relevant specifications, and identify previously undiscovered ground conditions and/or potentially contaminated soils.

All operatives and groundworkers should remain vigilant for unforeseen or suspicious ground conditions. Initial identification will be based on visual and olfactory assessment. General indicators of possible contamination could be arisings that quickly change appearance or appear inconsistent with the general soil mass (Section 5.2). Examples could be oily (or free phase) pockets, fibrous materials, strong odours or vibrant colours associated with the soil itself, but also physical foreign objects such as cement board, ash, brick, concrete, glass and rubbish. Examples of the types of observations that would be considered significant are set out in the following table.

Evidence	Description
Visual	<ul style="list-style-type: none"> <li>Fuel or oil like substances mixed in with or smeared on the soil or floating on perched, groundwater or surface waters;</li> <li>Waste materials (refuse, barrels, industrial wastes, ash, tar, etc.) buried at specific location or across the site;</li> <li>Marked variation in colour. For example red, orange, yellow, green, light or dark blue, etc. may indicate contamination from a variety of contaminants; and</li> <li>Soils including large amounts of ash and clinker where such contamination of soils was not expected.</li> </ul>
Odours	<ul style="list-style-type: none"> <li>Fuel, oil and chemical type odours; and</li> <li>Unusual odours such as sweet odours or fishy odours.</li> </ul>
Wellbeing	<ul style="list-style-type: none"> <li>Light headedness and/or nausea when in excavations, at the working face of an excavation, when visual or olfactory evidence of contamination exists, etc.;</li> <li>Burning of nasal passages, throat, lungs or skin; and</li> <li>Blistering or reddening of skin due to contact with soil.</li> </ul>

Note: The examples provided in this table are not exhaustive.

Vigilance shall be maintained for materials suspected of exceeding the hazardous waste thresholds. Physical contaminants such as potential ACM or other Man Made Mineral Fibres (MMMF) should be treated as hazardous until proven otherwise.

### 6.2 Baseline Conditions

A ground investigation was carried out by RSK on November 2017 and by Waterman on 2016 (WIE 13235-102-S-2-3-2-BGJD), which sets out the framework and nature of the intrusive investigation. Typical descriptions of soils encountered by that investigation are presented in Table 1.

AECOM understands that no further geo-environmental monitoring or assessment is required before the works commence.

## 6.3 Objective 1: Managing suspect ground conditions

<i>Issue Identified</i>	The exploratory holes carried out during previous fieldwork can only provide a general indication of site conditions. There may be exceptional ground conditions elsewhere on the site which have not been previously revealed and a strategy should be in place in the event that such conditions are uncovered.
<i>Commentary</i>	The discovery and management of potentially impacted soils should be dealt with on a case-by-case basis in order to address the specific nature of the ground conditions uncovered. A general approach however is provided below.
<i>Remediation Objective</i>	Employ a Discovery Strategy to identify and manage appropriately any potentially impacted soils that may be uncovered.
<i>Action</i>	Visual and olfactory inspection shall be used to identify potentially impacted soils. Following agreement on a plan of action it is likely that a conventional delineation and analysis exercise will be used to segregate impacted soil from the surrounding material.
<i>General Approach (Management Sequence)</i>	<p>The following sequence should be adopted for managing suspicious ground conditions:</p> <ol style="list-style-type: none"> <li>(1) Suspect ground conditions are identified by groundworker(s) and the works are halted;</li> <li>(2) Contractor assesses the requirement for any additional health and safety or environmental management control measures;</li> <li>(3) Contractor notifies the Client's Consultant to confirm that attendance by the consultant is not required;</li> <li>(4) Control measures, if required, are implemented;</li> <li>(5) Contractor's suitably qualified person records the extent of 'contamination' and nature of stratigraphy;</li> <li>(6) Findings are discussed with the Client's Consultant and a way forward is ascertained e.g. sampling and testing requirements, special measures required during excavation etc.;</li> <li>(7) Contractor's suitably qualified person collects samples and schedules the agreed laboratory analysis;</li> <li>(8) Details of samples collected and tests scheduled are recorded with (5);</li> <li>(9) Client's Consultant notifies Local Authority and provides a copy of the records made in (5);</li> <li>(10) Contractor provides the test results to the Client's Consultant for review;</li> <li>(11) Remedial action, if necessary, and programming of the works are agreed with the Local Authority;</li> <li>(12) Contractor is informed of the remedial action required;</li> <li>(13) Contractor prepares a Method Statement that details how the agreed remedial action will be carried out;</li> <li>(14) Method Statement is agreed by Client's Consultant;</li> <li>(15) Works proceed;</li> <li>(16) Evidence of work carried out is collated for inclusion in the Verification Report.</li> </ol>
<i>General Approach (Delineation Exercise)</i>	<p>The following sequence outlines the approach to be adopted for a conventional delineation exercise:</p> <ol style="list-style-type: none"> <li>(1) Strip the overlying soil that does not appear to be impacted ('clean') and stockpile separately.</li> </ol>



	<p>(2) Collect a minimum of 1no. sample from the stockpile. Schedule for analyses to be advised by the Client's Consultant.</p> <p>(3) Collect 1no. sample from the impacted soil horizon per 25m<sup>2</sup> (or part thereof). Schedule for analyses to be advised by the Client's Consultant.</p> <p>(4) Continue the delineation exercise, appropriately separating the impacted soil from the 'clean' soil.</p> <p>(5) Upon exposing 'clean' soil at the extents of the excavation, halt the delineation.</p> <p>(6) From each side of the excavation collect 1no. sample within 1m above the impacted horizon, 1no. sample at the depth of the impacted horizon, and 1no. sample within 1m below depth of impacted horizon. Schedule for analyses to be advised by the Client's Consultant.</p> <p>(7) Across the base of the excavation collect 1no. sample per 25m<sup>2</sup> (or part thereof). Schedule for analyses advised by the Client's Consultant.</p> <p>(8) All results and evidence of the work carried out should be collated for inclusion in the Verification Report.</p> <p><u>Notes:</u></p> <ul style="list-style-type: none"> <li>• Results collected at stage (3) can be used to determine if the perceived impacted soil can be reused directly or will require treatment before the soil can be reused.</li> <li>• Results collected at stages (6) and (7) are used to verify the performance of the delineation exercise.</li> </ul>
<p><i>Remediation Criteria</i></p>	<p>To be agreed as a critical step of the Discovery Strategy.</p>

## 7. EMERGENCY REMEDIAL PROCEDURES

The following table sets out the actions that must be taken if significant or suspected land, water or air contamination is observed by site staff, contractors or visitors.

Person observing contamination	To be reported to	Action to be taken
Site visitor	Must report observations to the site manager.	No direct action but move away from area.
Contractor	Must report observations to the site manager.	Stop work and where possible and safe make area safe and secure area before reporting to site manager.
On site manager	Must report observations to their direct manager, the appointed Environmental Consultant, the Planning Authority and Contaminated Land Officer at the London Borough of Camden.	Stop work and where possible and safe make area safe and secure area before reporting to others.
Environmental Consultant	Must report observations to the site manager, the Planning Authority and Contaminated Land Officer at the London Borough of Camden.	Advise that work stops and where possible that the area is made safe before reporting to others.

The following table identifies other organisations that may need to be contacted in an emergency, or where pollution of controlled waters or nuisance is occurring.

Occurrence	Description	Contact
Risk to the public	If at any point residents, the public or others may be at risk as a result of contamination found during the course of investigation, remediation or development works.	<ul style="list-style-type: none"> <li>• Contact the emergency services if there is a risk to life (999);</li> <li>• Contaminated Land Officer/Planning Authority; and</li> <li>• Health &amp; Safety Executive (HSE).</li> </ul>
Nuisance to residents/the public	If a nuisance has been or is likely to be caused to nearby residents, the public and others – for example odours, dust, noise, vibration, etc.	<ul style="list-style-type: none"> <li>• Pollution Control Team at the London Borough of Camden (and other London Borough's where necessary).</li> </ul>
Pollution of controlled waters	If any surface, culverted or groundwater has been polluted – for example slurry, contaminated soil/water or a chemical spillage entering a river or canal.	<ul style="list-style-type: none"> <li>• Environment Agency; and</li> <li>• Planning Authority and Contaminated Land Officer at the London Borough of Camden.</li> </ul>
Pollution of adjoining land	If land outside the boundary of the development site is polluted from site activities – for example slurry, contaminated soil/water or a chemical spillage.	<ul style="list-style-type: none"> <li>• The owner of the land; and</li> <li>• Planning Authority and Contaminated Land Officer at the London Borough of Camden.</li> </ul>

## 8. CONCLUSIONS

This Remediation Strategy has been prepared for the purpose of discharging Planning Condition 6, parts C and D in relation to Phases 1 and 2 of the proposed re-development of the land adjacent to, and forming part of, the existing Mount Pleasant Sorting Office located in Farringdon.

This report has been prepared based on the information provided in Preliminary Risk Assessment and Detailed Site Investigation reports prepared by Waterman Ltd and RSK Ltd (referenced in Section 1.1), which have been separately submitted as part of the application to discharge planning conditions. This document has been prepared by a 'Contaminated Land Professional' as defined by BREEAM.

The site investigations did not identify contamination requiring mitigation beyond normal good building practice and control of materials used. Therefore a Remedial Options appraisal has not been completed. However, this report sets out the strategy to take in the event that contamination is identified during construction works. Should unexpected contamination be identified during the works that requires extensive remediation, then a remedial approach including Remedial Options Appraisal will be prepared and submitted to the Local Planning Authority for approval before commencement.

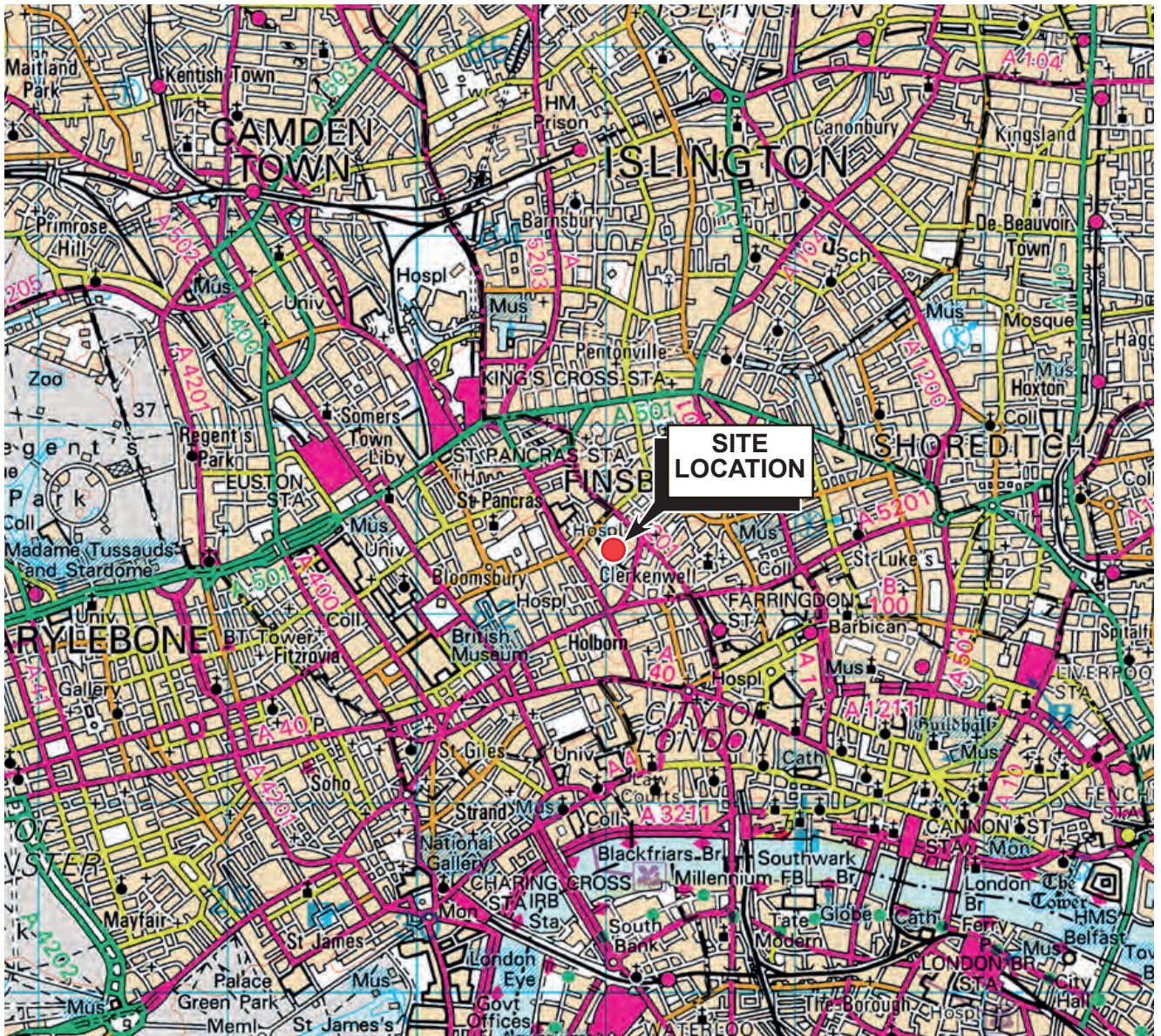
Some key aspects of this report are:

- The onsite manager shall keep a watching brief for observations of contamination and how this should be recorded;
- The Contractor will supply a suitably qualified and demonstrably competent person to direct and supervise the verification and discovery exercises;
- A Materials Management Plan be implemented in line with the CL:AIRE Code of Practice;
- A Verification Plan is provided setting out how verification will be undertaken and recorded;
- Specific remedial objectives are presented, including specifications for imported fill materials;
- A Discovery Strategy is presented in the event that unexpected contamination is encountered; and,
- Emergency Remedial Procedures are outlined.

Based on the above, it is recommended that Planning Condition 6 parts C and D be discharged.

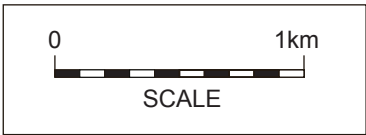
# FIGURES





\*Figure taken from Waterman Infrastructure & Environment Project WUB 13235-102: Mount Pleasant Sorting Office - Phoenix Place

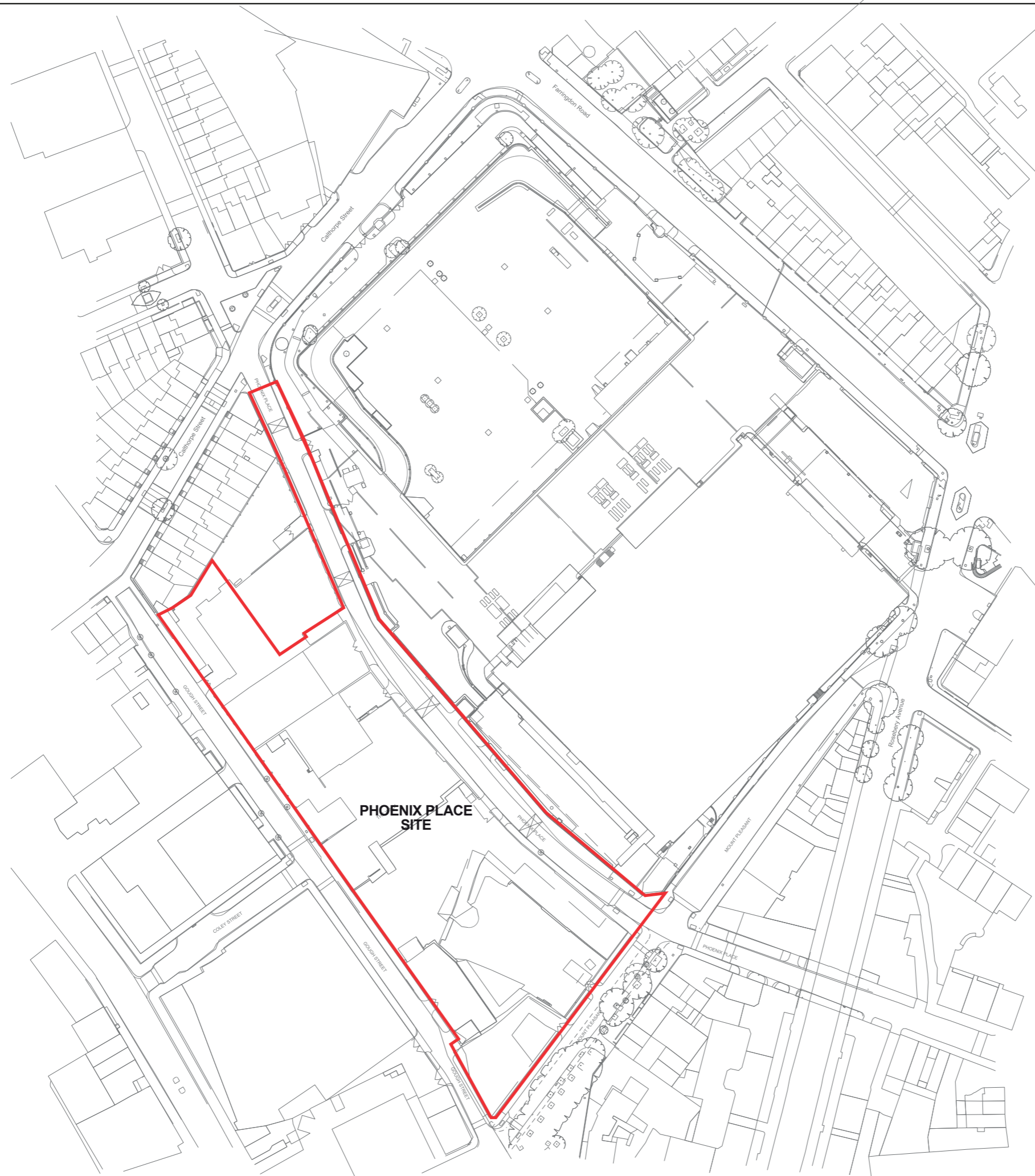
Title	FIGURE 1 - SITE LOCATION MAP		
Location	ROYAL MAIL, MOUNT PLEASANT SORTING OFFICE - PHOENIX PLACE		
Client	TAYLOR WIMPEY HOMES LTD		



Based upon an Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office. Crown copyright reserved. Licence No. AL 100017812

<b>AECOM</b>	App'd: TR	Drawn: OK	Date: NOV 2017
	FINAL	Ref:	HDP/AM/WIMB
	Scale: AS SHOWN	Job No:	60556156
	Drg. Size: A4	<b>FIGURE 1</b>	





NOTES

KEY:  
 Phoenix Place Site Boundary

\*Figure taken from Waterman Infrastructure & Environment Project WUB 13235-102: Mount Pleasant Sorting Office – Phoenix Place

CONSULTING ENGINEERS



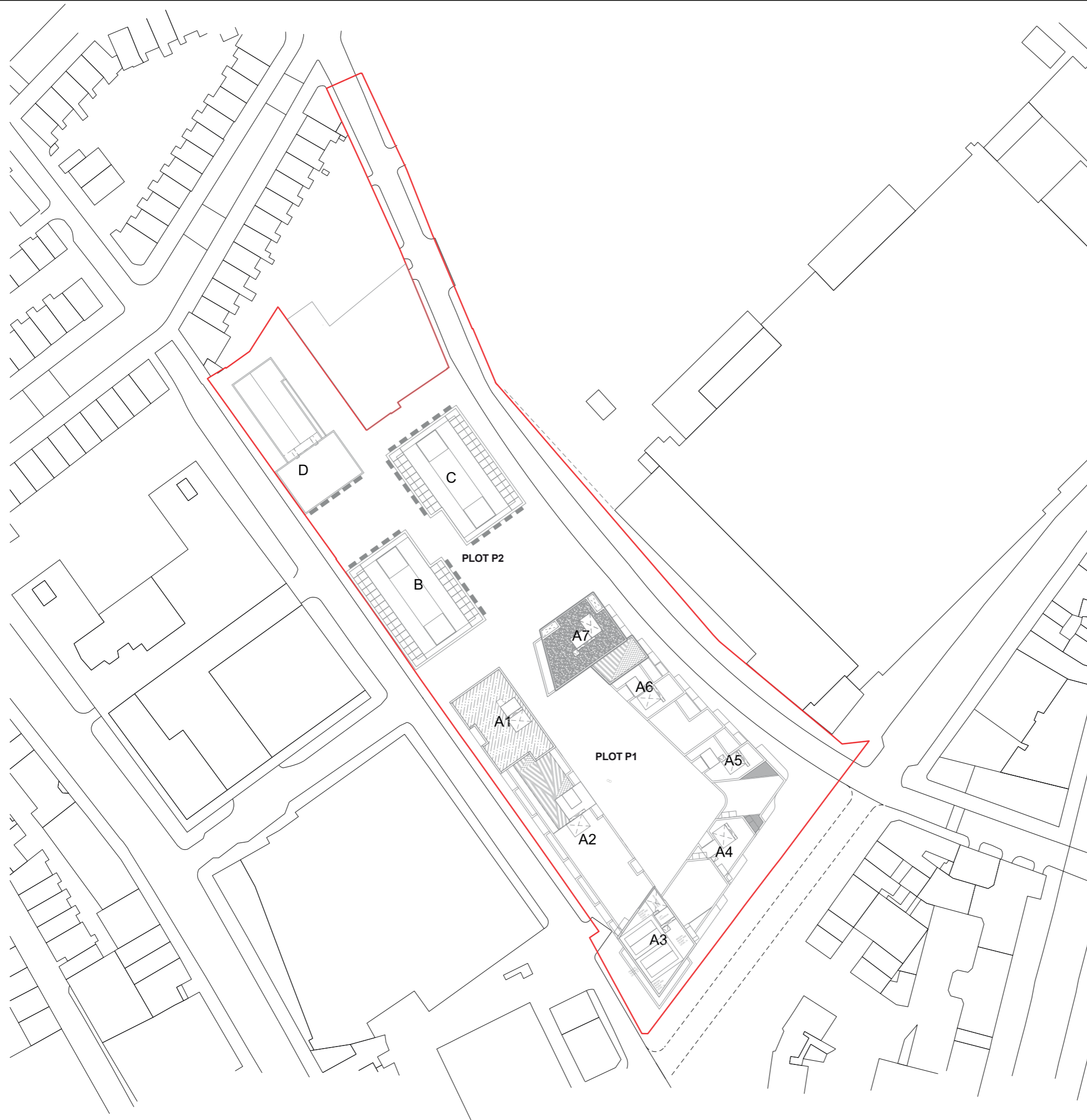
AECOM Infrastructure & Environment UK LTD  
 St George's House, 3rd Floor  
 5 St George's Road, Wimbledon, London SW19 4DR  
 Tel :020 7963 9800 Fax: 020 7963 9801

CLIENT  
 TAYLOR WIMPEY HOMES TD

PROJECT  
 Mount Pleasant

DRAWING TITLE  
 Figure 2 – Site Boundary

DRAWN OK	CHECKED VB	APPROVED TR	DATE NOV 2017
SCALE As Shown	DRG No. 60556156	REV.	



NOTES

Key:

☐ Phoenix Place Site Boundary

\*Figure taken from Waterman Infrastructure & Environment Project WUB 13235-102: Mount Pleasant Sorting Office – Phoenix Place

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PROJECT  
 Mount Pleasant

DRAWING TITLE  
 Figure 3  
 Phoenix Place Street Plots

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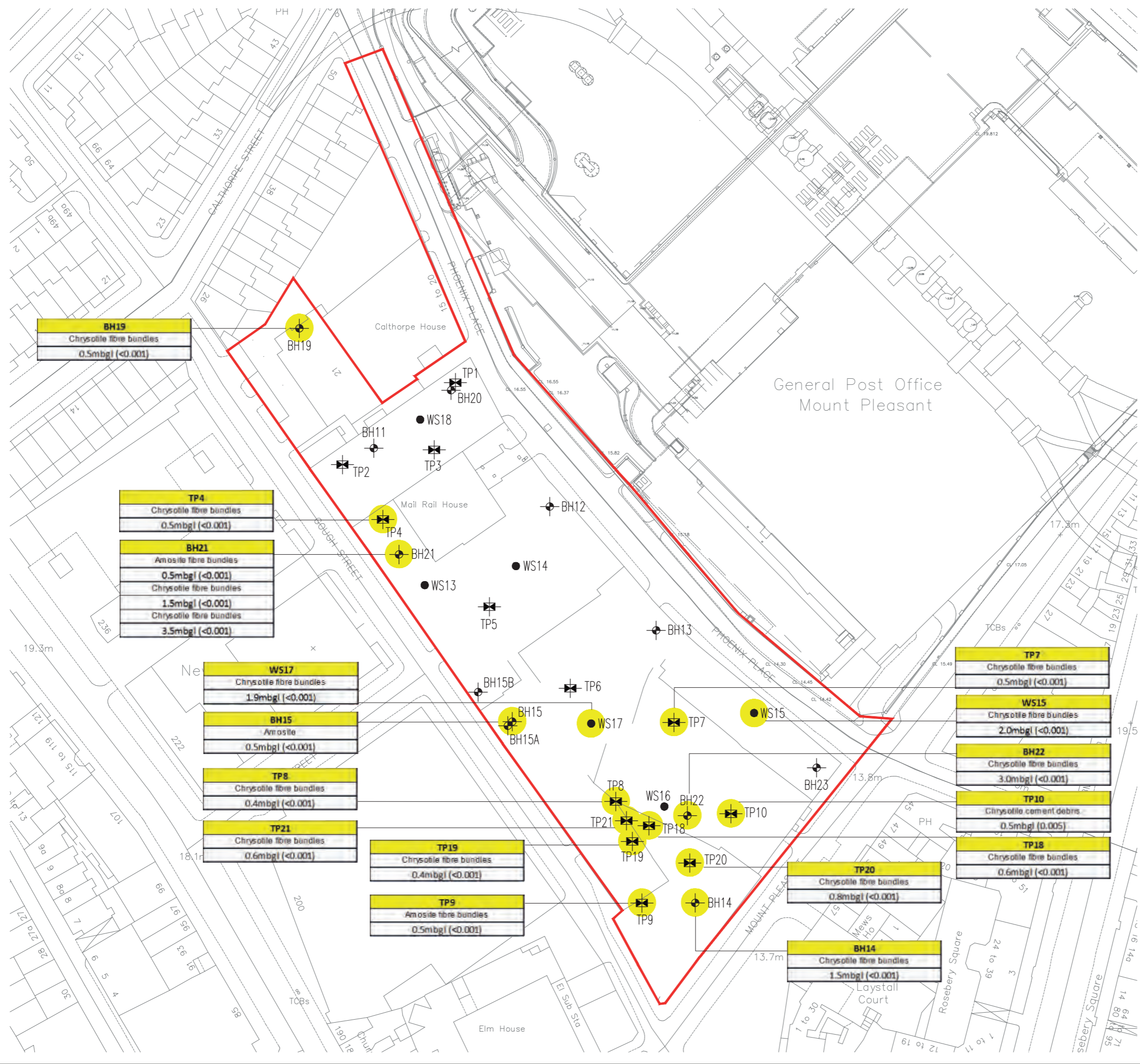


NOTES



Key:

- Site Boundary
- Window Sample
- ⊕ Borehole
- ⊗ Trial Pit (TP)
- Asbestos Above Limit of Quantification



\*Figure taken from Waterman Infrastructure & Environment Project WUB 13235-102: Mount Pleasant Sorting Office - Phoenix Place

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PROJECT  
 Mount Pleasant

DRAWING TITLE  
 Figure 4 - Soil Contamination Excendence Plan

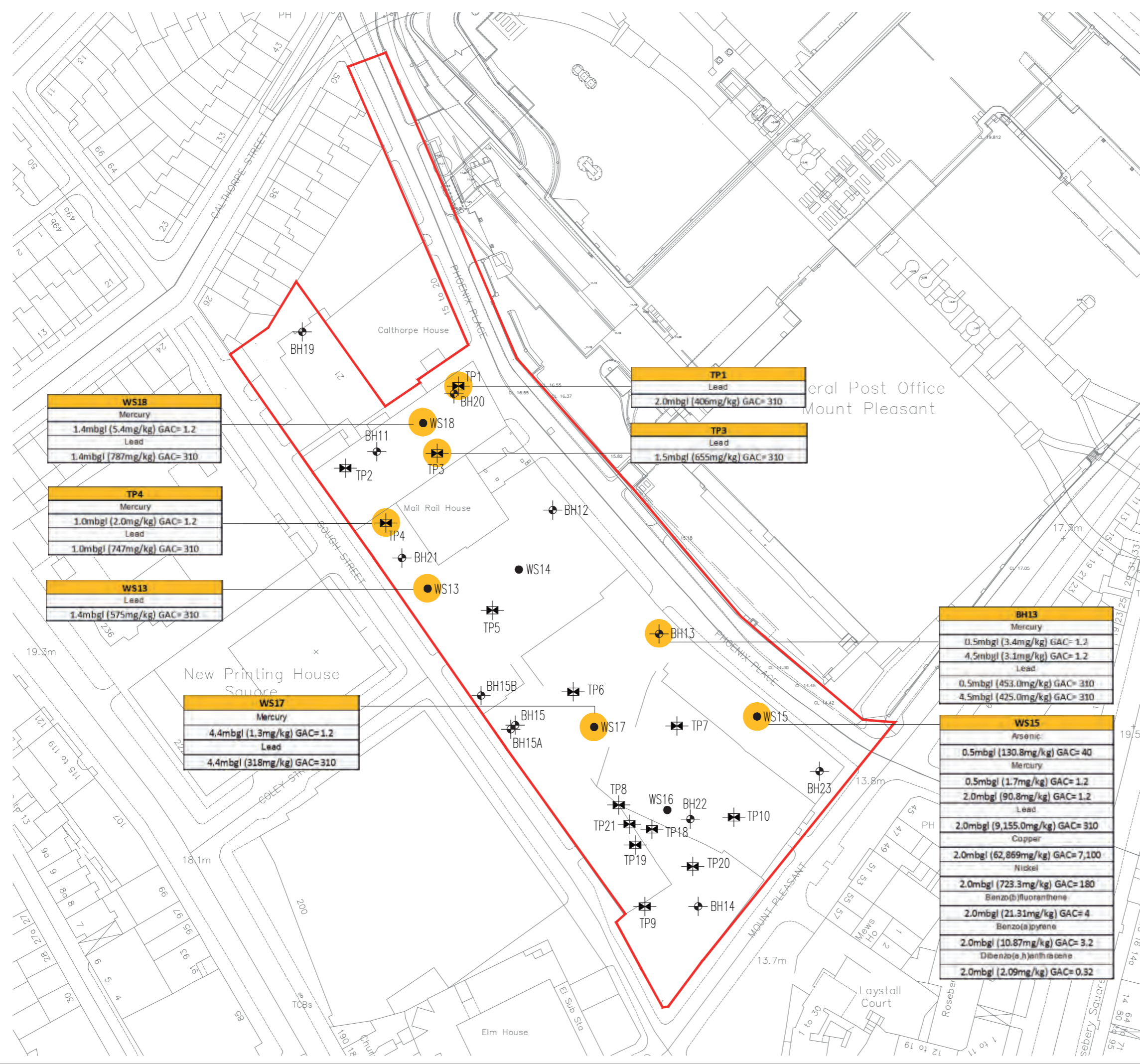
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SCALE As Shown	DRG No. 60556156	REV.	



NOTES

Key:

- Site Boundary
- Window Sample
- ⊕ Borehole
- ⊗ Trial Pit (TP)
- Contamination Exceedance



WS18	
Mercury	1.4mbgl (5.4mg/kg) GAC= 1.2
Lead	1.4mbgl (787mg/kg) GAC= 310

TP4	
Mercury	1.0mbgl (2.0mg/kg) GAC= 1.2
Lead	1.0mbgl (747mg/kg) GAC= 310

WS13	
Lead	1.4mbgl (575mg/kg) GAC= 310

WS17	
Mercury	4.4mbgl (1.3mg/kg) GAC= 1.2
Lead	4.4mbgl (318mg/kg) GAC= 310

TP1	
Lead	2.0mbgl (406mg/kg) GAC= 310

TP3	
Lead	1.5mbgl (655mg/kg) GAC= 310

BH13	
Mercury	0.5mbgl (3.4mg/kg) GAC= 1.2
Lead	4.5mbgl (3.1mg/kg) GAC= 1.2
Lead	0.5mbgl (453.0mg/kg) GAC= 310
Lead	4.5mbgl (425.0mg/kg) GAC= 310

WS15	
Arsenic	0.5mbgl (130.8mg/kg) GAC= 40
Mercury	0.5mbgl (1.7mg/kg) GAC= 1.2
Lead	2.0mbgl (90.8mg/kg) GAC= 1.2
Lead	2.0mbgl (9,155.0mg/kg) GAC= 310
Copper	2.0mbgl (62,869mg/kg) GAC= 7,100
Nickel	2.0mbgl (723.3mg/kg) GAC= 180
Benzo(b)fluoranthene	2.0mbgl (21.31mg/kg) GAC= 4
Benzo(a)pyrene	2.0mbgl (10.87mg/kg) GAC= 3.2
Dibenzo(a,h)anthracene	2.0mbgl (2.09mg/kg) GAC= 0.32

\*Figure taken from Waterman Infrastructure & Environment Project WUB 13235-102: Mount Pleasant Sorting Office – Phoenix Place

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CLIENT  
 TAYLOR WIMPEY HOMES LTD

PROJECT  
 Mount Pleasant

DRAWING TITLE  
 Figure 5 – Asbestos Location Plan

DRAWN OK	CHECKED VB	APPROVED TR	DATE NOV 2017
SCALE 1:1500	DRG No. 60556156	REV.	

## **APPENDIX A WATCHING BRIEF FORM**



## **APPENDIX B COMPLETION OF WORKS STATEMENT**

### COMPLETION OF WORKS STATEMENT

This written statement must clearly state whether or not evidence of contamination was identified during the course of the development and the action that was taken:

- Archaeology contractor upon completion of archaeological investigations;
- Site Preparation contractor upon completion of site preparation works;
- Ground works contractor(s) upon completion of foundations and ground works;
- On site manager upon completion of groundworks and landscaping work; and
- Environmental Consultant upon completion of groundworks and landscaping works.

"I am *[insert name]* from *[insert company]*  
We undertook *[insert works undertaken]*  
between the *[start date]* and *[finish date]*

During the course of work at *[insert site name and address]*

we observed *[delete were not applicable: no potential contamination / evidence of contamination / significant evidence of contamination]*.

Where contamination is identified:

The contamination identified *[include a description of the observations of the contamination]*:

Identify the location of the observations of contamination and mark the locations on a plan:

Who was notified of the observations:

What action was taken to mitigate/clear up contamination:

The on site manager statement must include confirmation of whether all site staff and contractors received an appropriate brief regarding the potential presence of contamination.

Signed:

Date:

