Planning Application for the Aylesbury Estate Regeneration

Plot 18 Reserved Matters Application

Remediation Method Statement

WSP

v1

Notting Hill Housing · Southwark Council · hta · DUGGAN MORRIS ARCHITECTS · GL Hearn Part of Capita plc · WSP · AECOM · Tamla Trees consulting arborists

AYLESBURYNOW

REPORT N^{O} 70009862

PLOT 18 AYLESBURY ESTATE, SOUTHWARK

REMEDIATION METHOD STATEMENT

PUBLIC

APRIL 2016

WSP | PARSONS BRINCKERHOFF

PLOT 18 AYLESBURY ESTATE, SOUTHWARK

REMEDIATION METHOD STATEMENT

On behalf of Notting Hill Housing Trust

Remediation Method Statement (V2.4)
Public

Project no: 70009682
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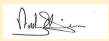
Signature		 O'Dea, Andy 2016.05.18 14:21:45 +01'00'		
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EXECUTIVE SUMMARY

WSP | Parsons Brinckerhoff was commissioned by Notting Hill Housing Trust to provide the remediation strategy required for Plot 18 Aylesbury Estate, London. The site is to be redeveloped as a mixed use scheme with residential and community facilities comprising two high rise buildings.

A Preliminary Risk Assessment (PRA) has been undertaken for the wider Aylesbury Estate site, and a ground investigation has been undertaken on the Plot 18 Aylesbury Estate site. The results from the WSP | Parsons Brinckerhoff ground investigation undertaken in December 2015 indicate that elevated concentrations of benzo(a)anthracene, benzo(a)pyrene and lead were observed to be present in Made Ground. In addition, asbestos (chrysotile, crocidolite and amosite) was identified within the Made Ground matrix. This may potentially pose a risk to potential receptors. In addition, a potential risk was identified from unexploded ordnance at the site.

The following remedial measures are required to reduce risk to potential receptors to an acceptable level:

TO PROTECT HUMAN HEALTH

Hardstanding, building footprint, and cover systems in areas of soft landscaping to provide a physical barrier to contact with residual contamination.

During redevelopment, an Asbestos Aware ethos should be implemented

TO PROTECT OFF SITE RECEPTORS, BUILDINGS, STRUCTURES AND FUTURE USERS

The implementation of protective membranes in basement areas

TO PROTECT UNDERGROUND SERVICES

Use of suitable materials for underground services and protection of underground services within a clean service corridor.

A watching brief and action plan should be in place during ground works to address unexpected contamination, if encountered.

Material reused on site or disposed off site should be undertaken through the use of appropriate waste management procedures and duty of care.

These remedial measures and waste management procedures should be verified by a qualified geoenvironmental engineer. Upon completion, a Verification Report should be provided as evidence the works were completed satisfactorily.

1 INTRODUCTION & OBJECTIVES

1.1 AUTHORISATION

WSP │Parsons Brinckerhoff was instructed by Notting Hill Housing Trust (the Client), to prepare a Remediation Method Statement (RMS) for the proposed redevelopment of Plot 18, Aylesbury Estate, Southwark, London, SE17 2BJ (the site). The works were commissioned to address potential contamination issues identified in previous WSP | Parsons Brinckerhoff investigations at the site, which comprised a Preliminary Risk Assessment (PRA) dated September 2014 and a Phase 2 Ground Investigation Report (GIR) dated December 2015. A Site Layout Plan is presented as **Figure 1**.

1.2 PROPOSED REDEVELOPMENT

At the time of reporting (April 2016), the site comprises temporary community facilities including a multi-use games area (MUGA) and a children's club. A residential block also currently occupies the south-western corner of the site. WSP | Parsons Brinckerhoff understands that the Client proposes to demolish and redevelop the site as a mixed use scheme, consisting of residential and community facilities.

Current development proposals for the site are shown on **Figure 2** and comprise two blocks referred to as the South Block and the North Block which are arranged around an area of public open space (Aylesbury Square).

The South Block will be a stand-alone building with a maximum of 4 storeys including a basement level. The North Block will be based around a courtyard comprising 3 buildings, two mid-rise, of up to 6 storeys, and one tall building with a maximum of 15 storeys (Special Tower). The North Block will also include a basement level for the Energy Centre, which is understood to be circa 6m below ground level.

1.3 AIMS AND OBJECTIVES

The key objectives of this report are to develop a remediation strategy in response to contamination identified at the site and to mitigate environmental risks and potential liabilities identified as part of the proposed redevelopment and future use of the site.

It should be noted that this Remediation Method Statement (RMS) only provides guidance in relation to addressing risks posed from soil and groundwater contamination. Other items included within the scope of a remediation contract such as service avoidance, unexploded ordnance (UXO), general site clearance, health and safety items and obtaining the necessary licenses and consents will be the overall responsibility of the contractor. Geotechnical specifications for fills generated and general re-use of materials will also need to be assessed separately.

1.4 CONFIDENTIALITY STATEMENT AND LIMITATIONS

This report is addressed to and may be relied upon by the following party:-

Notting Hill Housing Trust

This assessment has been prepared for the sole use and reliance of the above named party. This report has been prepared in line with the WSP | Parsons Brinckerhoff proposal and associated notes. This report shall not be relied upon or transferred to any other parties without the express written authorisation of WSP | Parsons Brinckerhoff. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party.

This report needs to be read and used in full. General limitations of the assessment are included in **Appendix A**.

2 PREVIOUS INVESTIGATIONS

2.1 PREVIOUS REPORTS

WSP | Parsons Brinckerhoff has completed a Preliminary Risk Assessment (PRA) for the wider Aylesbury Estate Site and a Ground Investigation Report (GIR) for Plot 18, Aylesbury Estate. The information within these documents has been used to inform this Remediation Method Statement (RMS).

- Geo-Environmental and Geotechnical Preliminary Risk Assessment, Aylesbury Estate (Wider site), Southwark WSP, Ref 50600304, September 2014
- Aylesbury: Plot 18 Massing and Capacity Study, Aylesbury Estate, Southwark, Notting Hill Housing HTA and Southwark Council, December 2014
- Aylesbury Estate, Plot 18, Southwark, Ground Investigation Report, Notting Hill Housing Trust, Ref 70009682, December 2015

2.2 SUMMARY OF FINDINGS

The Preliminary Risk Assessment (PRA) undertaken for the wider Aylesbury Estate site indicated potential contamination risk from former land uses (including mineral water works, waste paper works, floor cloth manufacturers and a timber yard), a potentially infilled/culverted tributary, electricity substations, potential below ground tanks, a cooling tower and potential boiler system, and unexploded ordnance due to WWII bombing at the site. Ground investigation was recommended to be undertaken across the wider site prior to redevelopment.

One cable percussive borehole, eight window sample locations and 15 hand dug pits were advanced across the Plot 18 site as part of the subsequent ground investigation. Three locations were installed with single 50mm monitoring standpipes, within the Lambeth Group, Made Ground/Kempton Park Gravel Formation and Made Ground (BH101, WS101 and WS110, respectively). The initial investigation aimed to provide coverage and characterisation of shallow subsurface conditions, to confirm the conceptual site model, to confirm the presence or absence of significant soil or groundwater contamination, to facilitate sampling of shallow groundwater, to characterise the ground gas regime, and to confirm the depth of Made Ground beneath the site.

The exploratory holes advanced on site by WSP | Parsons Brinckerhoff encountered hardstanding or soft landscaping (typically concrete, macadam and paving slabs) overlying Made Ground varying between 0.45m and 2.55m in thickness. The Kempton Gravel Formation was encountered beneath the Made Ground (3.9m in thickness, where proven). The Kempton Park Gravel Formation was underlain by the Lambeth Group (thickness unproven). Groundwater was encountered during monitoring at -1.90m to -1.84m AOD within the Lambeth Group (BH101). The top of the Lambeth Group was encountered at 4.70m bgl. During drilling, groundwater was struck at this location at 6.5m bgl during the ground investigation.

No visual or olfactory contamination was noted during the site investigation.

Soil samples were screened against UK SGVs and WSP GACs for a residential without gardens land use, and groundwater samples were screened against UK DWS and EQS. Elevated concentrations of benzo(a)anthracene, benzo(a)pyrene and lead were observed to be present in Made Ground. In addition, asbestos (chrysotile, crocidolite and amosite) was identified within the Made Ground matrix.

2.3 PROPOSED RECOMMENDATIONS FROM PREVIOUS INVESTIGATIONS

The redevelopment is likely to comprise hardstanding or soft landscaping across the majority of the site. Where soft landscaping is proposed, a clean cover system is recommended to be implemented for the protection of human health. Where hardstanding or a clean soil cover system is present, the potential risk to future site occupants of exposure from contaminants within the ground is mitigated due to the prevention of an exposure pathway. However, site workers during the construction phase of the development may be at risk of exposure to contamination, particularly due to the presence of asbestos within the Made Ground. In addition to this, once the development has been completed, ground maintenance workers will need to ensure mitigation of exposure to Made Ground when undertaking groundworks in excavations such as maintenance of underground services.

Basements are proposed beneath both the south building and north block. The basement beneath the north block is proposed to comprise an energy centre (circa 6m bgl). Where excavations are undertaken for basements, verification to confirm the absence of contamination is recommended as best practice within the base and walls of the excavation.

Assuming that human health exposure pathways are mitigated through the presence of hardstanding or clean soil cover across the development, then there is no requirement for any further remediation for the protection of human health (with the exception of verification of basement excavations).

Ground gas monitoring at the site indicated that the gas regime (in accordance with CIRIA C665) is CS1 (Characteristic Situation 1). Therefore, risks from ground gas are not considered further within this RMS.

It is therefore considered that remediation required would comprise the importation and placement of clean cover in areas of landscaping, the verification of basement extractions, waste classification of site won soils prior to disposal and construction of clean service corridors. It is necessary that asbestos management and control mechanisms are in place as part of this design due to its widespread presence in Made Ground.

3 SITE DETAILS AND ENVIRONMENTAL SETTING

3.1 SITE DETAILS

Table 3.1 presents a summary of site information.

TABLE 3.1 SITE DETAILS

Site Address	Plot 18, Aylesbury Estate, Walworth, Southwark, London, SE17 2BJ
Grid Reference	532997, 178243
Site Area	Approx. 1.02ha
Site Location	The Aylesbury Estate is located at the junction of Thurlow St and Inville Rd. Plot 18 is located towards the northern edge of the larger Aylesbury Estate (see **Figure 1**).
Current Site Use	The site currently comprises community facilities; including a multi-use games area and a children's club. A residential block occupies the south-western corner of the site.
Former Site Use	The earliest available maps (1896) indicate that the site consisted of residential dwellings comprising terraced housing and gardens. The south western corner of the site underwent significant bomb damage during World War II (WWII). The site was redeveloped after WWII, and again in the 1960s to include a youth club and community centre as part of the Aylesbury Estate development.

Full site details are summarised within Section 3 of the December 2015 WSP | Parsons Brinckerhoff Ground Investigation Report (GIR). A Site Location Plan is presented as **Figure 1**.

3.2 ENVIRONMENTAL SETTING SUMMARY

Geological Maps Sheet No. 270 South London (1:50,000 Series) was reviewed and indicates that the site is underlain by Made Ground, underlain by the Kempton Park Gravel Formation and subsequently the Lambeth Group, Thanet Sand Formation and White Chalk.

BGS boreholes in the vicinity of the site confirmed the general stratigraphy was as above, although the depth to the White Chalk was not confirmed.

GROUND CONDITIONS

The exploratory holes advanced on site by WSP | Parsons Brinckerhoff generally encountered hardstanding (typically concrete, macadam and paving slabs) or soft landscaping overlying Made Ground varying in thickness between 0.5 and 2.55m.

The Made Ground was generally encountered as cohesive deposits comprising orange brown to dark brown and black clayey, silty and gravelly sand. Occasional angular brick cobbles were encountered in some boreholes. The gravel component was angular to subrounded macadam, brick and flint.

The Kempton Park Gravel Formation was encountered as orange brown to brown sandy gravelly clay, clayey gravelly sand and sandy angular to subrounded gravel. The maximum encountered thickness of the Kempton Park Gravel Formation was 3.9m.

The Lambeth Group was encountered underlying the Kempton Park Gravel Formation. The thickness of the Lambeth Group was not proven during the investigation. This stratum was generally encountered as grey fine to medium sand and very stiff light to dark grey slightly gravelly clay. The gravel component was subangular to rounded, fine to coarse flint.

An Exploratory Hole Location Plan is presented as **Figure 3**. A summary of the general succession of strata observed during the ground investigation is summarised in **Table 3.2**.

TABLE 3.2 SUMMARY OF GROUND CONDITIONS

Stratum Name	Depth to Base of Strata (mbgl)*	Elevation of Base of Strata (maod)*	Thickness (m)*	Typical Description
Concrete WS109	0.10	2.10	0.10	Strong grey CONCRETE. 60% aggregate of angular flint, 40% matrix rebar.
Macadam BH101 WS107 WS108	0.10	2.10 to 2.08	0.10	Not Applicable.
Paving slab WS110	0.05	2.27	0.05	Not Applicable.
Made ground BH101 WS101 WS102 WS103 WS103A WS104 WS105 WS106 WS107 WS108 WS109 WS110	0.50 to 2.55	1.82 to -0.31	0.45 to 2.55	Grass and roots and rootlets present in some excavations. Orange brown to dark brown and black clayey, silty and gravelly SAND. Occasional cobbles in some boreholes. Sand is fine to coarse, gravel is angular to subrounded; fine to coarse macadam, brick and flint. Cobbles are angular of brick. Hard grey CONCRETE at base of Made Ground in WS110.
Kempton Park Gravel Formation BH101 WS101 WS102 WS103A WS107 WS108 WS110	4.70	-2.52	3.90 (where proven)	Orange brown to brown sandy gravelly CLAY, clayey gravelly SAND and sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded.
Lambeth Group BH101	NOT PROVEN	NOT PROVEN	>5.30	Grey SAND and very stiff light to dark grey slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular to rounded, fine to coarse flint.

***Brackets indicate maximum unproven depth and thickness and the minimum elevation; mbgl – metres below existing ground level; mAOD – metres above ordnance datum**

GROUNDWATER

The EA has classified the underlying Kempton Park Gravels as a potentially locally important Secondary (A) Aquifer. Underlying the Kempton Park Gravels is the Lambeth Group and Thanet Sand Formation, both of which are designated Secondary (A) Aquifers, overlying the White Chalk Group Principal Aquifer.

The BGS borehole logs predominantly encountered groundwater at depths of 4.36 to 5.79m bgl, within the Lambeth Group. However, one borehole located south-west of the site struck groundwater at 2.44m bgl, within the Kempton Park Gravels; due to inconsistencies within the borehole records it is possible that this represents a depth to standing water. These records are supported by information provided by the EA within the Wider Site PRA. In April 2010 groundwater was recorded in the superficial deposits between 5 and 9m bgl, and between 4 and 7m bgl in June 2007. Groundwater mapping in the region records a separate groundwater table within the Thanet Sands at 12m bgl.

The nearest Environment Agency Source Protection Zone is over 2km from the site. One groundwater abstraction is located within 500m of the site as detailed in **Table 3.3** below:

TABLE 3.3 GROUNDWATER ABSTRACTION LOCATIONS

Abstraction Licence No.	Abstraction Use	Distance (m)	Direction
28/39/42/0076	Commercial/ Industrial/ Public Services: Drinking; cooking; sanitary; and washing	500m	North

During the 2015 Phase 2 Ground investigation, groundwater was encountered during drilling at one location (6.50m bgl, BH101). In addition, groundwater monitoring was undertaken at the site following the Phase 2 Ground Investigation. A summary of groundwater levels recorded during the monitoring period is presented in **Table 3.4**.

TABLE 3.4 GROUNDWATER MONITORING RECORDS

Exploratory Hole	Elevation of Screen Top (mAOD)	Elevation of Screen Base (mAOD)	Geology of Response Zone	Groundwater Elevations recorded (mAOD)		
				Min	Mean	Max
BH101	-4.82	-7.82	Lambeth Group	**-1.84**	**-1.87**	**-1.90**
WS101	2.15	0.15	Made Ground/Kempton Park Gravel	**DRY**	**DRY**	**DRY**
WS110	1.82	-0.68	Made Ground	**DRY**	**DRY**	**DRY**

Groundwater is shown to be present within the Lambeth Group. At the time of monitoring no groundwater was detected within the Made Ground or Kempton Park Gravel. An inferred groundwater flow cannot be confirmed at this time as only one installation contained groundwater.

SURFACE WATER

The River Thames is located approximately 2.7km to the west, 2.2km to the north and 2.3km to the north-east of the site. The only surface water feature within a 1km radius is a lake associated with Burgess Park, which is situated 550m southeast of the site.

The entire site is located within an Environment Agency Flood Zone 3 – Flooding from Rivers or Sea without defences.

UXO

A report was undertaken by BACTEC for the wider Aylesbury Estate site as discussed within the December 2015 GIR. The site and surrounding area were subject to heavy bombing during WWII and BACTEC designated the risks associated with UXO at the site as Medium-High and Medium in the south-west with the remainder of the site considered to be within a Low Risk Zone.

JAPANESE KNOTWEED

No Japanese Knotweed was identified during the site walkover. A Japanese Knotweed investigation however has not been undertaken by a specialist within the site.

LANDFILL

No landfills were identified within 500m of the site.

4 REMEDIATION DRIVERS

4.1 BACKGROUND

The presence of contaminated land is generally only of concern if there exists an actual or potentially unacceptable risk. Within the context of current legislation (Part 2A), the interpretation of a site being determined to be 'contaminated land' is termed to be one where:

- For human health, significant harm is being caused or there is a significant possibility of such harm being caused, (where harm is defined as harm to health of living organisms or other interference with the ecological systems of which they form a part and, in the case of man, includes harm to his property).

Or in the case of controlled waters where:

- Pollution equivalent to "environmental damage" to surface water or groundwater as defined by The Environmental Damage (Prevention and Remediation) Regulations 2009, but which cannot be dealt with under those Regulations;
- Inputs resulting in deterioration of the quality of water abstracted, or intended to be used in the future, for human consumption such that additional treatment would be required to enable that use;
- A breach of a statutory surface water Environment Quality Standard, either directly or via a groundwater pathway; and / or,
- Input of a substance into groundwater resulting in a significant and sustained upward trend in concentration of contaminants (as defined in Article 2(3) of the Groundwater Daughter Directive (2006/118/EC).

In addition; Daughter Directive 2000/60/EC and Directive 2008/105/EC of the European Parliament and Council (which the UK has signed up to) sets out a strategy for protection against, and prevention of, pollution resulting from the discharge of certain substances into the aquatic environment.

To combat the pollution of these waters, two lists have been compiled of dangerous substances that need to be controlled:

- Prevent the inputs of hazardous substances; and,
- Limit the inputs of non-hazardous substances.

4.2 REDEVELOPMENT SCENARIO

The risk assessments that have informed this Remediation Method Statement (RMS) are based on the following redevelopment considerations:

- Redevelopment for a commercial/residential land use, including a basement level in both the proposed buildings;
- The site will be predominantly covered with hardstanding, with limited areas of soft landscaping;
- The existing slab will be broken up and potentially re-used on site; and,
- Site won soils will be tested and potentially re-used on site where they meet the remediation criteria.

4.3 IDENTIFIED CONTAMINANT LINKAGES

HUMAN HEALTH

Soil samples containing elevated heavy metals concentrations (lead), elevated PAH concentrations (benzo(a)anthracene and benzo(a)pyrene) and asbestos (chrysotile, crocidolite and amosite) were identified to be present within Made Ground at the site.

The redevelopment will comprise hardstanding across the majority of the site. Where hardstanding is present, the potential for contaminants within the ground to affect residents and site visitors is low, due to the mitigation of the contaminant exposure pathway. However, site workers during the construction phase of the development may be at risk from contamination, particularly due to the presence of asbestos within the Made Ground. In addition to this, it must be ensured that future site groundworkers are protected from exposure to contaminated Made Ground once the development has been completed.

As such, in relation to the protection of human health, the following potential contaminant linkages are not considered to require active remediation, but mitigation during redevelopment of the site:

- Inhalation of asbestos fibres on-site by **construction workers** and **future site users**;
- Inhalation of contaminated dust and asbestos fibres off-site by **adjacent site users** during construction and/or following redevelopment;
- Direct contact of **construction workers** on-site with contaminated shallow soils and perched groundwater and ingestion/inhalation of contaminated dust; and
- Direct contact of **ground/maintenance workers** post construction on-site with contaminated shallow soils and perched groundwater and ingestion/inhalation of contaminated dust once development is complete.

CONTROLLED WATERS

No contamination linkages have been identified for controlled waters at the site. Therefore, no active remediation or mitigation is currently proposed to be undertaken for the site for the protection of controlled waters. However, although a method statement is provided in the event of identification of unforeseen impacted soils or groundwater, which may present a risk to controlled waters.

Management of the following potential controlled waters contaminant linkages will be considered within this strategy:

- Removal of impacted soils considered to present a risk to controlled waters;
- Provide site betterment by preventing leaching of lead or poly-aromatic hydrocarbon (PAH) contamination from soils to groundwater; and
- The sealing of any surface water drainage to prevent off-site flow of contaminated surface water run-off.

JAPANESE KNOTWEED

Japanese knotweed has not been identified at the site, although a Japanese knotweed survey has not been undertaken to date.

4.4 CONTAMINANT SOURCE CHARACTERISATION

CONTAMINATED SOILS

Table 4.1 represents the areas of known contamination within soil recorded by site investigation. Based on site observations and the previous activities on site, the potential for further areas of contamination for lead and poly-aromatic hydrocarbons (PAH) to be recorded during the redevelopment works cannot be discounted and has been considered further within this method statement.

TABLE 4.1: CONTAMINANT SOURCE LOCATION (ELEVATED CONCENTRATIONS IN SOILS)

Exploratory Hole Location	Depth of Elevated Concentration (m bgl)	Stratum	Determinands	Total Concentration (mg/kg)	Potential Receptor Group at Risk
WS101	0.1	Made Ground	Lead	934	Human Health
WS103	0.5	Made Ground	Lead	399.4	Human Health
WS104	0.7	Made Ground	Lead	420.1	Human Health
WS108	0.4	Made Ground	Benzo(a)anthracene Benzo(a)pyrene	4.19 3.32	Human Health

ASBESTOS

Asbestos fibres were positively identified in 6 of 12 locations of the soils tested site wide. The presence of asbestos containing materials within the Made Ground will require consideration in order to mitigate risks to human health during and post construction. The risk associated with asbestos fibres in soils needs to be appropriately managed during construction activities by the remediation contractor and to be recorded in the Health and Safety File for any future below ground maintenance works. Following completion of future site hardstanding, or cover system in areas of soft landscaping, there will be no plausible active contaminant linkages for site occupants.

Table 4.2 below shows the location and information with regard to the asbestos encountered. Six of the samples were sent for quantitative assessment.

TABLE 4.2 ANALYTICAL ASBESTOS TESTING: SCREENING

Location	Depth	Stratum	Fibre Type	Asbestos Quantification (Total) %
WS101	0.1	Made Ground	Chrysotile and amosite asbestos (lagging, free fibres)	NADIS
WS102	0.2	Made Ground	Chrysotile asbestos (bitumen)	NADIS
WS104	0.7	Made Ground	Chrysotile and crocidolite asbestos (lagging, free fibres and cement)	<0.001
WS105	0.5	Made Ground	Amosite asbestos (free fibres)	0.004
WS106	0.5	Made Ground	Amosite asbestos (free fibres)	NADIS
WS109	0.2	Made Ground	Chrysotile asbestos (cement, lagging and free fibres)	<0.001

NADIS: No asbestos detected in sample

5 POTENTIAL SITE CONSTRAINTS

5.1 HISTORICAL BELOW GROUND STRUCTURES

Due to the historical development of the site there are likely to be below ground structures present that will need to be removed as part of the works. It is anticipated that due to the number of different building footprint configurations and historical use of the site as a residential estate that extensive below ground obstructions (foundations, buried floors, covered concrete pads, drainage, pipes and other infrastructure) will be present. The extent of such obstructions are currently not known, however it is assumed that all obstructions will need to be removed and, if suitable, concrete can be crushed and re-used either as an engineered fill material or for the piling mat. Other excavation arisings will need to be screened and either disposed of as scrap or waste.

No below ground tanks have been identified as part of either the desk study or ground investigation work.

5.2 SERVICES & UTILITIES

There are low pressure gas mains, high and low voltage electricity cables, surface drainage channels, water supply pipes (foul and potable) and telecoms cables (BT and Virgin Media) that serve the site. Whilst it is anticipated that these services will have been disconnected by the time of the works, it will be the contractor's responsibility to ensure that all redundant and live services have been identified and that these are disconnected and dead-ended where necessary. It will be the contractor's responsibility to avoid live services. A utilities plan is provided as **Figure 4**.

5.3 UNEXPLODED ORDNANCE (UXO)

An unexploded ordnance desk study has been completed by BACTEC for the wider Aylesbury Estate site. The report indicates that the Plot 18 Site was subject to bombing in World War II, particularly in the south west of the Plot 18 Site. The majority of the site was assigned as low risk, although the western portion of the site was medium and medium-high risk with regard to UXO

Consequently, it is recommended that safety briefings are put in place to ensure that all contractors are aware of the potential risks posed by UXO, how to recognise a UXO if it is uncovered and the steps required to ensure the health and safety of all those on site and in off-site areas. Emergency plans will need to be developed and contained within health and safety documentation. In addition, the presence of an EOD (Explosive Ordnance Disposal) Engineer on site to support in shallow intrusive works is required in medium-high risk areas of the site. It is also recommended that in these medium – high risk areas, intrusive magnetometer survey (and target investigation) of all pile locations down to a maximum bomb penetration depth is undertaken.

These measures will require consideration as part of the overall health and safety management of the site works.

5.4 GROUND CONDITIONS

The Made Ground at the site is likely to be relatively cohesive and the underlying natural deposits comprise the Kempton Park Gravel Formation. Therefore deep excavations are unlikely to remain stable without shoring or wall support. Excavations will need to be battered back at suitable angles so as not to pose a collapse risk. Alternatively, appropriate shoring of trench or basement excavations may be used.

5.5 GROUNDWATER

Shallow groundwater has generally been encountered within the Lambeth Group at a depth of 4.02m – 4.08m bgl. Consideration will need to be given to management of potential inflows of shallow groundwater during excavations at the site and for the potential requirement for dewatering, particularly within excavations for basements.

5.6 SURFACE WATER

The River Thames is located approximately 2.7km to the west, 2.2km to the north and 2.3km to the north-east of the site. The only surface water feature within a 1km radius is a lake associated with Burgess Park, which is situated 550m southeast of the site. No risks associated with controlled waters have been identified at the site. No specific surface water constraints relating to on-site works are therefore envisaged.

5.7 ASBESTOS

Asbestos fibres have been identified within the Made Ground with a maximum concentration of amosite in WS105 of 0.004%. Asbestos was also identified in WS101, WS02, WS104, WS105 and WS106; indicating that asbestos may be widespread in the north of the site although at low concentrations.

5.8 GROUND GAS

Ground gas monitoring undertaken at the site has identified the ground gas risk classification as CIRIA Characteristic Situation 1 (CS1), as detailed within CIRIA C665. No special precautions with regard to ground gas are deemed necessary.

5.9 ADJACENT PROPERTY / PARTY WALLS

Thurlow Street is located adjacent to the east of the site, Dawes Street to the west, and Inville Street to the south, with associated public footpaths. The areas adjacent to the site are characterised by residential properties. Potential impact to adjacent property/party walls will need to be considered as part of the works.

5.10 ENVIRONMENTAL CONTROLS & MANAGEMENT

It is important that good practice environmental controls are in place and followed at the site during the work. As a minimum, this should include stockpile management and material tracking, ensuring dust boundary monitoring and odour management (if required), sheeting of wagons and the presence of wheelwashes for heavy vehicles leaving the site.

5.11 SITE ACCESS, EGRESS & TRANSPORT

The site is accessed and egressed via Inville Road to the south and Thurlow Street to the east. The site is located in a built up area and therefore a Travel Plan will be required to ensure appropriate transport and vehicle routes are followed.

5.12 EXISTING BOREHOLES

Boreholes were advanced as part of the ground investigation previously undertaken at the site, which still remain. One of the following two approached should be adopted to remove the risk of introducing contaminants directly to subsurface aquifer units.

1. The protection of borehole integrity throughout the remediation process; or
2. The full decommissioning of boreholes at the site by a competent contractor.

6 REMEDIATION WORKS

6.1 APPROACH

This remediation strategy plans to validate basement excavations, implement a cover system in areas of soft landscaping, remove unexpected grossly contaminated soils or groundwater that may be encountered as enabling works progress, and protect site workers/residents from asbestos and residual soil contamination. In addition, existing buildings will be demolished, and foundation slabs will be removed which may uncover contamination not previously identified that will need to be addressed should it be encountered.

Remediation will be considered complete when the following criteria have been met:

1. Visible bound asbestos has been hand-picked and removed from excavated soils prior to re-use;
2. A clean granular cover is placed across the site to the required platform level in areas of soft landscaping which is free of asbestos;
3. Completion of a Materials Management Plan (MMP) and Validation/Verification Report; and
4. Regulatory approval is obtained.

SOIL

Elevated concentrations of lead, benzo(a)anthracene, benzo(a)pyrene and asbestos (chrysotile, crocidolite and amosite) have been detected in Made Ground at concentrations which pose a potential risk to groundworkers and residential receptors at the site. Where hardstanding is present, e.g. building footprint, roads and pavements, there is no requirement for remediation as mitigation measures are in place (i.e. a hard cover) that will prevent a direct contact exposure pathway. If soft-landscaping is present in public areas on ground level, then a minimum soil cover system of 450mm of clean soil (validated in accordance with **Appendix B**) underlain by a geo-membrane will be required to mitigate against potential exposure, and this should also be considered where/if tree planters are installed.

There is anticipated to be below ground structures associated with previous development on the site and this will need to be removed and, if suitable, concrete can be crushed and re-used either as an engineered fill material or for the piling mat. No asbestos should be present in this material within the upper 1m of finished platform level. Other items will need to be screened and either disposed of as scrap or waste. Consideration will also need to be given to arisings generated from piling activity and from the installation of any potential below ground tanks, services, utilities and infrastructure as part of development works on site. A detailed earthworks balance will need to be undertaken to confirm volumes of excavated soil and any land raise (if present) and the volume of material that may need to be removed once the development design has been finalised.

As part of the betterment process it is proposed that any soils imported on to site are screened against the proposed soil values in **Appendix B.**

The remediation criteria were derived using the approach provided within SR2, SR3, SP1010, CLEA Workbook v1.071and SR4 to produce a set of minimal risk GAC for a residential without plant uptake end use scenario.

6.2 EXCAVATION AREAS

Where excavation is required for foundation purposes (and for proposed basements), to reduce site levels for the development, or where contamination has been / is encountered the following process should be followed, in line with best practice:

- The volumes of any material removed off site will need to be recorded and waste documentation (including destination of material) retained for inclusion in a validation report;
- A photographic record will need to be undertaken and the excavated area shown on a site plan; and
- On completion of excavation validation sampling and testing will be required for inclusion in the validation report.

Visual assessment of the presence of contamination, field screening with a photo-ionisation detector (organic contamination only) and chemical analysis will be used to validate the lateral and vertical extent of excavations where necessary. All field observations are to be undertaken by a suitably experienced Remediation Engineer. The Remediation Engineer will be responsible for overseeing the remediation excavation works; providing visual assessment of contaminant extents; field screening using photo-ionisation detector where appropriate to support visual observations; and, obtaining environmental samples for analysis at a UKAS and MCERTS accredited laboratory.

6.3 SLAB REMOVAL AND UNEXPECTED FINDS (WATCHING BRIEF)

It should be noted that, although ground investigation has been completed on site, a potential exists that unexpected finds may be encountered during slab removal, grubbing out of services during proposed services diversion and/or construction.

A watching brief will be undertaken during slab and below ground structure removal. Where visual and/or olfactory evidence of contamination or unexpected materials are identified then they will be investigated and addressed in accordance with the risk assessments (reports listed in **Section 2.1**) and this remediation strategy with respect to the protection of both human health and controlled waters.

It is also recommended that a surface pick of visible potential asbestos containing materials is undertaken by a qualified contractor to remove items which may be present at surface below the slab across the site.

It is recommended that, should any localised areas of grossly impacted soils and/or groundwater be encountered, the most effective and practicable remediation approach is source removal. This would be achieved by ‘over-digging’ excavation in a limited zone around the identified contamination. Excavated soils should be tested against the remediation target criteria presented within **Appendix C**. Any material failing screening against the target criteria should be disposed or treated at an appropriately licensed off-site facility, and replaced with either uncontaminated site won material or imported fill.

Groundwater sampling has indicated that there is no evidence of significant groundwater contamination beneath the site. It is therefore currently assumed that if any contamination is present in groundwater exceeding water quality criteria that has been identified, then it would be present in relatively localised areas beneath the site. This should be identified by visual-olfactory assessment as part of the watching brief undertaken by the remediation contractor.

6.4 SOIL SEGREGATION AND STOCKPILING

Heavily impacted contaminated soils (if encountered) will be excavated and removed off site. The soils could be removed and disposed to a soil treatment facility or landfill. Either of these routes will need to be confirmed by the Contractor undertaking the work. For those soils that show little or no visual or olfactory impact, these should be validated for re-use, or subjected to WAC testing before disposal at landfill or a soil treatment facility.

To minimise cost and programme impacts, visual assessment of the presence of contamination and / or asbestos containing material (ACM), field screening with a photo-ionisation detector (organic contamination only) and chemical analysis should be used to initially validate the lateral and vertical extent of excavations prior to verification sampling and analysis.

Foundations, substructures and oversize brick and hardcore excavated from the remediation area should be segregated from the soil. This oversize material may be stockpiled for future management/use by the Contractor. The removal of any below ground structures should not introduce additional contaminant

pathways. Stockpiling of any impacted excavated material would be performed in a nominated area on the site in close proximity to the remediation area; preferably an area of hardstanding.

6.5 POTENTIAL FOR ASBESTOS CONTAINING MATERIALS (ACM)

Asbestos has been identified within the Made Ground across the site in the form of chrysotile, crocidolite and amosite (generally loose fibres and insulation board). It is the Contractor's responsibility to manage asbestos on site during the works and ensure that methodologies are in place to mitigate fibre release. The management and mitigation of exposure to such contamination will need to be ensured during the work. The site should therefore be an 'asbestos aware' site whereby contractors undertaking groundworks are aware of the presence of asbestos, tool box talks are provided, asbestos awareness training and competency can be demonstrated and potential exposure is mitigated through robust method statements and risk assessment measures. In addition, it will need to be ensured that asbestos (dust) is not being released at the site boundary and therefore boundary monitoring will be required. It will be assumed that any bonded or bulk asbestos will be handpicked and removed during the groundworks and that any asbestos associated with pipes or infrastructure (if present) below ground will be removed by the contractor.

When the concrete/hardstand at the site is being lifted, it will need to be visually assessed for potential bound or cemented asbestos material. If the asbestos can be handpicked and removed the concrete will need to be quarantined and tested for asbestos. Asbestos containing material cannot be crushed. If asbestos is present in soils at concentrations <0.1% wt/wt then it could be used as a sub-base engineered fill at depths below 1m of the finished platform level. Any crushed concrete used for the piling mat or surface cover of the site post-remediation must be free of asbestos (visual and laboratory analysis) (<0.001% wt/wt).

Should significant burial of ACMs be identified, works should stop at that location and an assessment made by a qualified person with regard to the extent of material present. Work may continue if it is considered safe to do so. If many fragments or pieces of potential ACM are uncovered, then works should stop in that area of that area of the site and a sample collected and submitted to the laboratory and a suitably qualified person contacted to provide advice on its control and management. The area should be backfilled and damped down to prevent potential release of dust and Herras fencing installed to prevent entry into the area if significant buried asbestos is encountered.

6.6 SOIL VALIDATION TESTING STRATEGY

Soil samples recovered from the remediation and validation investigations will be submitted for an appropriate chemical testing suite.

TABLE 6.1: SOIL VALIDATION TESTING STRATEGY AND CRITERIA

ACTIVITY	TESTING FREQUENCY	TESTING SUITE	VALIDATION CRITERIA
Validation of imported soils (if required) or site-won soils to be re-used	Samples will be analysed every 250m^3.	Suite including heavy metals, asbestos, and PAH.	See **Appendix B**
Investigation of unexpected contamination finds.	Where contamination is observed. Samples will be analysed every 100m^3.	Suite including heavy metals, asbestos, PAH, and total petroleum hydrocarbons (TPH).	See **Appendix B**
Site won demolition material (predominantly comprising crushed concrete) used to create site levels (if applicable).	One sample will be analysed per 250m^3 of material.	Asbestos.	<0.1% asbestos detected.
Soils to be removed off-site	One sample will be analysed per 250m^3 of	WAC suite	See **Appendix B**

to landfill	material.		
Validation of basement excavations	One sample to be taken in each wall of the excavation and 2 samples within the base	Suite including heavy metals, asbestos, and PAH.	See **Appendix B**

The laboratory testing results for soil samples obtained from the validation testing and remediation excavations will be compared with WSP Generic Assessment Criteria (GAC) for a residential without plant uptake end use scenario (SOM 1%) scenario (as presented in **Appendix B**).

6.7 EXCAVATIONS AND SEGREGATION

EXCAVATIONS

Controlled excavation and segregation of soils will be undertaken during soil remediation works. Excavation of these areas will be supervised by a Remediation Engineer experienced in monitoring the excavation of potentially impacted soils. Stockpiles of excavated material will be located only on hard standing or impermeable sheeting. Arisings will be generated where basements are proposed, areas that require cut (if applicable) and where piling is to be undertaken. Drainage and utility corridors will require clean corridors, and excavation may also be required to ensure that this is undertaken.

All equipment and plant used for excavation of contaminated materials (if encountered) shall be cleaned and decontaminated to avoid cross contamination of stockpiled materials. Excavation edges and bases shall be cleared to the discretion of the remediation consultant prior to validation sampling being undertaken.

If encountered within the excavation, remaining structures, services, slabs and/or foundations will, as far as reasonably practicable, not be damaged or broken out until the size of the structure and its content (if any) have been established, provided that samples can be retained from beneath such obstructions to confirm that migration of contamination has not taken place. The removal of below ground structures should not introduce additional contaminant pathways.

When carrying out soil excavations, the following will be implemented where possible:

- The dimensions of exposed foundations or other hard materials encountered within the excavations will be measured and recorded prior to removal and included on daily records.

SEGREGATION

Contaminated soils (if encountered) will be transported to a dedicated material stockpile area where soils will be stockpiled, segregated, tested and provided with identification labels stating the source of the material and approximate volume. Material will be segregated into that which may be suitable for re-use and materials which are to be removed off site and disposed of to a licensed disposal or treatment facility. The stockpile area will be established on either existing hard standing or an impermeable membrane to prevent cross-contamination of underlying soils from possible migration of contamination, in accordance with best practice.

When a combination of acceptable material and unacceptable material or different classes of material are present within an excavation area, the excavation will be carried out in such a manner that the materials are excavated separately, without cross contamination as far as is reasonably practical. Where possible, materials segregation will be carried out at the point of excavation.

6.8 MATERIALS MANAGEMENT, RE-USE AND DISPOSAL

MATERIALS MANAGEMENT

Soils excavated from across the site may be suitable for retention on site provided they are used in accordance with the remediation strategy and verification criteria. It is assumed that the remediation works will be carried out during redevelopment works and the on-site retention of excavated soils could be supported through the completion of a Material Management Plan (MMP) in line with guidance provided within; The Definition of Waste: Development Industry Code of Practice v2, CL:AIRE (2011).

Materials management will require individual stockpile source location, stockpile placement location, volume, material re-use location / disposal notes and drawings recorded in the plan in order to ensure that material fate is recorded sufficiently and line with current industry best practice. Soils to be assessed for re-use includes those to be excavated as part of the site-wide groundworks/remediation activities and from development-led activities such as basement excavations, drainage, services, utilities and pile arisings.

RE-USE OF MATERIALS AND BACKFILLING OF EXCAVATIONS

Soils removed as part of the remediation works (if contamination is encountered) may be suited to on-site treatment. If soil treatment is undertaken it will be the responsibility of the remediation contractor to ensure the treatment process is capable of meeting all of the remediation criteria and that the presence of asbestos within the soils does not result in exposure risks to site workers or the general public/neighbouring properties.

Where possible, the remediation excavations (where required) will be backfilled with overburden/treated material determined as acceptable material via validation with regards to the remediation criteria. Excess void space will be backfilled with arisings/validated demolition material. Should insufficient material be present on site to backfill remediation excavations, importing of material may be considered as an alternative.

Backfill materials require validation testing as per the requirements of **Table 6.1** and should not exhibit concentrations of contamination in excess of the criteria presented in **Appendix B.**

Stockpile materials resulting from the crushed concrete following slab break-out, will be subject to testing and potentially re-used to backfill voids (e.g. remediation voids) and create site levels. These will be validated in accordance with **Appendix B**. If they are deemed unsuitable following testing and risk assessment they will be disposed of to a licensed off-site disposal facility.

A backfill Engineering Specification will need to be detailed separately and will provide geotechnical information relating to performance specifications required for the backfilling of voids and re-use of material. This will need to be undertaken in accordance with the engineering specification required for the construction of the stand. Materials that are deemed as geotechnically unsuitable will require removal from the areas which are to be re-engineered. These materials may be suitable for use elsewhere on the site.

Material having an unacceptable grading (such as concrete and brick foundations) will be processed by crushing and screening to comply with Class 6F2 or other materials classification, as required. Records will be kept which demonstrate the source of all materials used for backfilling and the approximate area of placement on site.

It is not currently anticipated that grossly impacted soils or groundwater will be encountered at the site.

TOPSOIL/SUBSOIL COVER SYSTEM

A certified soil cover system will be required across the development in areas of public soft landscaping, with a required thickness of 450mm. The soil cover can comprise 150mm topsoil underlain by 300mm subsoil with a geotextile separator layer at the base.

The soil can be site-won from the development providing that it is suitably verified and the soils meet the soil screening criteria. Where the soil is imported it must come from a single certified supplier. All

imported topsoil/subsoil shall have supporting documentation to confirm its suitability for use as soil within a residential development. The topsoil assessment will be undertaken in accordance with BS:3882 'Specification for Topsoil'. In addition, all materials are to be below the recommended soil screening values provided in **Appendix B** and in accordance with any requirements for planting as required by the landscape architect.

The soil verification sampling chemical analysis suite should comprise the following:

- Metals (As, Cd, Cr, CrVI, Cu, Pb, Hg, Ni, Se, Zn);
- Polyaromatic hydrocarbons (PAH) (USEPA 16 suite);
- Total Petroleum Hydrocarbons Criteria Working Group including BTEX (TPH CWG);
- Asbestos soil screen;
- pH, sulphate, soil organic matter (SOM).

It is must be ensured that before the soil is imported that certificates of chemical analysis are obtained from the supplier and a qualified person confirms if the soils are acceptable.

DISPOSAL

Excavated materials deemed unsuitable for treatment and/or re-use on-site will be disposed of to a licensed off-site waste disposal or treatment facility using suitably licensed waste haulage contractors. Material designated for off-site disposal will be removed directly for disposal or treatment, unless agreed otherwise. Duty of Care documentation to provide a record of all soils removed from the site will be retained for inclusion within the remediation completion report.

Prior to disposal or off-site treatment, waste materials will require classification into one of the following waste types, as applicable:

- → Non-hazardous; or
- → Hazardous.

Waste which is classed as 'hazardous' and intended for disposal to landfill, will be subject to Waste Acceptance Criteria (WAC) testing in order to comply with relevant European waste legislation and as 'waste producer', a 'Waste Sampling Plan' would be prepared to satisfy the 'waste receiver' (i.e. the operator of the disposal facility). The site will also be registered with the Environment Agency as a 'hazardous waste producer'. Hazardous waste would be moved under Consignment Note.

A preliminary waste classification should be undertaken prior to any works and any material scheduled for disposal should be individually classified by the contractor.

Waste transportation will comply with all current legislation relating to the handling and transportation of contaminated soils including the detailed classification of the waste for disposal purposes and the selection of appropriate waste disposal facilities.

6.9 WATER INGRESS AND CONTROL

Excavations are likely to encounter groundwater (perched or otherwise). Water ingress has the potential to be locally contaminated (although the risk associated with controlled waters contamination is LOW, in accordance with the December 2015 GIR) and may require management through dewatering and betterment of water quality via a water treatment plant (WTP) prior to discharge via appropriate consent to foul sewer from the relevant statutory undertaker.

7 HEALTH, SAFETY AND ENVIRONMENTAL CONSIDERATIONS

GENERAL

The health and safety management scheme operated during demolition, remediation, earthworks and validation operations should take into account all relevant health and safety documentation, policy and methodology applicable to such works. The works should also comply with the Construction Design Management Regulations (CDM) 2015.

The contractor will also be required to prepare a Construction and Environment Management Plan (CEMP) and/or Method Statement demonstrating how the safety of construction workers and the public would be addressed in terms of potentially harmful substances. Protective measures would include:

- Provision of adequate facilities and procedures for personal washing and changing, including separation of “clean” and “dirty” areas of the site and information construction workers of potential contamination that could be present and appropriate handling techniques;
- Provision and use of personal protective equipment (PPE) and Respiratory Protective Equipment (RPE);
- Implementation of dust suppression methods;
- Sheeting of wagons and the use of vehicle wheel washing measures;
- Implementation measures to avoid surface water ponding and the collection and disposal of potential perched water and run-off; and
- Completion of a full-time environmental watching brief to allow rapid identification and risk assessment of any uncovered contamination.

Such measures should be carried out in accordance with the CEMP, the protection of workers and the general public during the development of contaminated land document and CIRIA Report 132: A guide for Safe Working on Contaminated Sites.

In addition to this, the contractors CEMP/Method Statement should include details of environmental protection associated with ecology, noise, vibration, vehicle movements and site facilities.

SITE FACILITIES

Site infrastructure should comprise the following elements:

- Site compound area – comprising site office, storage, toilet facilities, washing facilities and a decontamination units; and
- Soil management area – comprising a designated area of hard standing split into sections for material segregation (if soils are to be retained on site).

CONTAMINATION AND ASBESTOS

It will be necessary to ensure that construction workers are adequately protected and that a suitable health and safety management scheme is operated during ground, remediation and construction activities. Construction workers or maintenance staff involved in excavations at the site may be exposed to concentrations of contamination (including asbestos) in soils that will require construction phase risk assessment and management control procedures to ensure the risks are appropriately managed.

As a minimum the health and safety plan should address the following potential health and safety issues:

- Potential for vapours in excavations;

- Dermal contact;
- Ingestion; and
- Dust and (asbestos) fibre inhalation.

During redevelopment of the Site, workers should remain vigilant to the possible risk of encountering isolated areas of contaminated material (including asbestos). If potentially contaminated material is encountered, further testing may be required to assess the risk to health and safety of the site workers and the environment. If potential ACM is identified during redevelopment professional advice should be sought.

The Contractor will be responsible for completing a Health and Safety risk assessment for the workers undertaking excavation and movement of soils known to contain asbestos. The works must be risk assessed, planned and managed by a suitably competent professional in accordance with the Control of Asbestos Regulations 2012 (CAR 2012). The Contractor, via the competent professional, will be responsible for determining if the works are licensed and/or notifiable under CAR 2012.

The Contractor will undertake any monitoring identified as necessary through the risk assessment process including but not limited to ambient air monitoring and personal air monitoring, for personnel handling soils identified as containing asbestos.

ENVIRONMENTAL MONITORING

Due to the nature of the proposed works, a programme of environmental monitoring will be required during the works. These should be agreed in advance between the remediation contractor and the regulatory authorities. As a minimum these should comprise:

- Pre and post validation of any areas used for the stockpiling and treatment of contaminated soils if required);
- Dust will be monitored on a visual basis and via Frisbee gauges on the boundary of the site at agreed locations (3no. min). Damping down will be undertaken where an excessive dust was observed or where monitored dust levels exceed a value of 200mg/m^3;
- Dust monitoring will need to include asbestos; and
- Noise monitoring adjacent to sensitive receptors and high risk activities.

ENVIRONMENTAL MANAGEMENT AND CONTROL

The remediation contractor will be responsible for the provision of all necessary environmental controls during the remediation works. These measures will include, but may not be limited to:

- Protection of surface water drains and catchments of surface run-off during the remediation phase to reduce the risk of contaminated run-off and high-suspended solids entering surface or groundwater features;
- Management of stockpiles of recycled (crushed) construction aggregates and contaminated soils awaiting off-site disposal and/or on-site treatment/movement to minimise the potential for generation of contaminated run-off and dust (if present);
- Use of dust and odour suppression techniques during development to minimise off-site impacts and to control potential release of fibres into the air; and
- Storage of all fuels, oils and chemicals will be in appropriate containers within bunded compounds.

Guidelines presented within the Environment Agency document, “Pollution Prevention Guidance 6 – Working at Construction and Demolition Sites” will be adhered to and all relevant licenses obtained.

8 VERIFICATION

8.1 PROPOSED WORKS SUMMARY

Existing buildings on site will be demolished, and all foundations slabs removed. It is not yet known whether existing services and drainage runs on site will be decommissioned, although it is considered likely that existing service ingress and egress will be maintained, and the remainder excavated from site. Proposals have been put forward for the diversion of significant existing service runs.

In addition:

- Concrete, piping, infrastructure (including USTs), brickwork and other geotechnically unsuitable materials are removed.
- Area of proposed basements to be excavated (see **Figure 2**). Material to be removed from site should be disposed of under duty of care, with full waste tickets provided as part of the verification report. Verification of the walls and base of the excavation should be undertaken in accordance with **Section 6.6**.
- All artificially hard or geotechnically unsuitable materials segregated on excavation for subsequent re-use, recycling or removal from the site.
- Amendment of site levels (if applicable).
- Material to backfill excavations (if required) will comprise site won treated materials / crushed concrete or suitable clean imported materials (dependent of final formation levels).
- A topographic survey will be carried out on completion of the works.
- Any suspected contaminated materials and/or previously unidentified materials to be addressed.
- The management of excavated materials undertaken in accordance with the voluntary CL:AIRE Code of Practice (CoP) Version 2.
- Material will be tracked and assessment of all stockpiles within the site in line with the requirements of the CoP.

8.2 EXCAVATION VERIFICATION

Should significant additional areas of suspected contamination be encountered then a suitably qualified person will need to be contacted to assess the material. Should contamination be confirmed then the client will be notified and a soil sampling and validation approach will be adopted. In this instance the following approach will be adopted.

Representative soil samples shall be obtained from the base and walls of each excavation to confirm whether excavation has removed the identified contamination. Validation sampling shall be undertaken at the discretion of the site engineer, but should involve the collection of soil samples from both the lateral and vertical extents of the excavation. Samples shall be taken on a grid basis, at approximate 5m intervals. Chemical testing shall include analysis for organics (TPH, PAH and SVOC) inorganics (metals, cyanide) or asbestos dependant on the visual and olfactory indications of contamination.

As a minimum, a total of 5 No. validation samples shall be collected from the sides and base of each excavation area.

Validation samples collected shall be assigned a unique identification number included on the Chain of Custody sheet, and transported under temperature controlled conditions to a UKAS / MCERTS accredited laboratory.

8.3 REMEDIATION ENGINEER

The Engineer will ensure that the requirements of this Remediation Strategy are complied with in a safe and orderly manner.

The responsibilities of the Engineer may include, but not be limited to, the following:

- Ensuring that all site personnel are suitably qualified and given an appropriate induction;
- Supervision of the remediation and ground preparatory works;
- Advice on the correct handling of materials and conditions encountered;
- Guidance on the appropriate protective clothing and safety equipment that is to be made available and used;
- Ensuring that personal hygiene arrangements are adequate;
- Retrieval of soil and water samples and the subsequent scheduling of appropriate laboratory analysis to enable verification of various aspects of the works, and to advise the Project Manager of progress;
- Ensure that a topographic survey of site levels is undertaken prior to vacating the site; and
- Liaison with statutory authorities as required.

The Engineer will maintain records of the works to include the following:

- Daily record sheets to include a summary of the day's activities;
- Date and weather conditions;
- Plant, personnel and visitors present;
- Aspects relating to Health and Safety, Environmental Control, or non-compliance with either this Remediation Strategy or the Contractor's Method Statement;
- Site surveys as necessary to record the locations of demolition, excavation and filling activity; and
- Test results.

8.4 VERIFICATION REPORT

On completion of the remediation, a validation completion report will be produced detailing the following information:

- A summary of the remediation works undertaken, including any works associated with unforeseen ground conditions;
- Verification test results associated with the basement excavations;
- Verification test results associated with ‘hot-spot’ treatment, including plans showing sample locations and levels, and the extent of any ‘hot-spot’ excavations;
- Final ‘as built’ drawings (illustrating the extent of remedial works and residual obstructions);
- Photographic records;
- Final clean cover volumes and locations where a clean cover strategy has been implemented;
- Monitoring results and site inspection records;
- Soil laboratory chemical verification results;
- Backfill records, including the following, as applicable:
  - Chemical analysis for site derived fill materials (if applicable)

- Chemical analysis for imported fill materials (if applicable)

- Imported fill summary records (to include source location and placement location);
- Verification test results associated with proposed source materials for clean cover;
- Site derived fill summary records (if any);
- Details of the fate of any arisings excavated and disposed as waste and Duty of Care records;
- Records of consents, permits, authorisation and/or licences held or obtained by the Contractor (and sub-contractors) relevant to the Works;
- Records of any ground investigations carried out during the works, including exploratory hole records; and
- Records of any communication with the Local Planning Authority relating to specific aspects of the remediation works.

The report will be issued to the regulatory authorities for approval (Local Authority, Environment Agency as appropriate). Only once regulatory approval has been obtained will the remediation works considered to have been acceptably completed and close out of the works can be confirmed.

8.5 DEVELOPER WORKS

SOIL COVER VERIFICATION

As part of the verification process it is important that where soft standing is present at surface that soil thicknesses are confirmed through a verification process that comprises the excavation of hand pits to the base of the cover system, a thickness measurement undertaken using a tape measure (or equivalent), and then this being recorded with a photograph. A summary photo-log report will need to be prepared to demonstrate that an adequate thickness of topsoil has been placed and can be included within the overall Verification Report.

WATER SUPPLY / SERVICES

The developer will be responsible for confirming the appropriate water supply pipework with the statutory water supplier (i.e. whether barrier pipes or similar will be required as opposed to PE or PVC).

New services should be laid in corridors of clean certified materials. The risk of encountering potentially contaminated land containing asbestos and other hazardous materials needs to be appropriately assessed and managed by future ground-workers. The potential for asbestos and other contaminants to be present in soils across the site should be made clear and included within the Site Health and Safety file. In particular, protection measures and precautions for groundwork's outside of the clean service corridors should be stipulated.

CONDITION DISCHARGE

This RMS outlines works for the discharge of Planning Condition 10.2, and a verification plan to discharge Planning Condition 10.3. However, it is important to note that a verification report will also need to be completed which will record and document the works that have been undertaken in accordance with the verification plan.

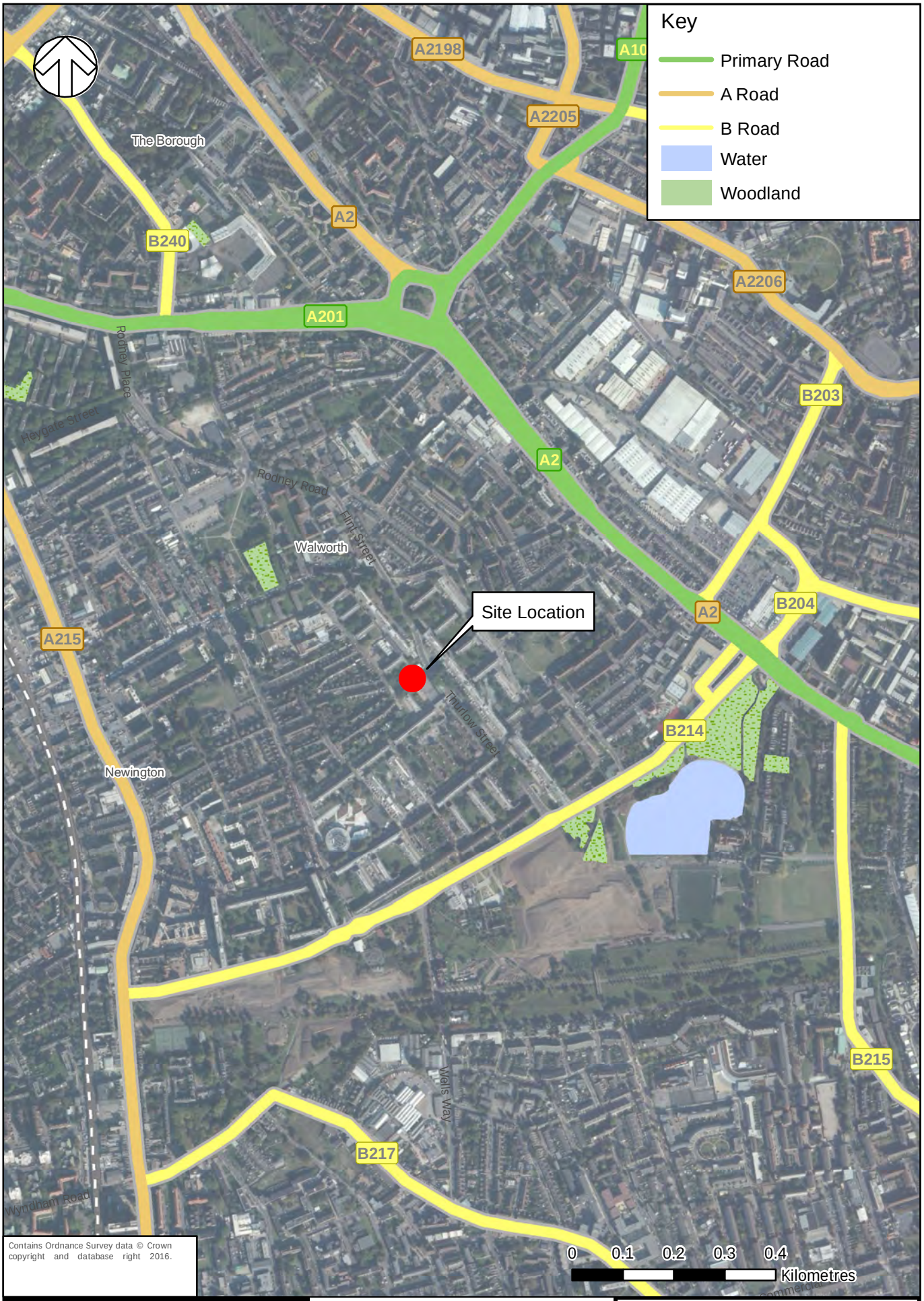
This verification plan includes for the verification of the implementation of the clean soil cover system. If this is to be the responsibility of a future developer then this will need to be communicated and ensured that it is undertaken. This will also need to include the findings from the watching brief and if any unexpected contamination was encountered and how this was dealt with. A plan will need to be agreed with the Local Authority prior to its implementation and subsequent verification reports submitted when these works are complete.

Should the property have transferred to a developer then it will be the developers responsibility to complete, and therefore to fully close out the condition. It should be made clear in any contract documents that it will be the purchaser/developer responsibility to complete any outstanding verification reports as part of the property transaction.

REFERENCES

- BS6068-6.11:2009 Water quality – Sampling Part11: Guidance on sampling of groundwaters.
- BS8485:2015 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
- BS10175:2011 Investigation of potentially contaminated sites – Code of practice.
- CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings'. 2007
- CIRIA C733 ' Asbestos in soil and made ground: a guide to understanding and managing risks' 2014
- CL:AIRE 'The EIS/AGS/CL:AIRE Soil Generic Assessment Criteria for Human Health Risk Assessment'. ISBN 978-1-05046-20-1. January 2010.
- CL:AIRE 'Guidance on Comparing Soil Contamination Data with a Critical Concentration' May 2008.
- CL:AIRE 'RB17 A pragmatic approach to ground gas risk assessment' 2012
- Defra 'SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Appendix E. September 2014.
- Defra 'SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Main Report'. September 2014.
- Defra 'SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document'. September 2014.
- Defra 'Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance'. April 2012.
- Environment Agency 'Human Health Toxicological Assessment of Contaminants in Soil', Report SC050021/SR2. January 2009.
- Environment Agency 'Updated Technical Background to the CLEA Model,' Report SC050021/SR3. January 2009.
- Environment Agency 'CLEA Software (Version 1.06) Handbook (and Software)', Report SC050021/SR4. September 2009.
- Environment Agency 'Guidance on human health risk assessment (SPOSH) (v4) 23/09/08.
- Environment Agency 'Model Procedures for the Management of Land Contamination' Contaminated Land Report 11. September 2004.
- Environment Agency ' Groundwater Protection: Principles and Practice (GP3)'. 2013
- Nathanail et al 'The LQM/CIEH S4ULs for Human Health Risk Assessment', Land Quality Press, ISBN 978-0-9931084-0-2. 2015.
- SoBRA 'Discussion Paper Example of a Part2A Decision Algorithm for Asbestos Cement Fragments in Residential Garden Soils 2015'. 2015.
- WFD 'The water framework directive (standards and classification) directions (England and Wales)' 2015.

FIGURES & APPENDICES



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Drawn By: UKAJA912 Date Modified: November 2015

WSP | PARSONS BRINCKERHOFF

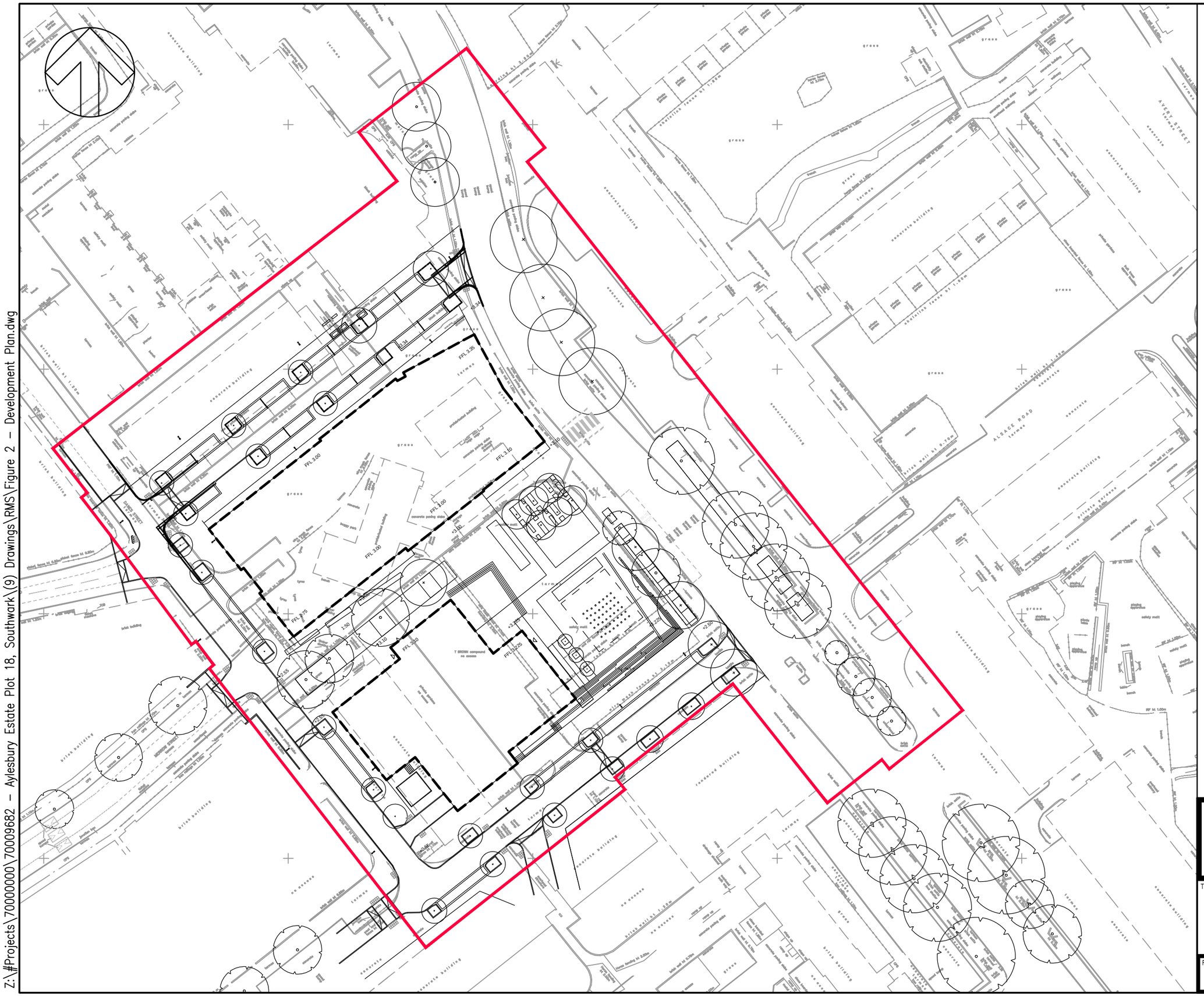
TITLE:

Aylesbury Estate
Plot 18
Site Location Plan

FIGURE No:

70009682 - Figure 1

Z:\#Projects\70000000\70009682 – Aylesbury Estate Plot 18, Southwark\(9) Drawings\RMS\Figure 2 – Development Plan.dwg



WSP | PARSONS BRINCKERHOFF

TITLE:

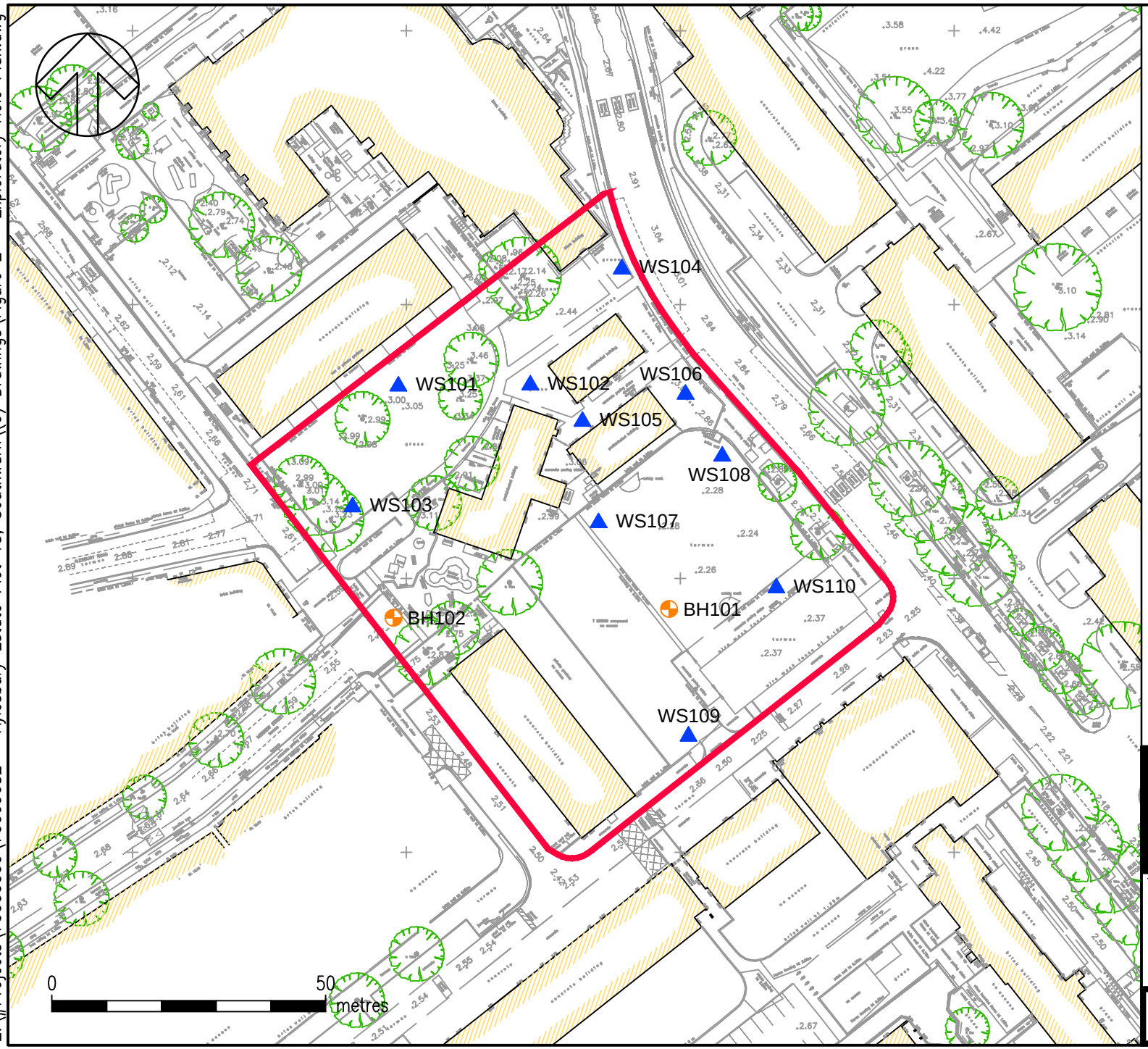
Aylesbury Estate, Plot 18

Development Plan

Not to Scale

FIGURE No:

70009682 - Figure 2



Key

Site Boundary

Cable Percussive Borehole (up to 10m below ground level)

Window Sample Borehole (up to 6m below ground level)

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TITLE:

Aylesbury Estate

Plot 18

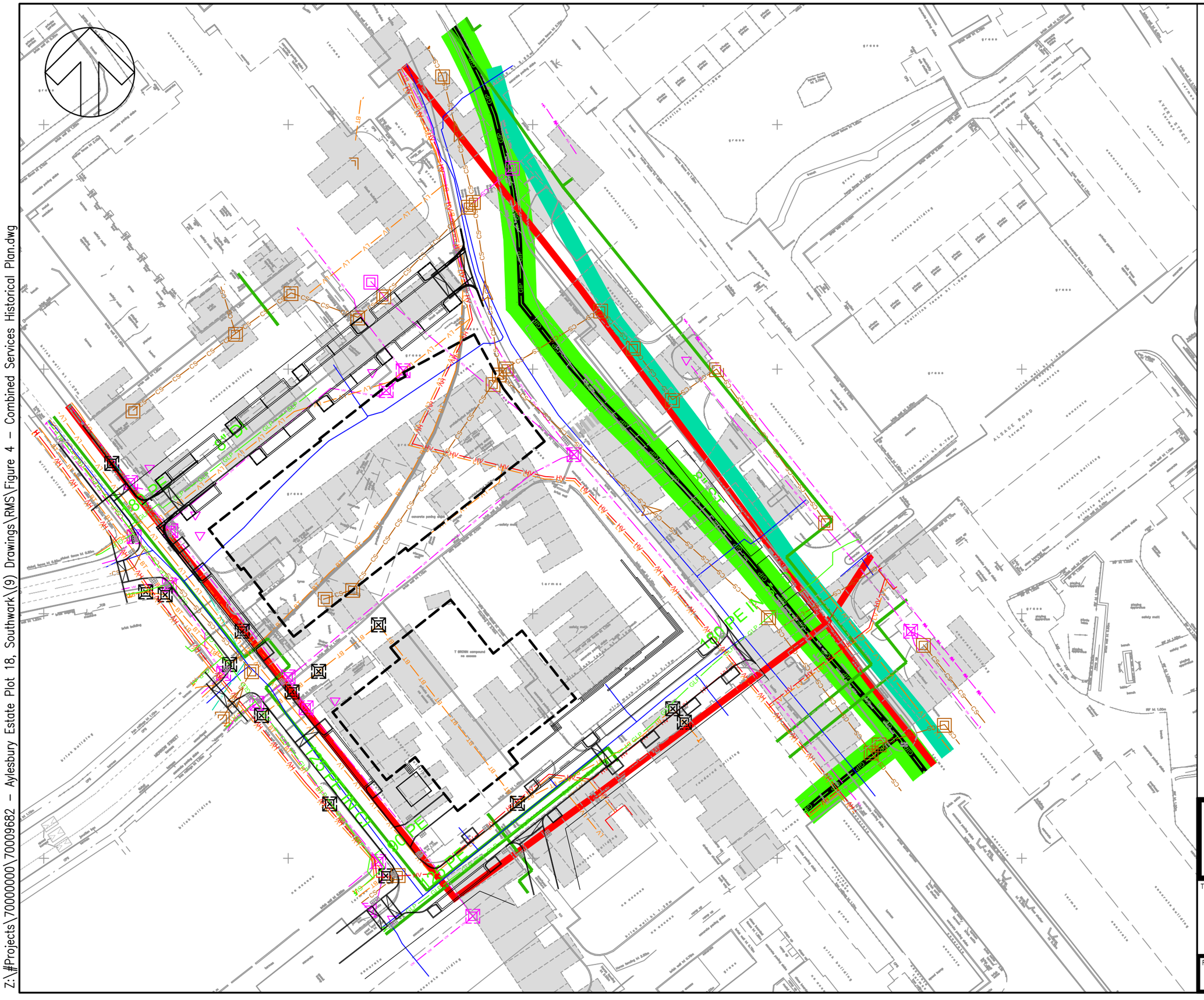
Exploratory Hole Plan

FIGURE No:

70009682 - Figure 3

Z:\#Projects\70000000\70009682 – Aylesbury Estate Plot 18, Southwark\(9) Drawings\Figure 2 – Exploratory Hole Plan.dwg

Z:\#Projects\70000000\70009682 - Aylesbury Estate Plot 18, Southwark\(9) Drawings\RMS\Figure 4 - Combined Services Historical Plan.dwg



Notes:

1. Historical Mapping taken from the 1896 Landmark Ordnance Survey Published Mapping.

WSP | PARSONS BRINCKERHOFF

TITLE:

Aylesbury Estate, Plot 18

1896 Historical Underlay

Not to Scale

FIGURE No:

70009682 - Figure 4

Appendix A

GENERAL LIMITATIONS

LIMITATIONS FOR WSP LAND RESTORATION AND GROUND ENGINEERING DIVISION

General

WSP has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP standard Terms and Conditions, as included within our proposal to the Client.

Project specific appointment documents may be agreed on a project by project basis, at our discretion. A charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP reserve the right to amend the fee should any changes to the appointment terms create an increase risk to WSP

The report needs to be considered in the light of the WSP proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report. The report is only valid for its originally intended purpose as set out in either our report or the proposal.

Phase 1 Geo Environmental and Preliminary Risk Assessments

The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. It is not standard, due to the timescales, to visit archives and local libraries as part of these works. WSP cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP reserves the right to review such information and, if warranted, to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the Site.

WSP does not warrant work / data undertaken / provided by others.

This section covers reports with the following titles or combination of titles: phase 1; Desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; geotechnical development risk register or baseline environmental assessment. The limitations associated with preliminary works apply when they are reported within an intrusive investigation report.

Intrusive Investigation Reports

The investigation has been undertaken to provide information concerning the type and degree of contamination present at the Site in order to allow a generic risk assessment to be undertaken or identification of the soil properties to allow for geotechnical development constraints to be identified.

The objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters. For Geotechnical investigations the purpose is to broadly identify the development constraints associated with the physical property of the soils underlying the site.

The amount of exploratory work, soil property and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of localised "hotspots" of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report. For example these include spatial variations in soil properties; the varying thickness and physical nature of the strata identified and changes in groundwater levels or flow rates.

The inspection; testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. WSP has interpreted between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation.

On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. A GDR can strictly only be prepared following confirmation of all structural loads and serviceability requirements. The design process requires close co-operation between the geotechnical engineer and the structural engineer and is iterative. Where a GDR is prepared using preliminary or assumed loadings and/or serviceability limits it should only be considered as an interim report and should not be relied upon for the procurement or construction of the works it describes.

During any build programme WSP should be consulted if alternative ground conditions are encountered. It assumes during any site works that the contractor will use their best endeavours to manage and control groundwater and other unforeseen ground conditions. WSP will not be liable for actions taken prior to consultation.

The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values. Specific assumptions associated with the WSP risk assessment process have been outlined within the body or associated appendix of the report.

Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must, be confirmed by a qualified quantity surveyor.

The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; geotechnical risk register.

Detailed Quantitative Risk Assessments and Remedial Strategy Reports

These reports either use primary data or build upon previous report versions and associated notes. The scope of the investigation; further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

The outputs of the Detailed Quantitative Risk Assessments are based upon WSP manipulation of standard risk assessment models. Models are simulations based on the available data set and should not be used as predictions.

Where a remediation strategy is proposed, this is based on our interpretation of the risk assessment criteria and is specific to a particular location and a particular intended land use and configuration / layout. Prior to adoption they will need discussing and agreeing with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of WSP. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

Geotechnical Design Report (GDR)

A GDR can strictly only be prepared following confirmation of all structural loads and serviceability requirements. The design process requires close co-operation between the geotechnical engineer and the structural engineer and is iterative. Where a GDR is prepared using preliminary or assumed loadings and/or serviceability limits it should only be considered as an interim report and should not be relied upon for the procurement or construction of the works it describes. A GDR will be a standalone specifically entitled report.

Monitoring (including Remediation Monitoring reports)

These reports are factual in nature and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of an earthworks or remedial works.

The data is presented and will be compared with assessment criteria.

Asbestos in soils

Unless explicitly included for in our proposal, our investigation does not include for a formal asbestos assessment. The inspection for asbestos, either as asbestos containing materials (ACMs) lying on the surface or as ACMs and/or as loose asbestos fibres within made ground / stockpiles are excluded. Our report will include for the factual reporting of any soil screens that are collected. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and/or trace loose asbestos fibres within the soil matrix at the site.

Where we indicate in our proposal that we will consider asbestos we will undertake screening of representative soil samples for the presences / absence of loose asbestos fibres. If these are found a further and more detailed specific investigation into asbestos in soils, will need to be undertaken which will include asbestos quantification testing. These investigations are associated with more rigorous monitoring of asbestos and health and safety provisions.

Appendix B

SCREENING CRITERIA: RESIDENTIAL WITHOUT PLANT UPTAKE

CONTAMINANT	UNITS	WSP GAC (1% SOM)	WSP GAC (3% SOM)	WSP GAC (6% SOM)
Asbestos	% w/w (<0.001)	No fibres detected.	No fibres detected.	No fibres detected.
Polyaromatic Hydrocarbons (PAH) USEPA 16				
Acenaphthene	mg/kg	2000	3300	3900
Acenaphthylene	mg/kg	2000	3200	3900
Anthracene	mg/kg	20000	23000	23000
Benzo[a]anthracene	mg/kg	3.7	5.5	6.2
Benzo(a)pyrene	mg/kg	1.0	1.0	1.0
Benzo[b]fluoranthene	mg/kg	7.0	7.3	7.4
Benzo[ghi]perylene	mg/kg	47	47	48
Benzo[k]fluoranthene	mg/kg	10.0	10.0	10.0
Chrysene	mg/kg	8.8	9.8	10.0
Dibenz[ah]anthracene	mg/kg	0.86	0.91	0.93
Fluoranthene	mg/kg	970	990	1000
Fluorene	mg/kg	1900	2600	2900
Indeno[123-cd]pyrene	mg/kg	4.2	4.4	4.4
Naphthalene	mg/kg	1.6	5.0	9.2
Phenanthrene	mg/kg	830	940	970
Pyrene	mg/kg	2300	2400	2400
Metals				
Arsenic	mg/kg	35	35	35
Cadmium	mg/kg	84	84	84
Chromium (III)	mg/kg	3000	3000	3000
Chromium (VI) (Hexavalent)	mg/kg	4.3	4.3	4.3
Copper	mg/kg	6200	6200	6200
Lead	mg/kg	310	310	310
Inorganic Mercury	mg/kg	238	238	238
Nickel	mg/kg	130	130	130
Selenium	mg/kg	595	595	595
Zinc	mg/kg	40000	40000	40000
Total Petroleum Hydrocarbons (TPHCWG)				
Benzene	mg/kg	0.27	0.56	1.00
Toluene	mg/kg	607	1506	2708
Ethylbenzene	mg/kg	167	451	843
m-Xylene	mg/kg	55	155	302
o-Xylene	mg/kg	60	165	321
p-Xylene	mg/kg	53	148	288
Aliphatic EC >5-6	mg/kg	30	63	110
Aliphatic EC >6-8	mg/kg	73	190	370
Aliphatic EC >8-10	mg/kg	19	55	110
Aliphatic EC >10-12	mg/kg	93	270	540
Aliphatic EC >12-16	mg/kg	740	2000	3000
Aliphatic EC >16-35	mg/kg	45000	67000	77000
Aliphatic EC >35-44	mg/kg	45000	67000	77000
Aromatic EC >5-7	mg/kg	260	555	980
Aromatic EC >7-8	mg/kg	610	1500	2700
Aromatic EC >8-10	mg/kg	33	96	190
Aromatic EC >10-12	mg/kg	180	490	870
Aromatic EC >12-16	mg/kg	1300	1600	1700
Aromatic EC >16-21	mg/kg	1300	1300	1300
Aromatic EC >21-35	mg/kg	1300	1300	1300
Aromatic EC >35-44	mg/kg	1300	1300	1300

Notes:
1 – The soil limit values are based on published Soil Guideline Values (SGV) or WSP Generic Assessment Criteria (GAC) for a residential without plant uptake end use scenario. Materials exceeding these values may be acceptable subject to further risk assessment.
2 – The materials will be inspected for visual and olfactory evidence of contamination.
3 – Validation of subsoil and topsoil growth medium materials will be the responsibility of the future developer.

Appendix C

SCREENING CRITERIA: GROUNDWATER

CONTAMINANT	UNITS	WSP GAC
Heavy Metals		
Arsenic	µg/l	10
Cadmium	µg/l	5
Chromium (III)	µg/l	50
Chromium (VI) hexavalent	µg/l	50
Copper	µg/l	2000
Iron	µg/l	200
Lead	µg/l	10
Nickel	µg/l	20
Zinc	µg/l	5000
Polyaromatic Hydrocarbons (PAH)		
Anthracene	µg/l	0.1
Benzo(a)pyrene	µg/l	0.01
Benzo[b]fluoranthene	µg/l	Σ = 0.1
Benzo[ghi]perylene	µg/l	
Benzo[k]fluoranthene	µg/l	
Indeno[123-cd]pyrene	µg/l	
Fluoranthene	µg/l	0.1
Naphthalene	µg/l	2.4
Total Petroleum Hydrocarbons (TPH)		
Aliphatic (>C5-C6)	µg/l	15000
Aliphatic (>C6-C8)	µg/l	15000
Aliphatic (>C8-C10)	µg/l	300
Aliphatic (>C10-C12)	µg/l	300
Aliphatic (>C12-C16)	µg/l	300
Aliphatic (>C16-C35)	µg/l	300
Aliphatic (>C35-C44)	µg/l	300
Benzene	µg/l	1
Toluene	µg/l	700
Ethylbenzene	µg/l	300
Xylene	µg/l	500
Aromatic (>C10-C12)	µg/l	90
Aromatic (>C12-C16)	µg/l	90
Aromatic (>C16-C21)	µg/l	90
Aromatic (>C21-C35)	µg/l	90
Aromatic (>C35-C44)	µg/l	90

Notes:
1 - The controlled waters generic assessment criteria are based on published Water Quality Standards (WQS) for a groundwater/drinking water receptor. Materials exceeding these values may be acceptable subject to further risk assessment.
2 - The materials will be inspected for visual and olfactory evidence of contamination.
3 - Contaminants which are not considered to be a priority substance under the Water Framework Directive (WFD) and are also defined as non-hazardous by the Joint Agencies Groundwork Directive Advisory Group (JAGDAG) have been excluded.

Appendix D

VERIFICATION WORKS

Reference	Principal Requirements	Design or Construction Related	Site visit required by qualified geoenvironmental engineer?	Supporting Documentation
General	The proposed development will comprise two residential and community high rise blocks with basements. Hardstanding is proposed around both buildings with limited soft landscaping. Site remediation requirements are as follows: → Visible bound asbestos has been hand-picked and removed from excavated soils prior to re-use; → A clean granular cover is placed across the site to the required platform level in areas of soft landscaping which is free of asbestos; → Appropriate materials for underground services; and → Completion of a Materials Management Plan (MMP) and Validation/Verification Report.	Design and construction	Yes As detailed below	Details of construction programme to be provided by client/contractor
Compliance with legislation	The construction and remediation activities on the site should be undertaken in accordance with all current health and safety and environmental legislation.	Construction	-	-
Health and safety requirements	Asbestos has been identified to be present at the site. Provision should be made to ensure that site workers and the general public are protected from the inhalation of respirable asbestos fibres. A potential unexploded ordnance risk has also been identified at the site. Reference should be made to the recommendations for mitigating UXO risk outlined within the RMS.	Design and construction	-	-
Soil re-use and disposal	Surplus soils are expected to be generated on site. If soils are to be reused, consideration should be given to the use of materials management protocols such as exemptions and environmental permits. All material removed for landfill disposal will require characterisation in accordance with the Hazardous Waste Regulations 2005 and disposal in accordance with the Landfill Regulations (2002)and the Environmental Protection (Duty Of Care) Regulations, 1991.	Construction	Yes Should additional classification of arisings be required prior to disposal/reuse	Duty of care records for disposal of waste Laboratory test results Material management protocols (as required)
Basements	Excavation of basements will be undertaken at the site.	Construction	Yes	The volumes of removed

Reference	Principal Requirements	Design or Construction Related	Site visit required by qualified geoenvironmental engineer?	Supporting Documentation
	The walls and base of this excavation should be sampled against human health screening criteria prior to basement construction.		Sampling of base and walls of excavation	material and waste documentation (including destination of material) photographic record with excavated areas shown on site plan Laboratory results
Soil cover system	A certified soil cover system will be required across the development in areas of public soft landscaping, with a required thickness of 450mm. The soil cover can comprise 150mm topsoil underlain by 300mm subsoil with a geotextile separator layer at the base.	Construction	Yes Verification of installation of cover system	Photographic record Site plan indicating area of cover system Laboratory results for any imported or reused soils
Watching Brief	A watching brief is to be undertaken during excavation works for any potential asbestos containing materials or unforeseen contamination. Should unexpected areas of contamination be encountered, a qualified geoenvironmental engineer is to be informed to conduct a site visit, take additional samples and assess the risk, as required. The regulators should also be notified. Excavation to remove any grossly impacted contamination should be undertaken in accordance with the RMS.	Construction	Yes If unexpected contamination is uncovered	Site visit reports including photographs Chemical test results Revised risk assessment
New Services	Consultation should be undertaken with the water company to confirm the best type of material for any new services, which should be installed within a clean service corridor.	Design and construction	-	Confirmation of pipework material and acceptance of material choice by water supply company.