

ASHBURNHAM HOUSE
1 MAITLAND ROAD
LION BARN ESTATE
NEEDHAM MARKET
SUFFOLK
IP6 8NZ

Our Ref CJS/13804GI2/PJB

16 November 2015

Higgins Construction
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Loughton
Essex
IG10 3SD

RECEIVED

17 NOV 2015

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By Email and Post -
shawn.nudd@higginsconstruction.co.uk

For the attention of Mr Shawn Nudd

Dear Shawn

**PLENDER STREET, CAMDEN, LONDON NW1 0LB
- SUPPLEMENTARY ASBESTOS INVESTIGATION**

1. Introduction

Following RSA Geotechnics' reports (13804SI and 13804GI) dated March and May 2014, further investigation was required due to significant presence of asbestos identified at the north eastern half of the site. The original site investigation reported in March 2014 encountered asbestos at WS8. It was requested that further investigation of this area was carried out and a further six trial pits and eleven window sample boreholes were undertaken as part of the supplementary investigation (report number 13804GI).

Goad Insurance maps dating from 1966 indicated a structure comprising an asbestos roof was located in the area of WS8 as shown on drawing number 13804GI/1. The supplementary investigation identified asbestos in eighteen of the forty nine samples including loose fibres of chrysotile, amosite and crocidolite. The asbestos was present within the made ground extending to a depth of 2.0 m. The amount of asbestos encountered is considered to originate from more than the identified shed on drawing number 13804GI/1.

At the time of the most recent investigation demolition had yet to occur along the western half of the site and access was not possible to the southern area of the site. It was recommended that further investigation was undertaken post-demolition when the area could be accessed. The made ground comprised brick rubble and included former foundations in-situ. The site was known to have suffered severe bomb damage during WWII and it is believed the made ground comprises the remnants of the demolished houses caused by the bombing.

This letter report (13804GI2) covers the further window sample boreholes to assess the risk posed by asbestos across the remainder of the site.

The brief for the second supplementary investigation was developed by RSA Geotechnics and included items detailed in RSA Geotechnics' quotation CJS/Quo20 dated 17 June 2015. The Clients' request was for an assessment of potential asbestos contamination only, as other contaminants had been risk assessed previously in RSA Geotechnics' report number 13804SI dated March 2014.

This report has been prepared for the sole internal use and reliance of Higgins Construction Plc. It shall not be relied upon by other parties without the express written authority of RSA Geotechnics Limited. If an unauthorised third party comes into possession of this report they rely on it at their own risk and the authors owe them no duty of care and skill.

The investigation was authorised by Shawn Nudd of Higgins Construction Plc in a completed RSA order form within an email dated 18 June 2015 with reference 62083.

2. Site Settings

2.1 Site Location

The site was located south of Plender Street, about 900 m north west of London St Pancras railway station. It can be approximately located by National Grid Reference TQ 293 835.

2.2 Site Description

The site was situated in a predominantly residential area although the northwest portion of the site comprised a row of low rise commercial properties. The site comprised a 'T' shaped parcel of land measuring approximately 85 m northeast to southwest and 80 m northwest to southeast, bounded by Plender Street to the north, Camden Street to the east and a former public house with a beer cellar to the west. The southern portion of the site extended along Bayham Place adjacent to existing tennis courts/school playground to the east and Rainham House, a high rise block of flats, to the west.

Since the previous fieldwork undertaken in 2014 the proposed development had been constructed across the north of the site. The southern portion of the 'T' was undergoing development and at the time of the site visit an excavator was removing soil in the southern area (Figure 1). A container was also located towards the southern boundary (Figure 2). Service drawings were provided by the Client on-site for the 'as-built'



Figure 1

services. The main service runs were at the proposed locations of WS101 and WS102 with an electrical substation located adjacent to proposed WS101 (Figure 3).



Figure 2



Figure 3

3. Ground Investigation

3.1 Fieldwork

Asbestos was found in the vicinity of WS8 during the original site investigation and a supplementary investigation encountered further asbestos across the north eastern half of the site.

Five further window samples were proposed targeting areas of soft landscaping and to provide coverage across the southern limb to the site. The proposed window sample locations are shown on drawing number 13804GI2/1 appended to this report. Due to the presence of services it was not safe to undertake the proposed boreholes at WS101 and WS102. The site foreman, Keith Fisher, informed the site technicians that WS102 was in an area that had previously been remediated due to its proximity to the north eastern half of the site.

Ongoing groundworks prevented access to WS105 as the area was been used to store spoil. Therefore only two window sample boreholes (WS103 and WS104) were undertaken as part of the investigation.

The window sampling was carried out on 20 October 2015 using a compact, rubber track mounted, percussive window sampling rig which utilised a sliding hammer to drive steel tubes into the ground. Disturbed 'D' samples were retrieved at approximately 0.5 m intervals from the soil core. The soils were logged on site by a geotechnical engineer.

The contamination sampling was carried out generally in accordance with BS 10175: 2011, 'Investigation of Potentially Contaminated Sites – Code of Practice'.

Full details of the fieldwork and ground conditions encountered are shown on the window sample logs later in this report.

3.2 Laboratory Testing

The programme of laboratory testing was designed to screen soils for the presence of asbestos fibres. Six samples of shallow soil were tested for the presence of ACM.

The asbestos screening was carried out between 22 and 27 October 2015 on selected samples to determine whether any contamination was evident from previous uses of the site. The screening was undertaken by QTS Analytical Ltd, which has both UKAS and MCERTS accreditation.

The results of the laboratory testing are given on the test reports later.

4. Ground Conditions

4.1 Ground Investigation Data

This aspect of investigation was only concerned with the made ground on site and the window sample boreholes were only extended to the base of made ground on site.

An upper layer of made ground extending to approximately 0.6 m depth comprised light brown medium to coarse sand with much fine to coarse concrete, a little subangular fine to medium brick and flint gravel, rare fine to medium gravel size flexible surfacing and rare rootlets.

This was underlain in both window samples by a former cobble road 100 mm thick. The cobbles are shown in Figure 4. Underlying the cobbles in WS103 was medium to coarse brown sand with some subangular fine to coarse flint gravel and rare fine gravel size brick extending to 0.8 m probably representing the former road subbase.



Figure 4

In WS104 the soil below the cobblestones comprised soft brown very sandy silty clay with some subangular fine to coarse flint gravel and occasional concrete with rare nails, and rare gravel size fragments of glass and ceramic pipes. The lower layer of made ground extending to 1.8 m in WS103 comprised similar material to that encountered beneath the cobbles in WS104, but without the glass, nails and ceramic fragments.

Natural ground interpreted to be the London Clay Formation was encountered beneath the made ground and comprised firm orange brown silty clay with occasional orange grey layers of silt.

No groundwater was encountered during the investigation.

5. Geoenvironmental Considerations

5.1 Asbestos Testing

Six samples of made ground were inspected for the presence of asbestos fibres using an optical microscope.

Potential asbestos containing materials (ACM) were not identified in the soils during the logging of the exploratory holes. Of the six samples sent for asbestos screening two were found to contain asbestos. Amosite and chrysotile within insulation lagging board were identified in WS103 at a depth of 0.4 m and loose fibres of amosite were identified in WS104 at 0.5 m depth.

Full details of the asbestos results can be found in the appended test reports.

5.2 Recommendations

The asbestos identified is likely to have originated from buildings in the area that were destroyed during WWII. Asbestos cement sheeting was also identified within the roof of terraced garages previously located along the central-south area of the site (13804GI/1), close to WS103 and WS104. The greatest hazard will be for groundworkers and off-site receptors due to windblown dust.

The made ground in WS103 and WS104 was distinctively different from that encountered previously in the north eastern area of the site which comprised brick rubble. At a depth of 0.55 m an old cobble road was encountered in the southern area of the site and it is possible that material beneath this pre-dates bulk production and use of asbestos in the UK. The road was identified on historic maps dating back to 1851.

The development had been built at the time of the second supplementary site investigation and the final landscaping works and hard surfacing were being prepared in the southern area of the site. The locations of WS103 and WS104 are in areas of proposed hard surfacing and therefore any asbestos within the soil will be capped during the construction process breaking a link to end users of the development.

The presence of loose fibres prevents visual identification of ACM directly on site. It is therefore recommended that the remaining areas of groundwork are undertaken with the assumption that asbestos may be present above the cobblestone road construction. The proposed development includes limited soft landscaping approximately 5 m west of WS103 and WS104. In these locations a clean cover system should be installed to the top of the cobblestone road or an equivalent depth, approximately 0.55 m. A deter-to-dig membrane should be placed beneath the clean cover system to prevent further excavation into potentially contaminated soils.

Once the results of the asbestos testing in WS103 and WS104 had been received an engineer from RSA Geotechnics Ltd informed the site manager of the positive ACM identification to ensure further works progressed in a manner which would not create dust.

It is understood that asbestos air monitors had been installed around the site prior to construction of the development and these should remain in place until all groundworks are complete. Groundworks should progress in such a manner that no dust is created by dampening down the soils. All site workers should be made aware of the potential to come into contact with loose asbestos fibres and appropriate PPE should be adopted.

Construction workers are likely to be exposed to the made ground on site. Groundworkers should be made aware of the sitewide elevated lead concentrations identified in RSA Geotechnics report number 13804SI dated March 2014. They should also be made aware of the asbestos fibres and insulation board found in the upper 0.5 m of made ground at the southern area of the site as identified on drawing number 13804GI2/1. The relevant levels of personal protective equipment will be required to mitigate the risk of adverse effects. Any groundworkers in the area of asbestos contamination should wear Tyvek® overalls, disposable shoe covers and be fitted with a face mask including P3 filter. Any asbestos containing materials identified should be appropriately removed and disposed of by a specialist contractor. The disposable overalls, covers and used masks should be disposed of as hazardous waste and used only once.

The area around the identified asbestos should be regularly dampened down and only disturbed when necessary for site-works. It is recommended that air monitoring is undertaken around the perimeter of the site and any gaps within the perimeter hoarding are fully enclosed between the site and the general public.

5.3 Waste Disposal

The remediation of the contaminated soils in areas of proposed soft landscaping will generate volumes of contaminated soils to be removed from the site.

Any asbestos containing materials (ACM), or soils containing asbestos containing materials, will need to be regarded as Hazardous Waste and therefore will be subject to the consignment note procedures given in the Hazardous Waste Regulations. Asbestos containing materials will generally be considered to be 'Stable Non-Reactive Hazardous' (SNRH) waste and will therefore need to be disposed of at a Hazardous landfill or a Non-Hazardous landfill which has separate cells to take SNRH waste. However, if the amount of asbestos present as fibres within the soils constitutes less than 0.1% by weight, the soils can potentially be classed as Non Hazardous.

Further recommendations on the disposal of waste can be found in RSA Geotechnics report number 13804SI dated March 2014. Further advice can also be sought from the local waste regulatory authority, who should also be able to offer advice on which landfills are available to accept the waste.

6. Conclusions

It is concluded that the proposed final development will cap the majority of asbestos containing soils on-site with hard pavements however some remediation will be required in the areas of soft landscaping. A clean cover system to the top of the

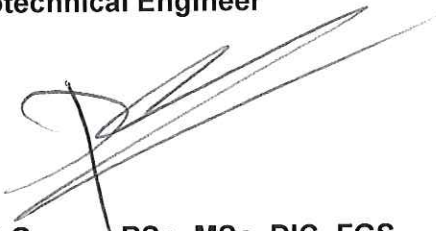
former cobblestone road or equivalent depth (0.55 m) should be installed with a deter-to-dig membrane or 150 mm layer of clean crushed concrete at the base.

We trust the above letter report will fulfil your present requirements but should you need further advice or investigation, please contact us again.

Yours sincerely
RSA Geotechnics Ltd



Chris Steward, BSc, FGS
Geotechnical Engineer



Phil Gawne, BSc, MSc, DIC, FGS
Technical Director

Encs Window Sample Hole Logs
Chemical Contamination Analyses Results
Plan Showing Potential Asbestos Source – Drawing Number 13804GI/1
Proposed Window Sample Hole Location Plan – Drawing Number
13804GI2/1

Water Level observations during boring, depths below GL.					
Strike	Depth Obs.	Depth after			
		5min	10 min	15 min	20 min

[illegible]



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Rose Lane Industrial Estate
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QTS Environmental Report No: 15-36825

Site Reference: Plender Street, Camden, London NW1 0LG

Project / Job Ref: 13804GI2 Schedule 1

Order No: None Supplied

Sample Receipt Date: 22/10/2015

Sample Scheduled Date: 22/10/2015

Report Issue Number: 1

Reporting Date: 27/10/2015

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate					
QTS Environmental Report No: 15-36825		Date Sampled	20/10/15	20/10/15	20/10/15
RSA Geotechnics Ltd		Time Sampled	None Supplied	None Supplied	None Supplied
Site Reference: Plender Street, Camden, London		TP / BH No	WS3	WS3	WS4
NW1 OLG					
Project / Job Ref: 13804GI2 Schedule 1		Additional Refs	D2	D3	D1
Order No: None Supplied		Depth (m)	0.40	1.00	0.15
Reporting Date: 27/10/2015		QTSE Sample No	173760	173761	173762

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Detected	Not Detected	Not Detected	Detected	Not Detected
Sample Matrix	Material Type	N/a	NONE	Insulation lagging in soil			Loose fibres	
Asbestos Type	PLM Result	N/a	ISO17025	Amosite & Chrysotile			Amosite	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C
 Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and Interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Graham Revell

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ⁽⁵⁾



QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate					
QTS Environmental Report No: 15-36825		Date Sampled	20/10/15		
RSA Geotechnics Ltd		Time Sampled	None Supplied		
Site Reference: Plender Street, Camden, London NW1 0LG		TP / BH No	WS4		
Project / Job Ref: 13804GI2 Schedule 1		Additional Refs	D4		
Order No: None Supplied		Depth (m)	1.50		
Reporting Date: 27/10/2015		QTSE Sample No	173765		

Determinand	Unit	RL	Accreditation				
Asbestos Screen	N/a	N/a	ISO17025	Not Detected			
Sample Matrix	Material Type	N/a	NONE				
Asbestos Type	PLM Result	N/a	ISO17025				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C
 Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

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Asbestos Analyst: Graham Revell

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ^(S)

Soil Analysis Certificate - Methodology & Miscellaneous Information	
QTS Environmental Report No: 15-36825	
RSA Geotechnics Ltd	
Site Reference: Plender Street, Camden, London NW1 0LG	
Project / Job Ref: 13804G12 Schedule 1	
Order No: None Supplied	
Reporting Date: 27/10/2015	

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

Date 19 MAY 2014

Scale NOT TO SCALE

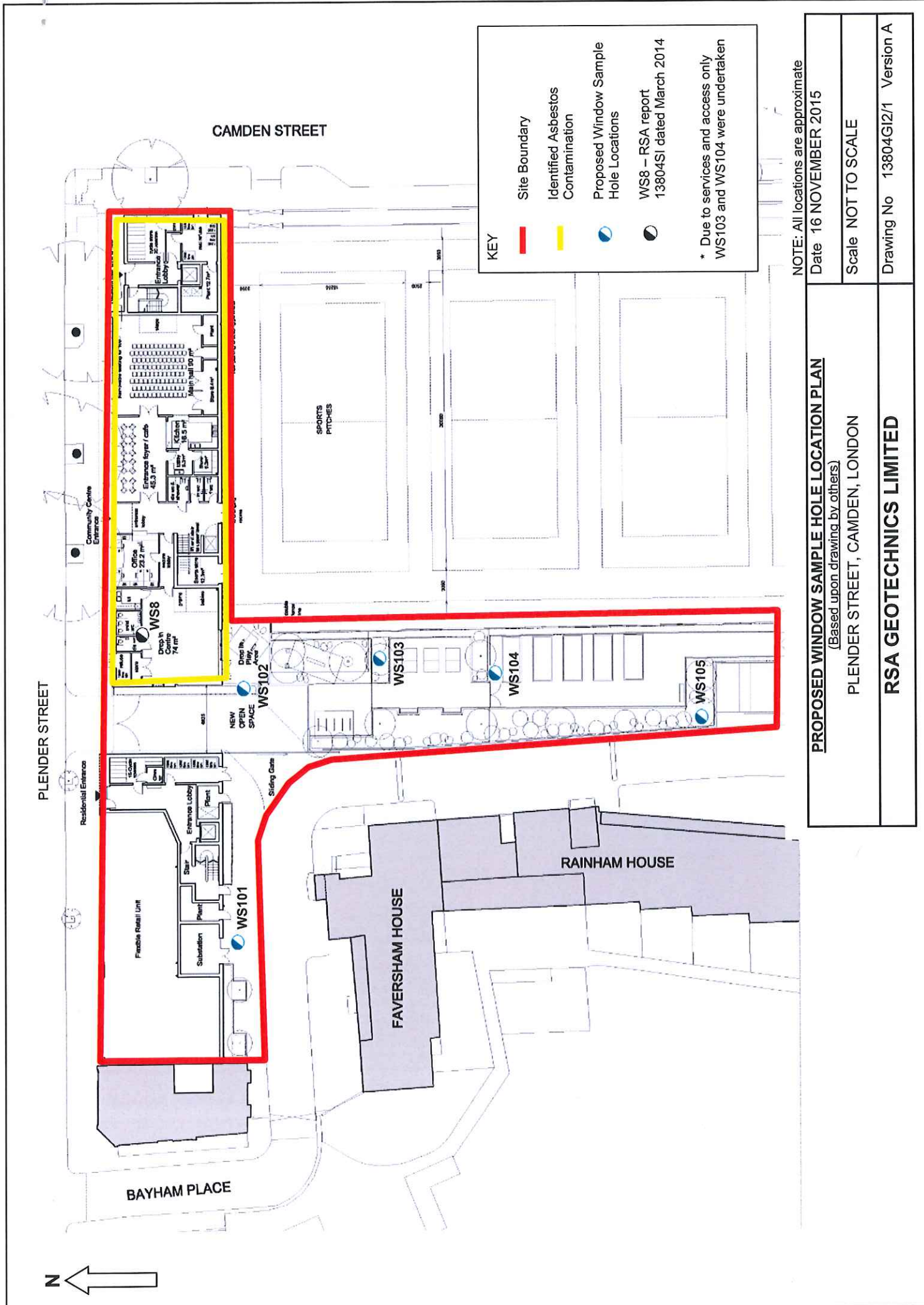
Drawing No 13804GI/1 Version A

PLAN SHOWING POTENTIAL ASBESTOS SOURCE

(Based upon Landmark Envirocheck)

PLUNDER STREET, CAMDEN, LONDON

RSA GEOTECHNICS LIMITED



KEY

- Site Boundary
- Identified Asbestos Contamination
- Proposed Window Sample Hole Locations
- WS8 – RSA report 13804SI dated March 2014

* Due to services and access only WS103 and WS104 were undertaken

NOTE: All locations are approximate

PROPOSED WINDOW SAMPLE HOLE LOCATION PLAN (Based upon drawing by others)	
Date 16 NOVEMBER 2015	Version A
Scale NOT TO SCALE	Drawing No 13804GI2/1
RSA GEOTECHNICS LIMITED	