



Geotechnical and Geo-environmental Consultants

GEO-ENVIRONMENTAL SITE INVESTIGATION REPORT

**102 NORTHUMBERLAND PARK
LONDON
N17 0TS**

**Reference Number 2293/Rpt 1v1
June 2019**

Prepared for

Billericay Electrical Ltd
Unit 6 Radford Crescent
Billericay
Essex
CM12 0DU

By

Brown 2 Green Associates Ltd
Suite 1, Wenden Court
Station Road
Wendens Ambo
Saffron Walden, Essex
CB11 4LB

Tel: 01799 542473
Web address: www.brown2green.co.uk

Client	Billericay Electrical Ltd
Client Address	Unit 6 Radford Crescent Billericay Essex CM12 0DU
Report Title	Geo-environmental Site Investigation Report: 102 Northumberland Park, London, N17 0TS
Reference Number	2293/Rpt 1v1
Date	June 2019

Prepared By	Philip Miles BSc, MSc, C Geol (Director)	
Reviewed By	Eileen Miles Dip (Open), Cert (Open) (Director)	
Reviewed and Approved By	Philip Miles BSc, MSc, C Geol (Director)	

TABLE OF CONTENTS

1	INTRODUCTION	2
1.1	Background	2
1.2	Proposed Development	2
1.3	Objectives	2
2	SITE LOCATION AND SETTING	4
2.1	Site Location	4
2.2	Historic Land Use	4
2.3	Geology and Hydrogeology	4
2.4	Hydrology	5
3	INITIAL CONCEPTUAL MODEL	6
3.1	Potential Sources of Contamination	8
3.2	Potential Pathways	8
3.3	Potential Receptors	8
3.4	Discussion of Potential Pollutant Linkages	8
4	SITE INVESTIGATION	11
4.1	Exploratory Fieldwork	11
4.2	Chemical Analysis	11
5	RESULTS	13
5.1	Summary of Site Investigation Observations	13
5.2	Laboratory Results	13
6	RISK ASSESSMENT	14
6.1	Human Health	14
6.2	Ground Gas	17
6.3	Controlled Water	17
6.4	Planting	19
6.5	Construction Materials	20
6.6	Water Supply Pipe	20
7	REVISED CONCEPTUAL MODEL	21
8	CONCLUSIONS AND RECOMMENDATIONS	22
8.1	Conclusions	22
8.2	Recommendations	22

FIGURES

Figure 1	Site Location Plan
Figure 2	Proposed Development Layout
Figure 3	Current Site Layout
Figure 4	Exploratory Hole Location Plan

APPENDICES

Appendix I	Limitation and Constraints
Appendix II	Geological Logs
Appendix III	Chemical Analysis Report
Appendix IV	Statistical Assessment Print-out
Appendix V	Asbestos Risk Assessment Print-out

EXECUTIVE SUMMARY

This report describes the findings of a Geo-environmental Site Investigation of 102 Northumberland Park, London, N17 0TS. It is proposed to redevelop the site for residential usage.

The Conceptual Model prepared for the site did identify potentially active pollution linkages between the historical land use of the site and the future use as residential.

The investigation consisted of the drilling of boreholes and the installation of monitoring wells. During the site work soil and groundwater samples were obtained and submitted for chemical analysis.

The following conclusions were made:

The Tier I Human Health Risk Assessment has identified the presence of concentrations of lead and individual PAHs within the made ground at levels that will pose a significant risk to human health of future residents where these concentrations are present within areas of soft landscaping in private gardens.

The Tier I Controlled Water Risk Assessment has determined that there are no unacceptable concentrations of potential contaminants within the underlying soils that would pose a potential risk to controlled waters.

The risk assessment for bio-genic ground gas concluded that there is no risk from ground gas.

The risk assessment in respect to the future planting and towards sensitive ecological receptors identified that the determinants at the site would not pose a potential risk.

The risk assessment in respect to water supply infrastructure identified that the determinants at the site would not pose a potential risk to the integrity of PE or PVC pipework.

Recommendations for remediation have been made.

1 INTRODUCTION

1.1 Background

Brown 2 Green Associates Ltd have been commissioned by Billericay Electrical Ltd to undertake a Geo-environmental Site Investigation of 102 Northumberland Park, Tottenham, London, N17 0TS. The site is located at National Grid Reference 534320, 191400. The site location is presented in Figure 1.

A Phase 1 Desk Study was previously completed by Lister Consulting Ltd. The findings of the Desk Study are presented in the report titled:

- Phase 1 Desk Study Report, L102 Northumberland Park, London, dated January 2019; Ref 2475_FP01.0-2019.

The report recommended that a Phase 2 Intrusive Site Investigation should be undertaken. This report presents the findings of the Phase 2 Intrusive Site Investigation. A copy of the Phase 1 Desk Study was submitted to the local planning authority for the discharge of the planning condition 11a.

This report should be read in conjunction with the Phase 1 Desk Study.

1.2 Proposed Development

It is proposed to convert the existing public house to residential and to construct a new residential building containing six apartments and two houses to the rear. The proposed development is shown on drawing number FPT-12 prepared by BB Partnership. The proposed development layout is presented in Figure 2.

1.3 Objectives

The objectives of the work are to provide an Environmental Risk Assessment to inform about potential re-development of the site, address the requirements of the National Planning Policy Framework¹ and Planning Practice Guidance. These objectives are achieved by:

- Investigation of any identified pollution linkages to determine any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors; and,
- Provide a factual and interpretive report and recommendations on any potential development issues.

The investigation has been completed using the initial Conceptual Site Model (CSM) developed as part of the Desk Study. This CSM examines potential Source-Pathway-Receptor contaminant linkages in relation to identified or potential contamination issues at the site and vicinity, incorporating them into a Preliminary Risk Assessment. This report has been completed in accordance with CLR11².

¹ National Planning Policy Framework, Department for Communities and Local Government, July 2018.

² Contaminated Land Research Report CLR 11, Environment Agency (2004). Model Procedures for the Management of Contaminated Land: Risk Assessment Procedure.

The Preliminary Risk Assessment seeks to establish firstly whether unacceptable risk as defined in Part 2A of the Environmental Protection Act 1990 is present and secondly whether a possibility of harm to controlled waters, human health or property is present and further investigation is therefore needed to better inform about risk assessment.

Consideration of geotechnical/engineering aspects of the proposed development falls outside the scope of this assessment.

2 SITE LOCATION AND SETTING

This section presents a summary of the site location and setting. A detailed description can be found in the previous report. Where changes have been identified, these have been noted.

2.1 Site Location

The site is located in a residential area on the corner of Northumberland Park and Turlock Road. The site location is presented in Figure 1.

The site layout is presented in Figure 3.

The site, rectangular in shape, comprised a public house at the northern site boundary, occupying approximately 50% of the overall site area. At the time of the site work, refurbishment of the building had commenced. This building comprised two floors and a basement and was built from standard masonry construction.

The remaining 50% of the site area was formed by an associated open garden area which also comprised two wooden bars / shelters. The ground cover of the external areas of the site was recorded as mixed tarmacadam / asphalt and paving slabs with a concrete access path extending from the garden to the rear entrance of the building.

The topography of the site was generally undulating with a slight downwards slope to the centre of the site.

2.2 Historic Land Use

The Desk Study identified that by 1867, the northern half of site was developed and contained a large building with an associated garden area in the south. Two small structures were identified attached to the rear (south) of the main building from 1886. The 1896 mapping record identifies the building as a public house and small structures, likely greenhouses, were present within the garden area. The southern part of the site had been cleared including greenhouse structures by 1935. No other significant changes were identified until the present.

2.3 Geology and Hydrogeology

The British Geological Survey website indicates that the site is underlain by the following geology:

Drift/Solid	Geological Unit	Description	Aquifer Classification
Drift/Superficial	Enfield Silt member	Clay and silt	Unproductive
	Kempton Park Gravel Formation	Sand and Gravel	Secondary A
Solid	London Clay Formation	Stiff grey clay	Unproductive

Geological logs for boreholes drilled within the local area indicates the London Clay Formation to be 27m thick. The London Clay Formation is underlain by the Lambeth Group, Thanet Sand and Chalk. The top of the chalk is approximately 47m below ground level.

The nearest active licensed groundwater abstraction is located 665m from the site. A groundwater abstraction well for the potable water supply is located 840m to the south east. Groundwater will be abstracted from the chalk. The site is located in a Zone 2 Source Protection Zone. The

presence of the London Clay Formation will provide protection to the deeper aquifers with the Thanet Sand Formation and the chalk.

2.4 Hydrology

The nearest surface water feature is a drainage ditch located 780m to the west.

There are no licensed surface water abstraction points within 500m radius of the site.

The database indicates that the site does not lie in a fluvial or tidal floodplain.

3 INITIAL CONCEPTUAL MODEL

Lister Consulting Limited developed a Conceptual Model to identify potential sources, migration pathways and receptors within the study area. Assuming there is an active pollution pathway linkage between the source and receptor an assessment has been made of the level of risk. The level of risk is a consideration of both:

- the likelihood of an event (probability) [takes into account both the presence of the hazard and receptor and the integrity of the pathway]; and
- the severity of the potential consequence [takes into account both the potential severity of the hazard and the sensitivity of the receptor].

The classifications of the likelihood of an event occurring based on C552 CIRIA, 2001³ are presented below:

Likelihood		Definition
High Likelihood	> 90% of hazard receptor linkage	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor that there is harm or contamination
Likely	45-90% of hazard receptor linkage	There is a pollution linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term
Low likelihood	10-50% of hazard receptor linkage	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	10% of hazard receptor linkage	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

The classifications of the severity of an event are presented below:

Severity	Category	Definition	Examples
Severe: It is likely that the hazard source could cause harm to a designated receptor and harm would be significant.	Humans	Short term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA.	High concentrations of cyanide on the surface of an informal recreation area.
	Controlled Water	Short term risk of pollution of sensitive water resource.	Major spillage of contaminants from site into controlled water.
	Property	Catastrophic damage to building or property	Explosion causing building to collapse.
	Ecological systems	A short term risk to a particular ecosystem, or organism forming part of such an ecosystem.	Loss of ecosystem.
Medium: It is possible that the hazard source could cause harm to a designated receptor, but it is unlikely that the harm would be significant	Humans	Chronic damage to human health ("significant harm" as defined in the DETR, 2000).	Concentrations of a contaminant from site exceeds the generic, or site specific assessment criteria
	Controlled Water	Pollution of sensitive water resources.	Leaching of contaminants from a site to a Principal Aquifer.
	Ecological systems	A significant change in a particular ecosystem, or organism forming part of such an ecosystem.	Death of a species within a designated nature reserve.

³ Contaminated land risk assessment. A guide to good practice (C552), D J Rudland, R M Lancefield and P N Mayell.

Severity	Category	Definition	Examples
Mild: It is possible that the hazard source could cause significant harm to a designated receptor, however it is likely to be mild	Controlled Waters	Pollution of non-sensitive water resource.	Pollution of non-classified groundwater
	Property	Significant damage to buildings/structures and crops ("significant harm" as defined in the DETR, 2000). Damage to sensitive buildings/structures or the environment.	Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor: The potential hazard source cannot cause significant harm to the receptor.	Financial or project	Harm, although not necessarily significant harm, which may result in a financial loss, or an expenditure to resolve.	
	Humans	Non-permanent health effects to human health (easily prevented by means such as Personal Protective Clothing, etc).	The presence of contaminants at such concentrations that protective equipment is required during site works.
	Property	Easily repairable effects of damage to buildings/structures	The loss of plants in landscaping scheme. Discolouration of concrete.

The comparisons of Likelihood against Severity are presented below:

		Severity			
		Severe	Medium	Mild	Minor
Likelihood	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

The potential consequences of risk classifications are presented below:

Very High Risks	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High Risks	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate Risks	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Moderate / Low Risks	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be medium to mild and professional judgement is required. Some remediation works may be required in the long term where high sensitivity receptors are involved.
Low Risks	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low Risks	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

3.1 Potential Sources of Contamination

On-site Potential Sources

Lister Consulting identified the following potential on-site sources of contaminants that may plausibly impact the site:

- General quality of the made ground resulting from construction and demolition of buildings.

Off-site Potential Sources

Lister Consulting identified the following potential off-site sources of contaminants that may plausibly impact the site:

- Numerous engineering works within close proximity of the site.

3.2 Potential Pathways

Plausible pathways identified for each contaminant are presented in the Initial Conceptual Model detailed overleaf.

3.3 Potential Receptors

Brown 2 Green Associates Ltd has identified the following possible receptors:

- Human health - future users of the site (residential with private gardens).
- Human health - construction workers.
- Controlled water (groundwater).
- Buildings and construction materials (concrete).
- Water supply pipework.
- Future planting.

3.4 Discussion of Potential Pollutant Linkages

Potential pollution linkages identified are presented in the Initial Conceptual Model detailed overleaf.

Initial Conceptual Model and Risk Assessment

Potential Contaminant	Potential migration pathway	Potential Receptors	Likelihood	Severity	Risk Classification	Comments Active/Inactive
On-site Sources						
Made ground						
Metals (As, Cd, Cr, Pb, Hg, Se, Ni, V) and other inorganics	Ingestion of contaminated soil and dust by direct contact and soil attached to home grown vegetables.	Future site users	Low	Medium	Moderate to low	Potentially active in areas of soft landscaping and private gardens. Further assessment required.
	Inhalation of dust (indoor and outdoor).					
	Ingestion of contaminated soils by direct.	Construction workers	Unlikely	Mild	Very Low	Potentially active but short term exposure. General site practices and site PPE (gloves) will reduce exposure.
	Inhalation of dust (indoor and outdoor).					
Metals (Cu, Ni, Zn)	Uptake by plants	Planting and soft landscape areas	Likely	Minor	Low	Potentially active in areas to be developed as soft landscaping and gardens. Further assessment required.
Total Petroleum Hydrocarbons, PAHs and diesel and oil	Ingestion of contaminated soil and dust by direct contact and soil attached to home grown vegetables.	Future site users	Likely	Medium	Moderate	Potentially active in areas of soft landscaping and private gardens. Further assessment required.
	Inhalation of dust (indoor and outdoor).					
	Contact with contaminated soils.					
	Inhalation of vapours.					

Potential Contaminant	Potential migration pathway	Potential Receptors	Likelihood	Severity	Risk Classification	Comments Active/Inactive
Total Petroleum Hydrocarbons, PAHs and diesel and oil	Ingestion of contaminated soil and dust by direct contact.	Construction workers	Unlikely	Mild	Very Low	Potentially active but short term exposure. General site practices and site PPE (gloves) will reduce exposure.
	Inhalation of dust (indoor and outdoor).					
	Contact with contaminated soils.					
	Inhalation of vapours.					
	Downward and lateral migration.	Groundwater	Low likelihood	Mild	Low	Potentially active.
	Contact with contaminated soils.	Water supply infrastructure	Likely	Medium	Moderate	Potentially active.
Asbestos	Inhalation of fibres.	Future site users and construction workers	Low	Medium	Moderate to low	Potentially active.
Ground gas	Through soil.	Future users and buildings	Low likelihood	Severe	Moderate	Potentially active.
pH and soluble sulphate	Contact	Concrete in foundations	Likely	Mild	Moderate to low	Potentially active.
General engineering works in surrounding area						
Total Petroleum Hydrocarbons, PAHs	Lateral migration of contaminants to down hydraulic gradient in groundwater	Future site users	Low	Medium	Moderate to low	Potentially active.

4 SITE INVESTIGATION

4.1 Exploratory Fieldwork

Five boreholes (WS1 to WS5) were drilled with a window sampling drilling rig on 3rd May 2019. The borehole target depth was 4m below ground level, however due to the density of the underlying gravel formation, boreholes were terminated at shallower depths. The sample locations were determined to provide a general assessment of the ground quality beneath the site. The sampling locations are illustrated in Figure 4.

Soil samples destined for chemical testing were collected in laboratory prepared jars. Samples for organic analysis were placed in amber glass jars, samples for volatile analysis in vials with septums and samples for inorganic analysis in plastic tubs. During the site works recovered soils were geologically logged by an experienced Geo-environmental Engineer. The geological logs are presented in Appendix II.

Groundwater samples were obtained from the monitoring well installed in WS2 on 14th May 2019 following purging of the water in the well (at least three volumes). All other monitoring wells were dry. The purging and the collection of water samples were completed using dedicated disposable bailers. Samples were transferred to laboratory prepared bottles; samples for organic analysis were placed in amber glass bottles, samples for volatile analysis in vials with septums and samples for inorganic analysis were placed in plastic bottles. Samples were transported to the laboratory in cool boxes with blue ice under chain of custody.

4.2 Chemical Analysis

The soil samples were submitted to Chemtest Ltd of Newmarket, Suffolk. The chemical analysis was carried out under UKAS/MCERTS accreditation protocols. The chemical analysis was carried out in accordance with the findings of the Desk Study and the Observations made during the site works. The chemical testing programme included.

- Metals Suite (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, V);
- Speciated PAH (USEPA 16);
- TPH – CWG;
- Total Cyanide;
- pH;
- Soil organic matter; and
- Soluble Sulphate.

The groundwater samples were submitted to Chemtest Ltd, of Newmarket, Suffolk. The chemical analysis was carried out under UKAS accreditation protocols. The chemical testing programme included:

- Metals Suite (Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, V);
- Speciated PAH (USEPA 16);
- TPH – CWG;
- pH.

To provide an assessment of the risk to groundwater from the leaching of contaminants from the made ground, selected samples of the made ground were subjected to leachate testing. The leachate was analysed for the following suite:

- Metals Suite (Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, V);
- Speciated PAH (USEPA 16);
- TPH – CWG;
- pH.

5 RESULTS

5.1 Summary of Site Investigation Observations

Ground Conditions

The geological logs are presented in Appendix II.

Made Ground

The boreholes indicate that the site is underlain by up to 0.8m of made ground. The made ground generally consists of asphalt or paving slab hand standing over a dark brown very clayey fine grained sand with occasional gravels of flint, concrete, brick, ash, coal and tile.

Natural Strata

The made ground is underlain by between 0.2 and 0.95m of light orange brown, very slightly silty clay. The silt is underlain by very dense, light brown and light grey very sandy gravel.

Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of contamination was noted.

Groundwater Conditions

During the drilling groundwater was struck in WS2 at 2.8m in the sandy gravel. On the 14th May 219, groundwater was recorded at 1.89m bgl.

It should be noted that groundwater levels can fluctuate seasonally and therefore, may be encountered at higher or lower elevations than those recorded in this site investigation.

5.2 Laboratory Results

The chemical analysis of the soil samples and the leachate testing was undertaken by I2 Ltd under MCERT and UKAS accreditation. The test certificates are included in Appendix III.

The chemical analysis of the groundwater samples was undertaken by Chemtest Ltd of Newmarket under UKAS accreditation. The test certificates are included in Appendix III.

6 RISK ASSESSMENT

6.1 Human Health

Approach

Brown 2 Green Associates Ltd has undertaken a Tier 1 Human Health Risk Assessment to determine if any potential contaminants within the underlying soil pose an unacceptable level of risk to the identified human health receptors.

At a Tier 1 Stage the long term (chronic) human health toxicity of the soil has been assessed with reference to Generic Assessment Criteria (GAC) detailed in Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham (Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3086). If no generic GAC (CIEH/LQM) is available, reference has been made to Category 4 Screening Values or GAC have been determined by Brown 2 Green Associates Ltd using CLEA 1.06 with adjustments based on input data used in the calculation of Category 4 Screening Values.

Where appropriate for determinants that exceed the adopted Tier 1 Screening Levels, in accordance with the CIEH (2008) Guidance on Comparing Soil Contamination Data with Critical Concentration the 95%ile upper confidence level of the measured mean has been compared to the relevant GAC threshold, to determine whether the degree of contamination detected is statistically significant.

For the assessment of risk to human health from groundwater a Qualitative Risk Assessment has been undertaken. Within this section we have only considered the risk to users of the site. An assessment of risk to human health beyond the boundaries of the site is considered as part of the risk to controlled waters.

Soil

For the purposes of the Tier 1 Assessment, Brown 2 Green Associates Ltd have initially compared the laboratory test data directly to the relevant Brown 2 Green Associates Ltd GAC for residential with plant uptake end use with a soil organic matter content of 2.5%. The results of this direct comparison is presented below:

Determinant	Units	GAC	n	MC	Locations above GAC	Path-way	Assessment
Arsenic	mg/kg	37	7	23	-	1	No Further Action
Cadmium	mg/kg	11	7	2.3	-	5	No Further Action
Chromium	mg/kg	910	7	33	-	4	No Further Action
Copper	mg/kg	2400	7	130	-	5	No Further Action
Mercury (Inorganic)	mg/kg	40	7	1.3	-	1	No Further Action
Nickel	mg/kg	130	7	28	-	1	No Further Action
Lead *	mg/kg	200	7	530	WS2 (0.1m-0.3m) WS3(0.1m-0.3m) WS4(0.1m-0.3m) WS5(0.15m-0.3m)	1, 4	Further Assessment (see below)
Selenium	mg/kg	250	7	2.4	-	1	No Further Action

Determinant	Units	GAC	n	MC	Locations above GAC	Path-way	Assessment
Zinc	mg/kg	3700	7	350	-	5	No Further Action
Cyanide (total)***	mg/kg	791	5	<1	-	1	No Further Action
Naphthalene	mg/kg	5.6	7	< 0.05	-	5, 2	No Further Action
Acenaphthylene	mg/kg	420	7	< 0.05	-	5	No Further Action
Acenaphthene	mg/kg	510	7	< 0.05	-	5	No Further Action
Fluorene	mg/kg	400	7	< 0.05	-	1, 5	No Further Action
Phenanthrene	mg/kg	220	7	2.2	-	5	No Further Action
Anthracene	mg/kg	5400	7	0.70	-	5	No Further Action
Fluoranthene	mg/kg	560	7	6.5	-	5	No Further Action
Pyrene	mg/kg	1200	7	5.9	-	1, 5	No Further Action
Benzo(a)anthracene	mg/kg	11	7	2.6	-	1	No Further Action
Chrysene	mg/kg	22	7	2.5	-	1	No Further Action
Benzo(b)fluoranthene	mg/kg	3.3	7	3.0	WS3(0.1m-0.3m)	1	WS2 (0.1m-0.3m) WS3(0.1m-0.3m)
Benzo(k)fluoranthene	mg/kg	93	7	2.1	-	1	No Further Action
Benzo(a)Pyrene	mg/kg	2.7	7	3.0	WS2 (0.1m-0.3m) WS3(0.1m-0.3m)	1	WS2 (0.1m-0.3m) WS3(0.1m-0.3m)
Indeno(123-cd)pyrene	mg/kg	36	7	1.6	-	1	No Further Action
Dibenz(ah)anthracene	mg/kg	0.28	7	0.39	WS2 (0.1m-0.3m) WS3(0.1m-0.3m) WS4(0.1m-0.3m)	1	WS2 (0.1m-0.3m) WS3(0.1m-0.3m)
Benzo(ghi)perylene	mg/kg	340	7	2.0	-	1	No Further Action
TPH C ₅ -C ₆ (aliphatic)	mg/kg	78	5	<0.001	-	2	No Further Action
TPH C ₆ -C ₈ (aliphatic)	mg/kg	230	5	<0.001	-	2	No Further Action
TPH C ₈ -C ₁₀ (aliphatic)	mg/kg	65	5	<0.001	-	2	No Further Action
TPH C ₁₀ -C ₁₂ (aliphatic)	mg/kg	330	5	<1.0	-	2	No Further Action
TPH C ₁₂ -C ₁₆ (aliphatic)	mg/kg	2400	5	<2.0	-	1	No Further Action
TPH C ₁₆ -C ₃₅ (aliphatic)	mg/kg	92000	5	<8.0	-	1	No Further Action
TPH C ₅ -C ₇ (aromatic)	mg/kg	140	5	<0.001	-	2	No Further Action
TPH C ₇ -C ₈ (aromatic)	mg/kg	290	5	<0.001	-	2	No Further Action
TPH C ₈ -C ₁₀ (aromatic)	mg/kg	83	5	<0.001	-	2	No Further Action
TPH C ₁₀ -C ₁₂ (aromatic)	mg/kg	180	5	3.5	-	2	No Further Action
TPH C ₁₂ -C ₁₆ (aromatic)	mg/kg	330	5	4.5	-	1	No Further Action
TPH C ₁₆ -C ₂₁ (aromatic)	mg/kg	540	5	35	-	1	No Further Action
TPH C ₂₁ -C ₃₅ (aromatic)	mg/kg	1500	5	130	-	1	No Further Action
Benzene	mg/kg	0.170	5	<0.001	-	2	No Further Action
Ethylbenzene	mg/kg	110	5	<0.001	-	2	No Further Action
Toluene	mg/kg	290	5	<0.001	-	2	No Further Action
m&p-xylene	mg/kg	130	5	<0.001	-	2	No Further Action
o-Xylene	mg/kg	140	5	<0.001	-	2	No Further Action
MTBE **	mg/kg	49	5	<0.001	-	2	No Further Action

Notes

Main Exposure Pathways: 1 = Soil and dust Ingestion, 2 = Vapour Inhalation (indoor), 3 = Dermal Contact, 4 = Dust Inhalation, 5 = consumption of home grown produce.

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration.

Tier 1 GAC are based on Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham. **Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3086.**

* - Category 4 Screening Level.

** - EIC/AGS/CL:AIRE Soil Generic Assessment Criteria for Human Health Risk Assessment January 2010.

*** - Brown 2 Green HH-GSV using CLEA V 1.06 and tox data from DEFRA/Environment Agency SGV.

As all of the results are below their respective GAC, it is considered that soils at the site will not pose a significant risk to human health of the future residents.

For determinants that exceed their respective GAC, statistical assessment has been completed. The results are summarised below:

Within the made ground the 95%ile upper confidence levels (of the measured mean) for the concentrations of lead (490 mg/kg), benzo(b)fluoranthene (3.3mg/kg), benzo(a)pyrene (3.1 mg/kg) and dibenzo(a,h)anthracene (0.47 mg/kg) exceed the relevant GAC of 200mg/kg for lead, 2.7mg/kg for benzo(a)pyrene and 0.28 mg/kg for dibenzo(a,h)anthracene. The concentration of benzo(b)fluoranthene is the same as the GAC. All show-normal distribution with no outliers. This indicates that the data is from the same data set. At the concentrations present it is considered the concentrations of lead and individual PAH's that are present within the made ground are at levels that may pose a significant risk to human health where active pollution pathways are created. These will be created within parts of the site that are developed as soft landscaping within private gardens.

A significant portion of the site will be covered by hard standing or building footprint. This provides a barrier that breaks the pollution linkage and therefore in these areas it is considered that the elevated PAH concentrations will not pose a significant risk to human health.

A copy of the statistical assessment is presented in Appendix IV.

In respect to the risk to construction workers, this report and the generic assessment criteria (GAC) consider long term and chronic risk to humans based on defined exposure scenarios set out in the CLEA model. In some cases contaminants may also pose acute hazards to workers at a site, or a worker's exposure scenario may differ from the scenarios considered when deriving the GAC. As exposure times for construction workers are generally short term, risks from site contamination are generally addressed through the use of appropriate working procedures and the use of personal protective equipment (PPE) in line with the Management of Health and Safety at Work Regulations (1999), Construction (Design) Management Regulations (2007) for some sites and the Control of Substances Hazardous to Health Regulations (2002).

Asbestos

Asbestos was identified in the sample of made ground from WS2 (0.1-0.3m) and WS4 (0.1-0.3m). The sample contained fibres/clumps of Chrysotile at a concentration of less than 0.001%. In the other samples submitted for asbestos determination, no asbestos was identified.

The Decision Support Tool for the Qualitative Risk Ranking of Work Activities and Receptors

Involved in or Exposed to Asbestos in Soil and Construction & Demolition materials (CL:AIRE Version 2, February 2017) indicate the following condition to the made ground:

- Hazard ranking: Low (10);
- Exposure ranking: Low (4);
- Receptor ranking: High (8);
- Combined hazard, exposure and receptor ranking: Low;
- Pathway ranking: Medium (4D);
- Overall ranking: Low.

From the CL:AIRE Model Qualitative Risk Ranking, the presence of asbestos within the made ground poses a low risk to human health where active pollution linkages are present. These would be present within areas of soft landscaping, principally within the private gardens. A copy of the assessment is presented in Appendix V.

In respect to the risk to construction workers, this report and the generic assessment criteria (GAC) consider long term and chronic risk to humans based on defined exposure scenarios set out in the CLEA model. In some cases contaminants may also pose acute hazards to workers at a site, or a worker's exposure scenario may differ from the scenarios considered when deriving the GAC. As exposure times for construction workers are generally short term, risks from site contamination are generally addressed through the use of appropriate working procedures and the use of personal protective equipment (PPE) in line with the Management of Health and Safety at Work Regulations (1999), Construction (Design) Management Regulations (2007) for some sites and the Control of Substances Hazardous to Health Regulations (2002).

Results from the CL:AIRE Decision Support Tool for the Categorisation of Work Activities Involving Asbestos in Soil and Construction & Demolition Materials in accordance with the Control of Asbestos Regulations 2012 (Version 2, July 2016) (Joint Industry Working Group (JIWG)) show that:

- Hazard ranking: Very low (0);
- Exposure ranking: Low (7);
- Combined hazard and exposure ranking: Very low (7).

Based on the findings of the assessment it is considered that the presence of the asbestos in the made ground will not pose a significant risk to construction workers.

A copy of the assessment is presented in Appendix V.

Groundwater

As no pollution linkages have been identified, it is considered groundwater beneath the site will not pose a significant risk to human health.

6.2 Ground Gas

From the results of the site investigation, no additional sources of ground gas were identified. From the assessment it is considered that ground gas will not pose a significant risk to human health and the development.

6.3 Controlled Water

Within the UK there is an absence of assessment criteria for groundwater quality within the context

of contaminated land. In the absence of such guidance Brown 2 Green Associates Ltd have utilised standards developed for the chemical assessment of water quality for use as a potable supply (UK Drinking Water Standards) or within aquatic surface water systems (Environmental Quality Standards – Freshwater). The UK Drinking Water Standards have been developed for the measurement of actual potable water supplies, and therefore their use within assessment of groundwater beneath a contaminated site is considered particularly stringent. The Environmental Quality Standards are derived for the protection of surface water and thus may not be fully representative for the assessment of risk to groundwater quality. However in the absence of any other applicable standards, Brown 2 Green Associates Ltd have utilised these values for a Tier 1 Qualitative Assessment.

The assessment of risk to controlled waters from the leaching of contaminants from soil is based on the results of the groundwater sample and the leachate testing completed on soil samples. The results have been compared with the same values adopted for the assessment of the groundwater samples. In addition a Qualitative Risk Assessment has also been undertaken considering the site conditions. The results that exceed the relevant Tier 1 Screening Value are presented in the table below.

Determinant	Units	EQS Freshwater Threshold	Drinking Water threshold	Location of exceedance	Maximum Concentration
Arsenic	µg/l	50	10	Leachate from WS3 and WS4	13
Cadmium	µg/l	5	5		<0.08
Chromium	µg/l	5 – 250	50		2.6
Lead	µg/l	4 – 250	25	Leachate from WS3 and WS4	34
Mercury	µg/l	1	1		<0.5
Selenium	µg/l	-	10		<4.0
Copper	µg/l	1 – 28	2000	Leachate from WS3 and WS4	45
Nickel	µg/l	50 – 200	20		3.1
Zinc	µg/l	8 – 125	-		31
pH		6.5 – 10	5.5 – 9.5		
Sulphate	mg/l	-	250		
Cyanide – Total	mg/l	-	50		
PAH*	µg/l	-	0.1		<0.01
Naphthalene	µg/l	10	-		<0.1
Benzo(a)pyrene	µg/l	30†	0.01		<0.1
Total TPH C6 – C7	µg/l	30+	90§		<1.0
Total TPH C7 – C8	µg/l	50++	15000§		<1.0
Total TPH C8 – C10	µg/l	50++	15000§		<1.0
Total TPH C10 – C12	µg/l	Insoluble§	300§		<1.0
Total TPH C12 – C16	µg/l	Insoluble§	300§		<1.0
Total TPH C16 – C21	µg/l	Insoluble§	300§		<1.0
Total TPH C21 –	µg/l	Insoluble§	Insoluble§		<1.0

C35					
-----	--	--	--	--	--

Notes for Table

Values in bold greater than UK DWS, shaded cells exceed Tier 1 EQS.

* Sum of 4 most carcinogenic PAH listed in the DWS.

+ Based on the DWS and EQS values for Benzene.

++Based on the EQS and WHO values for Toluene.

+++ Based on the EQS and WHO values for Xylene.

§ WHO Guidelines (WHO/SDE/WSH/05.08/122, 2005).

† DEFRA proposed Aquatic Quality Standard (freshwater, annual average).

Risk to Potable Water Supplies

The above table indicates that the concentrations of arsenic and lead within the leachate samples of the made ground exceed UK DWS.

The UK DWS have been specifically developed for the protection of human health for potable drinking water supplies. Therefore for a potential risk to exist a viable exposure pathway must exist between the identified impact and a potable water supply. Within the context of the developed CSM for the site, the risk to groundwater quality is not considered significant due to the following mitigating factors:

The arsenic concentration in the sample of groundwater was significantly less than the UK DWS.

There are no potable groundwater abstraction licenses within 1km of the site boundary where groundwater is abstracted from the aquifer contained within the superficial deposits. The presence of the London Clay Formation will protect the quality of the aquifer within the chalk.

The majority of the site will be encapsulated by hard standing with limited landscaping, therefore limiting any viable risk to future site occupants.

Risk to Environmental Quality Systems

The recorded concentrations have also been compared to the Environmental Quality Standards to make a preliminary assessment of the potential risk to controlled waters. Copper was identified above the EQS in the leachate samples. The concentration in the groundwater was less than the EQS. It is therefore considered that the copper is not leaching at concentrations that pose a risk to surface water.

From the findings of the assessment it is considered that the site will not pose a significant risk to controlled waters

6.4 Planting

An assessment of risk to from potentially phytotoxic metal compounds has been completed. In the absence of published assessment criteria specifically for contaminated land, GAC have been obtained from legislation (UK and European) and guidance related to the use of sewage sludge on agricultural fields.

For the assessment values defined in The Sludge (use in Agriculture) Regulations 1989 (Public Health England, Wales and Scotland), as amended in 1990 and The Sludge (use in Agriculture) Regulations (Northern Ireland) SR No, 245, 1990 have been adopted. In addition the Department of Environment (DoE) produced a Code of Practice (CoP) (Updated 2nd Edition) in 2006 which provided guidance on the application of sewage sludge on agricultural land. The specified limits of concentrations of selected elements in soil are presented in the 2nd Edition of the DoE Code of

Practice and are designed to protect plant growth.

As all concentrations are below their respective assessment criteria, it is considered that the concentrations of phytotoxic metals will not pose a significant risk to planting.

6.5 Construction Materials

The assessment of the risk to concrete from the concentrations of sulphate and the pH in the soil has been made using BRE guidance Special Digest 1:2005 Concrete in Aggressive Ground.

Sulphate concentrations of between 11mg/l and 57mg/l and pH values of 7.6 to 7.9 were recorded in the soils. The site has been assessed as brownfield due to the presence of previous developments and made ground of unknown origin and a static groundwater regime apportioned in view of the findings of the boreholes.

Following the guidance set out in the Digest the Characteristic Sulphate Content is 570mg/l and the Characteristic pH is 7.6 in the soil; the Design Sulphate Class for the site is DS-1 and the Aggressive Environment for Concrete Class is AC-1. Based on the results of the assessment it is considered that the made ground beneath the site will not pose a significant risk to concrete through acid attack.

This recommendation is based on samples taken in the near surface materials on site. If deeper foundations are required additional testing should be undertaken and the conclusions of this section should be re-assessed in light of the additional test results available.

6.6 Water Supply Pipe

The assessment of risk to pipe work used in the potable water supply has been made using UK Water Industry Research (UKWIR) "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" (Ref 10/WM/03/21)" January 2011 and supplement "Contaminated Land Assessment Guidance" dated January 2014. The results from samples of made ground (through which any new water supply pipes are likely to pass) have been compared with the threshold values listed in the UKWIR guidance. It should be noted that the threshold values are for use by designers in the selection of appropriate pipe materials. Exceedance of a threshold value indicates only that there could be a 'water quality issue'. Threshold values are generally protective of taste and odour quality of water in plastic water pipes and only threshold values for benzene and MTBE are protective of human health.

Beneath the site the results indicate that concentrations are at levels that enable PE/PVC pipe work to be adopted. It is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

7 REVISED CONCEPTUAL MODEL

In light of the results of the Site Investigation, results of the Chemical Analysis and the Risk Screening Assessment presented in the previous sections the Conceptual Model developed has been updated. The Conceptual Model is presented below.

Source	Potential migration pathway	Potential Receptors	Discussion, Remedial or Precautionary Measures and Mitigating Factors
Lead, PAHs within the made ground	Ingestion of contaminated soil and dust by direct contact and soil attached to home grown vegetables. Inhalation of dust (indoor and outdoor).	Future site users	Active pollution linkages present within areas to be developed as soft landscaping in gardens. Removal of made ground and provision of capping material

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

The Tier I Human Health Risk Assessment has identified the presence of concentrations of lead and individual PAHs within the made ground at levels that will pose a significant risk to human health of future residents where these concentrations are present within areas of soft landscaping in private gardens.

The Tier I Controlled Water Risk Assessment has determined that there are no unacceptable concentrations of potential contaminants within the underlying soils that would pose a potential risk to controlled waters.

The risk assessment for bio-genic ground gas concluded that there is no risk from ground gas.

The risk assessment in respect to the future planting and towards sensitive ecological receptors identified that the determinants at the site would not pose a potential risk.

The risk assessment in respect to water supply infrastructure identified that the determinants at the site would not pose a potential risk to the integrity of PE or PVC pipework.

8.2 Recommendations

From the results of the investigation, it is recommended that remediation is undertaken. In summary, the remediation should consider the removal of the made ground to a maximum depth of 600mm below finished garden level from all areas that are to be developed as soft landscaping in private gardens. The resulting excavation should be backfilled with suitable clean top and sub-soil. As part of the remediation work, validation should be undertaken to provide confirmation that suitable and sufficient remediation has been undertaken to ensure that all pollution linkages have been broken and that contamination does not pose a significant risk to human health and environmental receptors.

As required by the planning consent a Remediation Method Statement (RMS) should be prepared that provides full details of the remediation works to be undertaken and the validation requirements. This should be undertaken by a competent person.

From the findings of the site investigation it is considered that MDPE pipework can be adopted for the water supply pipework. It is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

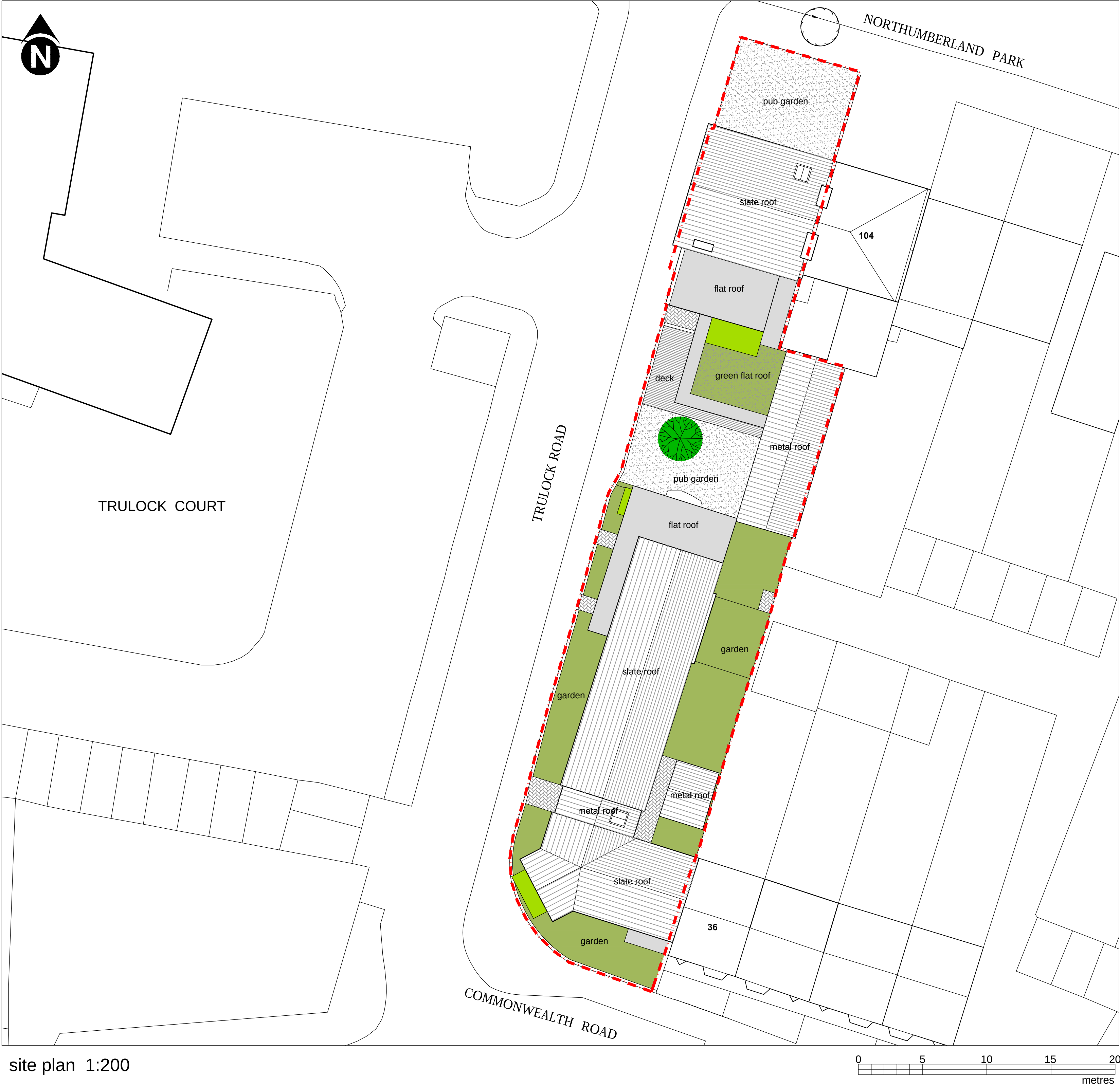
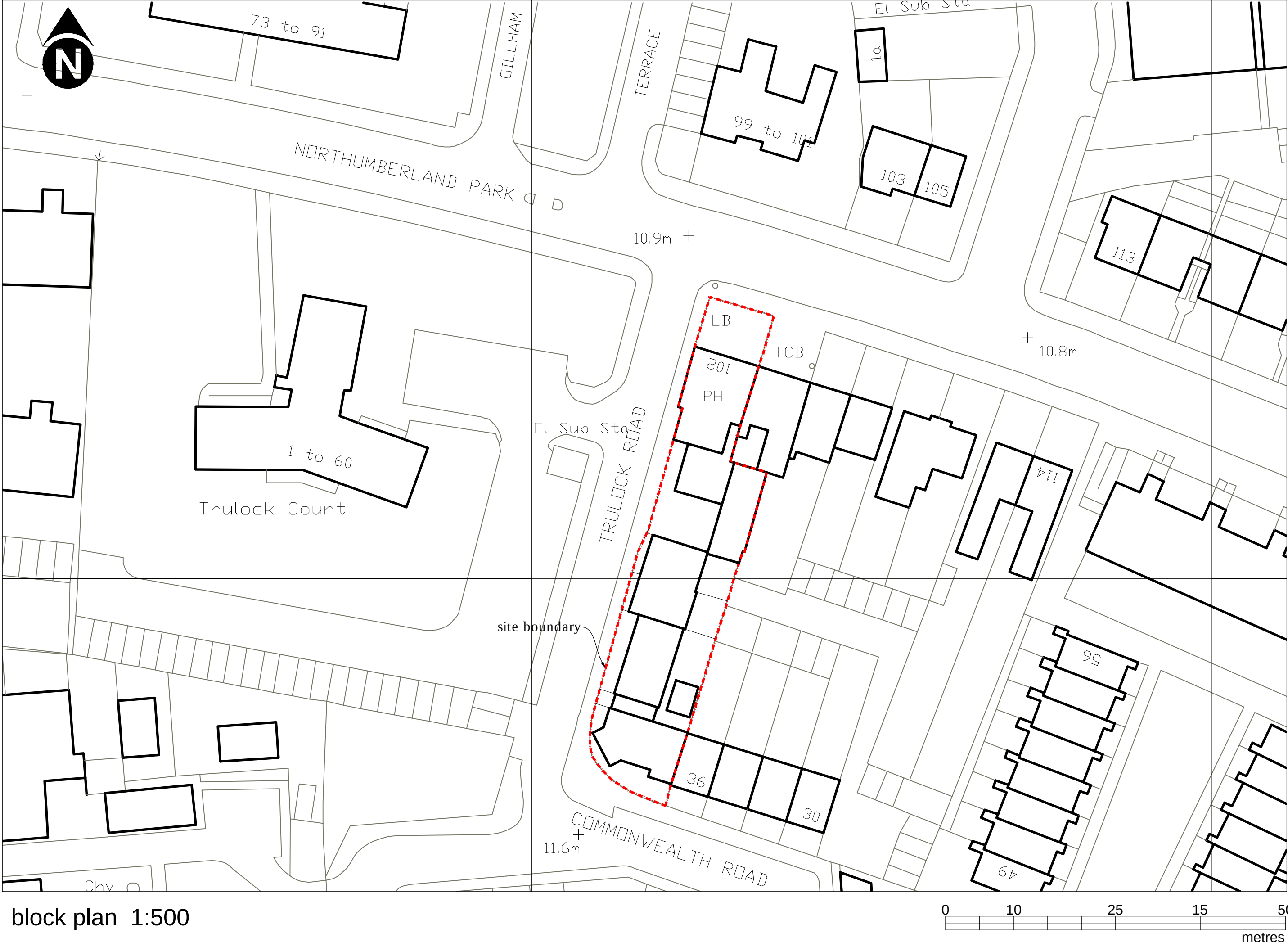
FIGURES



Based on an Ordnance Survey map with permission of HMSO. Crown copy right reserved. Licence number 100053399

Project Number: 2293	Project: 102 Northumberland Park, London	Scale: NTS
Figure 1	Site Location Plan	

FIGURE 2
PROPOSED DEVELOPMENT LAYOUT

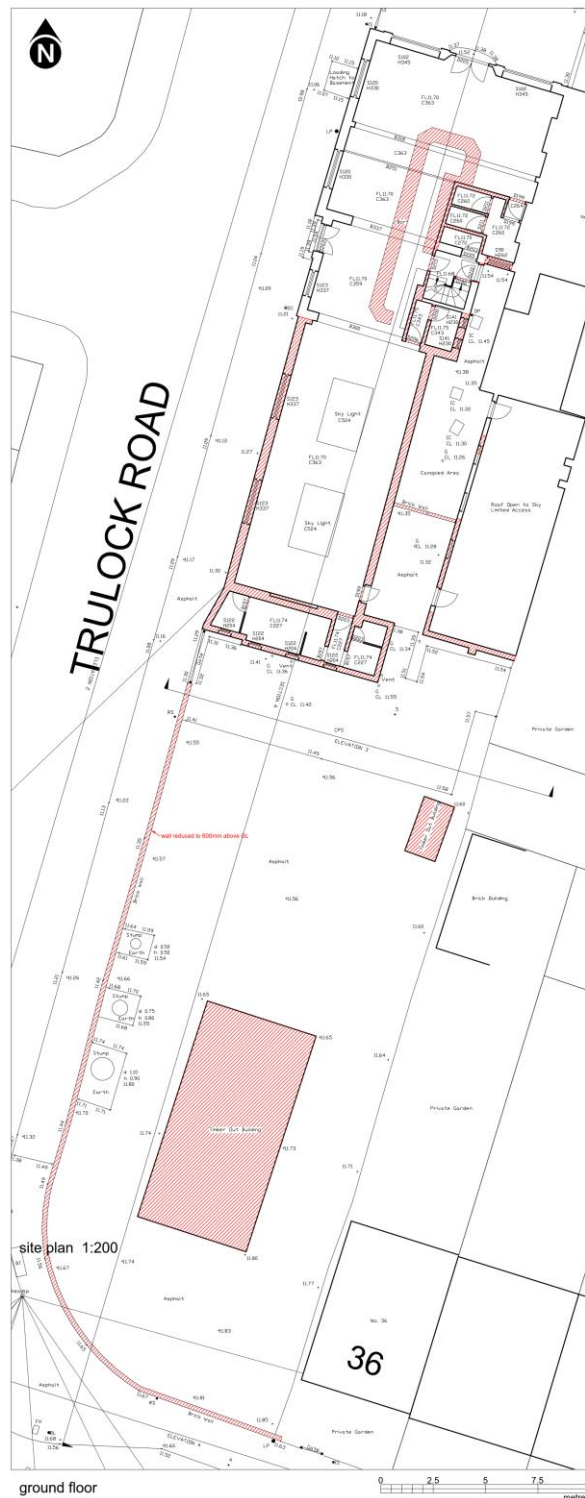


SCHEME DESIGN SUBJECT TO
STRUCTURAL ENGINEER /SERVICES ENGINEER,
& PLANNERS COMMENT

FOR PLANNING

BB PARTNERSHIP LTD
CHARTERED ARCHITECTS
Studios 33-34, 10 Hornsey St, London. N7 8EL
Tel 020 7336 8555 - e-mail - architect@bbpartnership.co.uk

client		
project Public House conversion and extension and new apartments 102 Northumberland Park London N17 0TS		
drawing As Proposed Block and Site Plans		
date Aug'17	scale As noted@A1	drawn by JS
drg.no. FPT_11	revision	



Project Number: 2293	Project: 102 Northumberland Park, London	Scale: NTS
Figure 3	Site Layout Plan	Brown 2 Green



APPENDIX I
LIMITATIONS AND CONSTRAINTS

Brown 2 Green Associates Limited has prepared this report in accordance with our standard Terms and Conditions 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.

Brown 2 Green Associates Ltd cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The client cannot place reliance on the report until full payment has been made. The copyright in this report and other plans and documents prepared by Brown 2 Green Associates Ltd is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of the report may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by Brown 2 Green Associates Ltd in this connection without their explicit written agreement thereto by Brown 2 Green Associates Ltd.

For the work, reliance has been placed on publicly available data obtained from the sources identified and data supplied by other parties. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information. Brown 2 Green Associates Ltd does not warrant work / data undertaken / provided by others.

Due to the short timescales associated with these projects responses may not have been received from all parties. Brown 2 Green Associates Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

This report has been produced in accordance with UK policy and legislative requirements for land and groundwater contamination at the time the report was commissioned. Should changes in legislation or policy occur the report findings may need revisiting once the development layout is confirmed.

During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walk-over no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown or the location of the area has not been made known, or where access has not been permitted.

Access considerations, the presence of services and the activities being carried out on the site limited the positions where sampling locations could be installed and the techniques that could be used.

This report presents an interpretation of the geo-environmental information established by excavation, observation and testing. It should be noted that when investigating, or developing land it is important to recognise that sub-surface conditions may vary spatially and also with time. Groundwater conditions are dependent on seasonal and other factors. Consequently there may be conditions present not revealed by this investigation. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas. Additional contamination may be identified following the removal of the buildings or hard standing.

The scope of any investigation is based on 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.

Rather, this investigation has been undertaken to provide a characterisation of the existing sub-surface geo-environmental characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

During any development programme Brown 2 Green Associates Limited 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. Brown 2 Green Associates Limited will not be liable for actions taken prior to consultation.

Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and does not constitute or replace full and proper surveys.

APPENDIX II
GEOLOGICAL LOGS

GEOLOGICAL LOG

Project: 102 Northumberland Park Location: London			Borehole Number: WS1			
Project No: 2293 Client: Billericay Electrical Ltd Logged By: Cordes			Start of Drilling: 03-May-19 Completion of Drilling: 03-May-19 Drilling Method: Window sampling Ground Level (m AOD):			

Sample/Test			Description	Log	Depth (m)	Thick- ness (m)	S/pipe
Sample / Test	Result	Sample range					
T,J,V		0.35 - 0.45	MADEGROUND - Light grey, concrete paving slab		0.05	0.05	
			MADE GROUND - Light orange yellow fine grained SAND		0.13	0.08	
			MADE GROUND - Concrete		0.30	0.17	
			MADE GROUND - Dark brown, very clayey fine grained SAND with occasional gravel of angular to subangular fine to coarse brick, concrete, tile, ash and coal.				
T,J,V		0.8-0.9		0.8	0.5		
			Light orange brown and occasional grey mottling, very slightly silty CLAY with occasional gravel of medium flint.	- - -	1.0		0.2
			Light brown and light grey very sandy (medium to coarse) medium to coarse GRAVEL of flint occasional cobble present.	o . o o o o o . o . o o o o o .	1.4		>0.4
			End of borehole - drilling terminated as not further advance due to density of gravel.				
					2.0		
					3.0		
					4.0		
					5.0		
					6.0		
					7.0		

Remarks: Groundwater:		 GREENHOUSE AND CARBON-NEUTRAL CONSULTANTS
------------------------------	--	--

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample.

Page 1 of 1

GEOLOGICAL LOG

Project: 102 Northumberland Park			Borehole Number: WS2				
Location: London			Start of Drilling: 03-May-19				
Project No: 2293			Completion of Drilling: 03-May-19				
Client: Billericay Electrical Ltd			Drilling Method: Window sampling				
Logged By: Cordes			Ground Level (m AOD):				
Sample/Test							
Sample / Test	Result	Sample range	Description	Log	Depth (m)	Thick-ness (m)	S/pipe
T,J,V		0.1-0.3	MADE GROUND - Black angular fine gravel of limestone in asphalt.		0.04	0.04	
			MADE GROUND - Light grey to light red, fine sandy gravel of crushed brick and concrete.		0.10	0.06	
			MADE GROUND - Dark brown very clayey fine SAND with occasional gravel of angular to subround flint, brick and tile.		0.6	0.5	
T,J,V		0.7-0.9	Light orange brown with occasional black mottling, very slightly silty CLAY.		1.0		
			Light brown and light grey very sandy (medium to coarse) medium to coarse GRAVEL of flint.		2.0		
			Base of borehole		4.0		
					5.0		
					6.0		
					7.0		
Remarks: Collapsed to 3.0m							
Groundwater: water strike at 2.8m.							
Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml iar, D - Small Disturbed, B - Large bulk sample, W - Water sample.							Page 1 of 1

GEOLOGICAL LOG

Project: 102 Northumberland Park Location: London			Borehole Number: WS3			
Project No: 2293 Client: Billericay Electrical Ltd Logged By: Cordes			Start of Drilling: 03-May-19 Completion of Drilling: 03-May-19 Drilling Method: Window sampling Ground Level (m AOD):			

Sample/Test			Description	Log	Depth (m)	Thick- ness (m)	S/pipe	
Sample / Test	Result	Sample range						
T,J,V		0.1-0.3	MADE GROUND - Black angular fine gravel of limestone in asphalt.	[Pattern]	0.04	0.04	[Pattern]	
			MADE GROUND - Light grey to light red, fine sandy gravel of crushed brick and concrete.	[Pattern]	0.10	0.06		
			MADE GROUND - Dark brown very clayey fine SAND with occasional gravel of angular to subround flint, coal, ash, concrete, brick and tile.	[Pattern]	0.7	0.6		
T,J,V		0.8-0.9	Light orange brown with occasional black mottling, very slightly silty CLAY.	[Pattern]	1.0	[Pattern]	[Pattern]	
				[Pattern]	1.2			0.5
			Light brown and light grey very sandy (medium to coarse) medium to coarse GRAVEL of flint.	[Pattern]	2.0			>0.8
			End of borehole - drilling terminated as not further advance due to density of gravel.					
					3.0			
					4.0			
					5.0			
					6.0			
					7.0			

Remarks: Groundwater:		
Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample.		Page 1 of 1

GEOLOGICAL LOG

Project: 102 Northumberland Park Location: London			Borehole Number: WS4			
Project No: 2293 Client: Billericay Electrical Ltd Logged By: Cordes			Start of Drilling: 03-May-19 Completion of Drilling: 03-May-19 Drilling Method: Window sampling Ground Level (m AOD):			

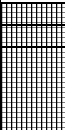
Sample/Test			Description	Log	Depth (m)	Thick- ness (m)	S/pipe
Sample / Test	Result	Sample range					
T,J,V		0.1-0.3	MADE GROUND - Black angular fine gravel of limestone in asphalt.	[Grid]	0.05	0.05	
			MADE GROUND - Light grey to light red, fine sandy gravel of crushed brick and concrete.	[Grid]	0.10	0.05	
			MADE GROUND - Dark brown very clayey fine SAND with occasional gravel of angular to subround flint, coal, ash, concrete, brick and tile.	[Grid]	0.65	0.55	
T,J,V	0.7-0.8	Light orange brown with occasional black mottling, very slightly silty CLAY.	[Grid]	1.0			
			[Grid]	1.5	0.95		
		Light brown and light grey very sandy (medium to coarse) medium to coarse GRAVEL of flint.	[Grid]	1.6	>0.1		
End of borehole - drilling terminated as not further advance due to density of gravel.							
					2.0		
					3.0		
					4.0		
					5.0		
					6.0		
					7.0		

Remarks:		 environmental and geotechnical specialists
Groundwater:		

Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample.

GEOLOGICAL LOG

Project: 102 Northumberland Park Location: London			Borehole Number: WS5			
Project No: 2293 Client: Billericay Electrical Ltd Logged By: Cordes			Start of Drilling: 03-May-19 Completion of Drilling: 03-May-19 Drilling Method: Window sampling Ground Level (m AOD):			

Sample/Test			Description	Log	Depth (m)	Thick-ness (m)	S/pipe
Sample / Test	Result	Sample range					
T,J,V		0.15-0.3	MADE GROUND - Black angular fine gravel of limestone in asphalt.		0.05	0.05	
			MADE GROUND - Light grey to light red, fine sandy gravel of crushed brick and concrete.		0.12	0.07	
T,J,V		0.7-0.8	MAFDE GROUND - dark brown, very clayey fine SAND with occasional gravel of angular to subangular flints, brick, concrete, tile and coal.		0.6	0.5	
			Light orange brown with occasional black mottling, very slightly silty CLAY.		1.0		
					1.1	0.6	
			Light brown and light grey very sandy (medium to coarse) medium to coarse GRAVEL of flint.		1.9	0.8	
			End of borehole - drilling terminated as not further advance due to density of gravel.		2.0		
					3.0		
					4.0		
					5.0		
					6.0		
					7.0		

Remarks: Groundwater:		 environmental and geotechnical consultants
Keys J - 250 or 500ml Jar, T - Tub, V - Vial or 60ml jar, D - Small Disturbed, B - Large bulk sample, W - Water sample.		Page 1 of 1

APPENDIX III
CHEMICAL ANALYSIS REPORTS

**Philip Miles**

Brown 2 Green Associates Ltd
Suite 1, Wenden Court
Station Road
Wendens Ambo
Walden
CB11 4LB

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: philip.miles@brown2green.co.uk

Analytical Report Number : 19-40022

Project / Site name:	Northumberland Park	Samples received on:	03/05/2019
Your job number:	2293	Samples instructed on:	07/05/2019
Your order number:		Analysis completed by:	14/05/2019
Report Issue Number:	1	Report issued on:	14/05/2019
Samples Analysed:	9 soil samples		

Signed:

Rexona Rahman
Head of Customer Services
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-40022
Project / Site name: Northumberland Park

Lab Sample Number				1215328	1215329	1215330	1215331	1215332
Sample Reference				WS1	WS1	WS2	WS2	WS3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.35-0.45	0.80-0.90	0.10-0.30	0.70-0.90	0.10-0.30
Date Sampled				03/05/2019	03/05/2019	03/05/2019	03/05/2019	03/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	19	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	14	10	16	16
Total mass of sample received	kg	0.001	NONE	1.0	1.0	1.1	0.89	1.1

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Chrysotile	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Detected	-	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	< 0.001	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	< 0.001	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	7.7	-	-	7.6
Total Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	-	1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.057	0.052	-	-	0.11
Organic Matter	%	0.1	MCERTS	-	-	3.3	-	4.6

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.24	-	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.36	-	1.7	< 0.05	2.2
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	0.37	< 0.05	0.70
Fluoranthene	mg/kg	0.05	MCERTS	0.42	-	5.2	< 0.05	6.5
Pyrene	mg/kg	0.05	MCERTS	0.38	-	4.5	< 0.05	5.9
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	1.9	< 0.05	2.6
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	2.0	< 0.05	2.5
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	2.2	< 0.05	3.0
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	1.6	< 0.05	2.1
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	2.2	< 0.05	3.0
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	1.2	< 0.05	1.6
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	0.34	< 0.05	0.39
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	1.5	< 0.05	2.0

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	1.40	-	24.6	< 0.80	32.4
-----------------------------	-------	-----	--------	------	---	------	--------	------

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.7	-	23	11	19
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	0.9	< 0.2	2.3
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	-	25	31	26
Copper (aqua regia extractable)	mg/kg	1	MCERTS	63	-	79	18	90
Lead (aqua regia extractable)	mg/kg	1	MCERTS	130	-	410	28	530
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.6	-	1.1	< 0.3	1.1
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	-	23	15	28
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	51	-	350	51	260

Analytical Report Number: 19-40022
Project / Site name: Northumberland Park

Lab Sample Number				1215328	1215329	1215330	1215331	1215332
Sample Reference				WS1	WS1	WS2	WS2	WS3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.35-0.45	0.80-0.90	0.10-0.30	0.70-0.90	0.10-0.30
Date Sampled				03/05/2019	03/05/2019	03/05/2019	03/05/2019	03/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	< 8.0	-	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	< 10	-	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	3.3	-	2.3
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	28	-	35
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	91	-	130
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	120	-	170

Analytical Report Number: 19-40022
Project / Site name: Northumberland Park

Lab Sample Number				1215333	1215334	1215335	1215336	
Sample Reference				WS4	WS4	WS5	WS5	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.10-0.30	0.80-0.90	0.15-0.30	0.70-0.80	
Date Sampled				03/05/2019	03/05/2019	03/05/2019	03/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	15	15	20	15	
Total mass of sample received	kg	0.001	NONE	1.0	0.95	1.1	1.1	

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile	-	-	-	
Asbestos in Soil	Type	N/A	ISO 17025	Detected	-	Not-detected	-	
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	< 0.001	-	-	-	
Asbestos Quantification Total	%	0.001	ISO 17025	< 0.001	-	-	-	

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	10.4	-	-	7.9	
Total Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	-	
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.39	-	-	0.056	
Organic Matter	%	0.1	MCERTS	4.7	1.1	-	0.7	

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	1.4	2.7	-	
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.50	0.42	-	
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.33	0.20	-	
Phenanthrene	mg/kg	0.05	MCERTS	2.2	0.69	1.4	-	
Anthracene	mg/kg	0.05	MCERTS	0.40	0.16	0.31	-	
Fluoranthene	mg/kg	0.05	MCERTS	6.1	0.25	2.7	-	
Pyrene	mg/kg	0.05	MCERTS	5.5	0.23	2.4	-	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.3	< 0.05	1.2	-	
Chrysene	mg/kg	0.05	MCERTS	3.1	< 0.05	1.3	-	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	3.3	< 0.05	1.8	-	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.7	< 0.05	0.74	-	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.9	< 0.05	1.4	-	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.6	< 0.05	0.73	-	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.50	< 0.05	0.23	-	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.0	< 0.05	0.90	-	

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	31.5	3.59	18.7	-	
-----------------------------	-------	-----	--------	------	------	------	---	--

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	18	10	18	-	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	2.1	< 0.2	0.8	-	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	33	28	22	-	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	130	24	71	-	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	370	47	300	-	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.9	< 0.3	1.3	-	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	17	19	-	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.4	< 1.0	1.8	-	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	280	51	150	-	

Analytical Report Number: 19-40022
Project / Site name: Northumberland Park

Lab Sample Number				1215333	1215334	1215335	1215336	
Sample Reference				WS4	WS4	WS5	WS5	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.10-0.30	0.80-0.90	0.15-0.30	0.70-0.80	
Date Sampled				03/05/2019	03/05/2019	03/05/2019	03/05/2019	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	-	< 2.0	
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	-	< 8.0	
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	-	< 8.0	
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	-	< 10	
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	-	< 0.001	
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	3.4	-	< 1.0	
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	4.3	4.5	-	< 2.0	
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	33	< 10	-	< 10	
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	99	< 10	-	< 10	
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	140	< 10	-	< 10	



Analytical Report Number: **19-40022**
Project / Site name: **Northumberland Park**
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1215330	WS2	0.10-0.30	139	Loose Fibres	Chrysotile	< 0.001	< 0.001
1215333	WS4	0.10-0.30	135	Loose Fibrous Debris	Chrysotile	< 0.001	< 0.001

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 19-40022

Project / Site name: Northumberland Park

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1215328	WS1	None Supplied	0.35-0.45	Brown clay and sand with gravel.
1215329	WS1	None Supplied	0.80-0.90	Light brown clay and sand.
1215330	WS2	None Supplied	0.10-0.30	Brown loam and sand with stones and vegetation.
1215331	WS2	None Supplied	0.70-0.90	Light brown clay and sand.
1215332	WS3	None Supplied	0.10-0.30	Brown loam and clay with vegetation and plastic.
1215333	WS4	None Supplied	0.10-0.30	Brown loam and clay with vegetation and gravel
1215334	WS4	None Supplied	0.80-0.90	Light brown clay and sand.
1215335	WS5	None Supplied	0.15-0.30	Brown loam and clay with vegetation and gravel
1215336	WS5	None Supplied	0.70-0.80	Light brown clay and sand.

Analytical Report Number : 19-40022

Project / Site name: Northumberland Park

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

**Philip Miles**

Brown 2 Green Associates Ltd
Suite 1, Wenden Court
Station Road
Wendens Ambo
Walden
CB11 4LB

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e: philip.miles@brown2green.co.uk

Analytical Report Number : 19-41315

Project / Site name:	Northumberland Park	Samples received on:	03/05/2019
Your job number:	2293	Samples instructed on:	15/05/2019
Your order number:		Analysis completed by:	22/05/2019
Report Issue Number:	1	Report issued on:	22/05/2019
Samples Analysed:	2 leachate samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.



Analytical Report Number: 19-41315
Project / Site name: Northumberland Park

Lab Sample Number				1222314	1222315			
Sample Reference				WS3	WS4			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.10-0.30	0.10-0.30			
Date Sampled				03/05/2019	03/05/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	7.4	7.7			
----	----------	-----	-----------	-----	-----	--	--	--

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01			

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2			
-------------------	------	-----	------	-------	-------	--	--	--

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	11	13			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (dissolved)	µg/l	0.4	ISO 17025	2.6	2.6			
Copper (dissolved)	µg/l	0.7	ISO 17025	45	42			
Lead (dissolved)	µg/l	1	ISO 17025	34	23			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5			
Nickel (dissolved)	µg/l	0.3	ISO 17025	3.1	1.8			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Zinc (dissolved)	µg/l	0.4	ISO 17025	31	30			



Analytical Report Number: 19-41315
Project / Site name: Northumberland Park

Lab Sample Number				1222314	1222315			
Sample Reference				WS3	WS4			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.10-0.30	0.10-0.30			
Date Sampled				03/05/2019	03/05/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			



Analytical Report Number : 19-41315

Project / Site name: Northumberland Park

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L1028-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



2183

Final Report

Report No.:	19-16448-1		
Initial Date of Issue:	23-May-2019		
Client	Brown 2 Green Associates		
Client Address:	Suite 1, Wenden Court Station Road Wendens Ambo Nr. Saffron Walden Essex CB11 4LB		
Contact(s):	Philip Miles		
Project	2293 Northumberland Park, Tottenham		
Quotation No.:	Q15-04830	Date Received:	16-May-2019
Order No.:		Date Instructed:	16-May-2019
No. of Samples:	1		
Turnaround (Wkdays):	5	Results Due:	22-May-2019
Date Approved:	23-May-2019		
Approved By:			
Details:	Robert Monk, Technical Manager		

Client: Brown 2 Green Associates	Chemtest Job No.:				19-16448
Quotation No.: Q15-04830	Chemtest Sample ID.:				826724
	Client Sample ID.:				WS2
	Sample Type:				WATER
	Date Sampled:				14-May-2019
Determinand	Accred.	SOP	Units	LOD	
pH	U	1010		N/A	8.2
Arsenic (Dissolved)	U	1450	µg/l	1.0	< 1.0
Cadmium (Dissolved)	U	1450	µg/l	0.080	0.10
Chromium (Dissolved)	U	1450	µg/l	1.0	< 1.0
Copper (Dissolved)	U	1450	µg/l	1.0	< 1.0
Mercury (Dissolved)	U	1450	µg/l	0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1.0	11
Lead (Dissolved)	U	1450	µg/l	1.0	< 1.0
Selenium (Dissolved)	U	1450	µg/l	1.0	21
Vanadium (Dissolved)	U	1450	µg/l	1.0	< 1.0
Zinc (Dissolved)	U	1450	µg/l	1.0	7.4
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10
Naphthalene	U	1700	µg/l	0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10
Pyrene	U	1700	µg/l	0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10
Chrysene	N	1700	µg/l	0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10

Results - Water

Client: Brown 2 Green Associates	Chemtest Job No.: 19-16448				
Quotation No.: Q15-04830	Chemtest Sample ID.: 826724				
	Client Sample ID.: WS2				
	Sample Type: WATER				
	Date Sampled: 14-May-2019				
Determinand	Accred.	SOP	Units	LOD	
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10
Total Of 16 PAH's	N	1700	µg/l	2.0	< 2.0

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44 Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

APPENDIX IV
STATISTICAL ASSESSMENT PRINTOUT

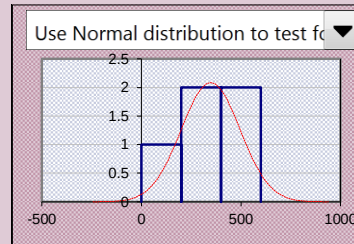
Test Results

Client/client ref:
Project ref: 2293

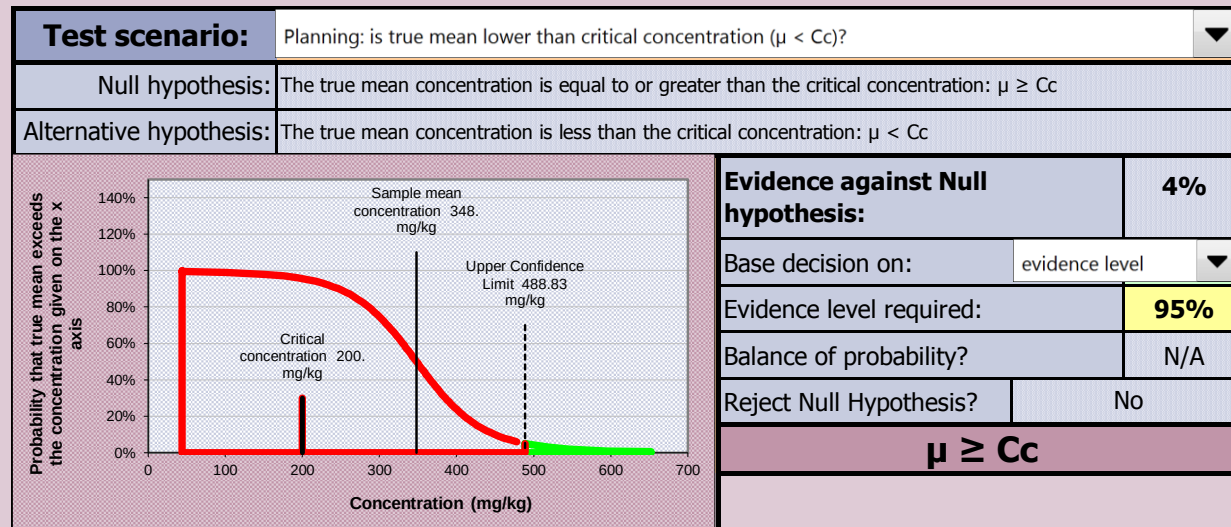
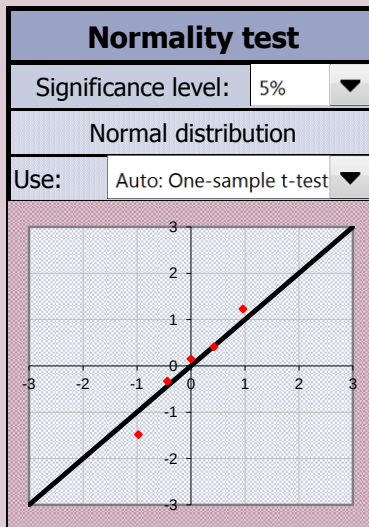
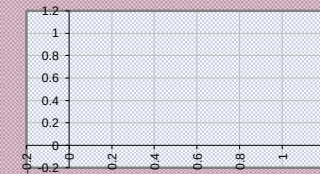
Site ref: Norhumberland Park, London
Data description: Made ground

Date: 12-Jun-2019
User details: PDM

Dataset:	Lead (mg/kg) ▼
Sample mean, $\bar{X}$ (mg/kg)	348
Sample standard deviation, s	147.72
Sample size, n	5
Critical concentration, Cc (mg/kg)	200



Outliers & non-detects	
Outliers present?	NO
Significance level	5% ▼
Outliers removed?	0
Non-detects	0



[Back to data](#)

[Back to summary](#)

[Go to outlier test](#)

[Go to normality test](#)

Test Results

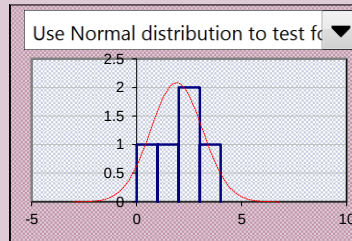
Client/client ref:
Project ref: 2297

Site ref: Northumberland Park, London

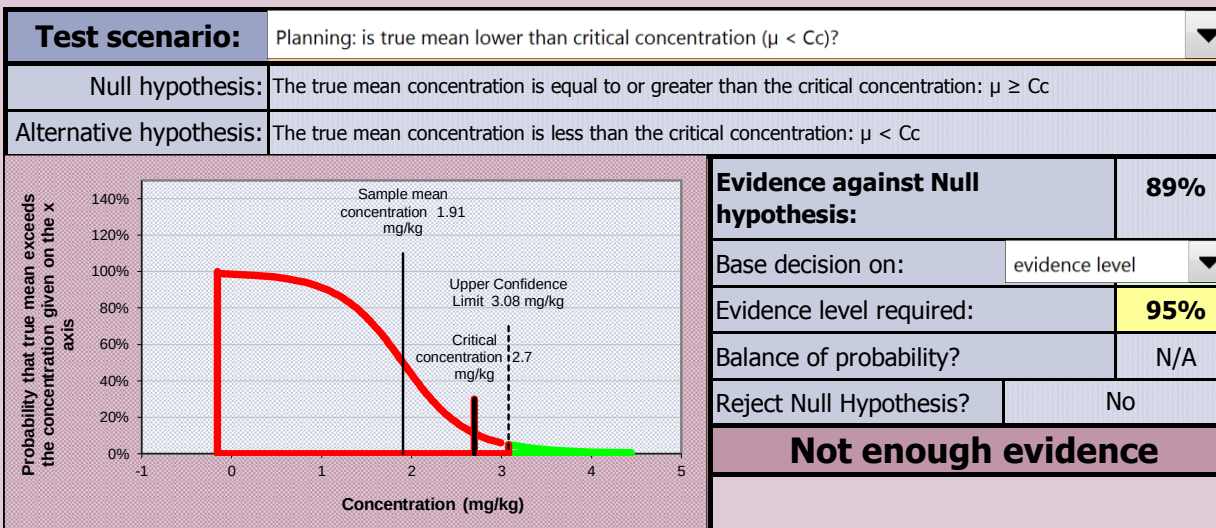
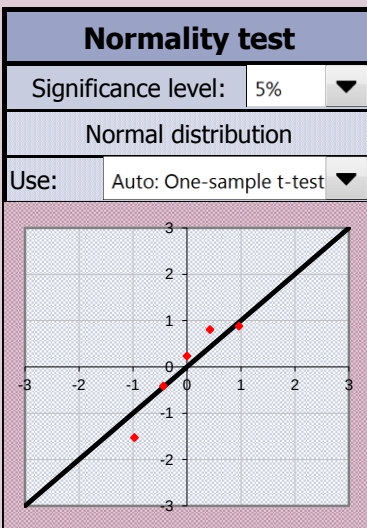
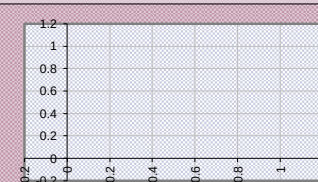
Date: 12-Jun-2019

Data description: Speciated PAH and Phenols: Resid User details: PDM

Dataset:	Benzo(a)pyrene (mg/kg) ▼
Sample mean, $\bar{X}$ (mg/kg)	1.905
Sample standard deviation, s	1.2314
Sample size, n	5
Critical concentration, Cc (mg/kg)	2.7



Outliers & non-detects	
Outliers present?	NO
Significance level	5% ▼
Outliers removed?	0
Non-detects	1



[Back to data](#)

[Back to summary](#)

[Go to outlier test](#)

[Go to normality test](#)

Test Results

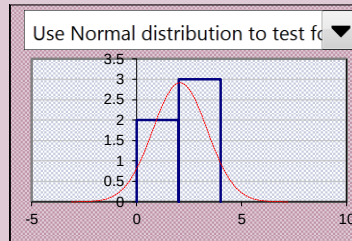
Client/client ref:
Project ref: 2297

Site ref: Northumberland Park, London

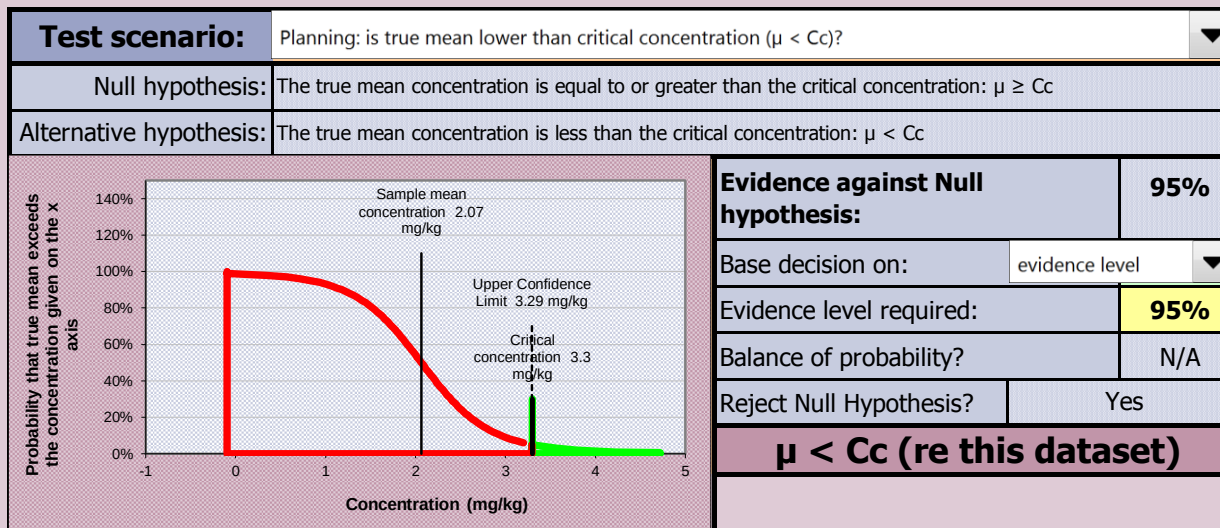
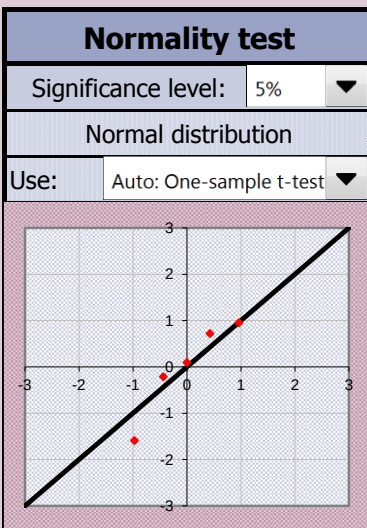
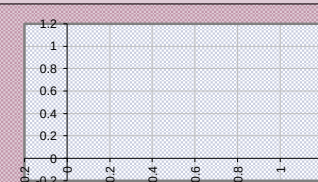
Date: 12-Jun-2019

Data description: Speciated PAH and Phenols: Resid User details: PDM

Dataset:	Benzo(b)fluoranthene (mg/kg) ▼
Sample mean, $\bar{X}$ (mg/kg)	2.065
Sample standard deviation, s	1.2893
Sample size, n	5
Critical concentration, Cc (mg/kg)	3.3



Outliers & non-detects	
Outliers present?	NO
Significance level	5% ▼
Outliers removed?	0
Non-detects	1



Back to data

Back to summary

Go to outlier test

Go to normality test

Test Results

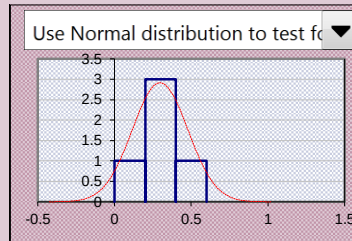
Client/client ref:
Project ref: 2297

Site ref: Northumberland Park, London

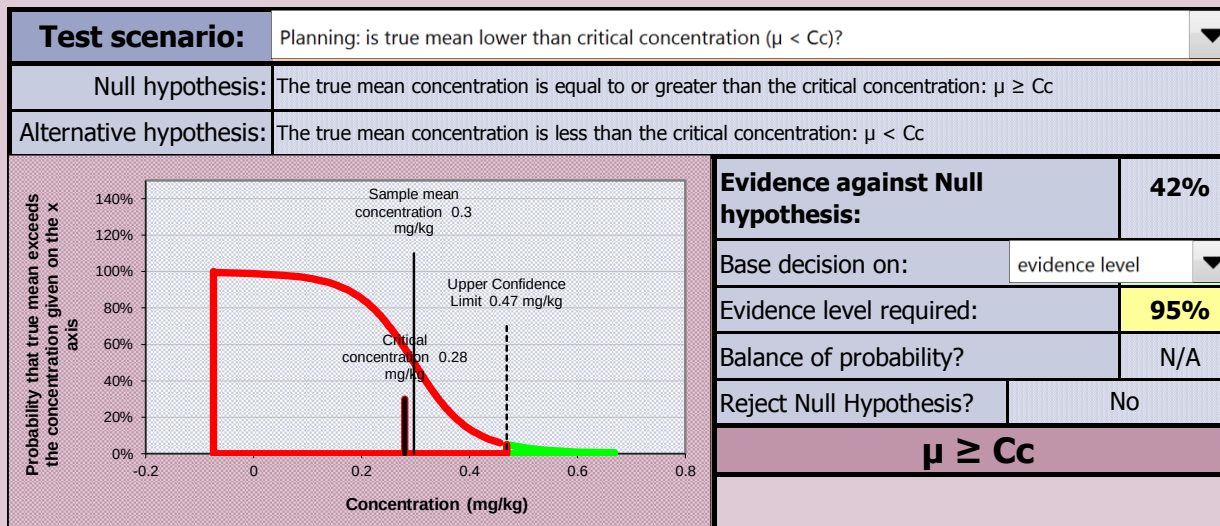
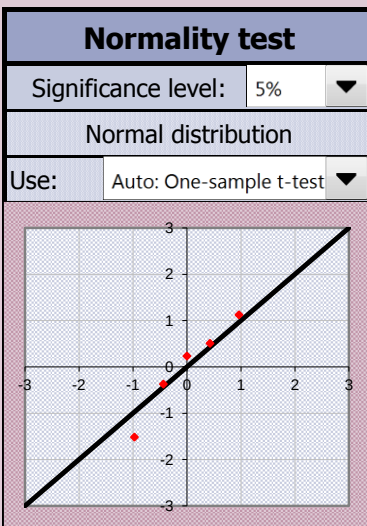
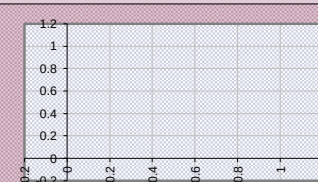
Date: 12-Jun-2019

Data description: Speciated PAH and Phenols: Resid User details: PDM

Dataset:	Dibenz(ah)anthracene (mg/kg) ▼
Sample mean, $\bar{X}$ (mg/kg)	0.297
Sample standard deviation, s	0.1804
Sample size, n	5
Critical concentration, Cc (mg/kg)	0.28



Outliers & non-detects	
Outliers present?	NO
Significance level	5% ▼
Outliers removed?	0
Non-detects	1



[Back to data](#)

[Back to summary](#)

[Go to outlier test](#)

[Go to normality test](#)

APPENDIX V

ASBESTOS RISK ASSESSMENT PRINTOUT

Decision Support Tool for Receptor Risk Ranking

Stage 1 Hazard Identification		Score
Select ACM type (run model for each type to generate 'Worst Case' output)	Free dispersed fibres/fibre bundles	2
Extent of degradation of ACMs	Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)	4
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)	4
Distribution of Visible Asbestos Across Affected Area	No visible ACMs/fibre bundles	0
Asbestos fibre type	Chrysotile alone	0
Sub-total		10
Hazard ranking		Low

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.
It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.



Stage 2		Score
Emission Factors		
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Trace quantities - <0.0001 to <0.001 %wt/wt	0
Respirable fibre index for ACM - RIVM report 711701034 (2003)	Negligible	0
Activity type and effect on deterioration of ACMs	Moderate disturbance, slight deterioration expected	3
Best description of primary host material matrix	Fine Silt and/or Clay	1
Sub-total		4
Exposure ranking		Very Low

Stage 3 Pathway and Receptor Sensitivity		Score	
Receptor category	Residential	No score required	
Age of Receptor	Infant (under 5)	4	
Duration of exposure/site occupancy	>> 10 hours per day (e.g. 24 hour residential exposure)	4	
Receptor ranking		8	High
Combined hazard, exposure and receptor ranking			Low
Pathway: Distance of Receptor from Source	In or within 10m of area of disturbance	4	
Pathway: Depth to impacted material	Material present near the surface, potential to be disturbed during non-construction/routine use of land	D	
Pathway ranking		4D	Medium
Overall ranking			Low



Joint Industry Working Group

Asbestos in Soil and Construction & Demolition Materials

Project Reference	Project Number 2293
Site Name	Northumberland Park, London
Client	
Run by	PDM
Date	12-Jun-19
Reviewed by	
Characterisation of scenario being evaluated	Made ground in proposed gardens of private houses. Excavation of soil may potentially occur
Interpretation of scenario ranking by DST	



Joint Industry Working Group

Asbestos in Soil and Construction & Demolition Materials

Project Reference

2297

Site Name

Northumberland Park, London

Client

Run by

PDM

Date

12-Jun-19

Scenario details

During construction

Decision Support Tool for CAR2012 Work Categories

Stage 1

Hazard Factors

Score

Select ACM type (run model for each type to generate 'Worst Case' output)

Extent of degradation of ACMs at outset of work

Friability and degree of bonding by matrix (ACM matrix, not ground materials)

Distribution of Visible Asbestos Across Affected Area

Amount of asbestos fibre in selected ACM/fibre type as % of host material

Free dispersed fibres/fibre bundles

2

Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)

4

Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)

4

No visible ACMs/fibre bundles

0

Trace quantities - <0.0001 to 0.001 %wt/wt

0

Sub-total

0

Note: the asbestos licensing regime is unaffected by the type of asbestos fibre present in ACMs

Hazard ranking

Negligible

No warranty, expressed or implied, or reliance, is provided in relation to the use of this tool.

It is contingent on users to satisfy themselves that the output from the tool is relevant and appropriate to the assessment being made.

Stage 2

Exposure Factors

Anticipated airborne fibre concentration - Control Limit or SALI?

Anticipated duration of exposure to asbestos

Activity type and effect on deterioration of ACMs during work

Best description of primary host material matrix (soil/made ground)

Respirable fibre index for ACM - RIVM report 711701034 (2003)

<0.001 fibres/ml

> 2 hours in a 7 day period and Up to 10 hours in a day (e.g. full time occupational exposure)

Low intensity, no or minimal deterioration expected

Coarse to Fine Sand

Very low

Score

0

4

0

2

1

Sub-total

7

Exposure ranking

Low

Combined hazard and exposure ranking

7

Very Low

Stage 3

Risk Assessment Outputs

Probable Licensing Status	CAR do not apply
RPE*	None
Dust Suppression**	None
Hygiene/Decontamination***	None

*Where RPE has to be worn continuously for long periods (e.g. more than 1-hour), then powered RPE may be necessary.

**Reduction in control measures possible if natural mitigation factors are present (e.g. raining, wet ground)

***Guide only; suitability of selected personal hygiene measures may be reviewed on a site/contamination-specific basis