

TECHNICAL NOTE

Job	Green Park Village
Client	St Edward Homes Ltd
Technical Note no.	1620000492/TN/003
Date	10/08/2016
By	Chris Dawson
Approved	Phil Studds
Subject	Phase 5 Ground Investigation Findings and Remedial Options
Revision	R05

1. Introduction

Ramboll UK Ltd (Ramboll) were commissioned by St Edward Homes Ltd (St Edward) to undertake an intrusive ground investigation to delineate the extent of asbestos impact in soils on the Phase 5 area of the Green Park Village (GPV) development site, following the identification of suspected asbestos sheeting by the groundworks contractor during lifting and breaking of the slab. Concurrent to this, an assessment of any other potentially harmful onsite contaminants was also undertaken.

The ground investigation was to be undertaken in order to delineate the area of impact, to provide further detail on the pollutant linkages and to assess the suitability of the site soils for re-use onsite.

The ground investigation was designed, procured and undertaken by Ramboll, the findings of which are presented herein.

Multiple previous reports relating to the wider Green Park Village site have been made available to Ramboll. This current report details the historic reports and give a Phase 5 specific ground contamination assessment with associated recommendations:

- Green Park Village Ground Contamination Interpretative Report, Ramboll, March 2016.

2. Constraints and Limitations

This report is intended for St Edward Homes Ltd for the purpose of assisting them in evaluating the site in the context of the development of the Phase 5 area of the Green Park Village site

only. This technical note should not be used in whole or in part by any third parties without the express permission of Ramboll in writing.

Ramboll has endeavoured to assess all information provided to them and any recommendations provided herein relate to the development of the site based on the information gained at the time of writing. Any substantial changes to the use of the site may require a reassessment of the implications of the risks identified and the recommendations provided. It should be noted that although every effort has been made to ensure the accuracy of the data obtained from the investigation, the possibility exists for variations in ground conditions between and around the trial pit locations.

3. Location & Proposed Development

The site is located approximately 4km to the south of Reading town centre Berkshire, located off Longwater Avenue in Green Park. The wider GPV site is intended for approximately 737No. residential properties, including housing with both private and communal gardens, a school, retirement care home, community uses, commercial premises and public open spaces. The development also includes access roads and soft landscaping. Ground levels across the entire site are intended to be raised for flood alleviation purposes.

Within the wider side area, the site has been split into a number of phases, of which Phase 5 is provisionally planned to comprise residential housing with gardens, areas of soft landscaping and associated infrastructure. Generally ground levels are proposed to be raised by approximately 1.0m to 1.5m above current levels under an Environmental Permit.

Details of the Phase 5 and wider GPV site area including; site history, relevant potentially contaminative onsite activities, environmental setting and previous phases of ground investigation are provided with the Ramboll *GPV Ground Contamination Interpretative Report*, (Ramboll 2016).

A Site Location Plan is presented as Figure 1, the Development Phases as Figure 2, and the Proposed Site Development Plan is shown as Figure PL-MPL-005, May 2010.

4. Ground Investigation & Results

The scope of the current ground investigation comprised the following elements of work:

- Excavation of 22No. trial pits to a maximum depth of 2.70m below ground level (mbgl) in a grid pattern across the Phase 5 site at approximate 20m spacings;
- Selective sampling of visibly discrete asbestos-containing materials (ACM) by Lucion Environmental Ltd site personnel;
- Selective sampling of recovered soils for subsequent laboratory testing at i2 Analytical Services Ltd for a typical 'brownfield suite of contaminants' including, *inter alia*, asbestos

screen?, selected metals, pH, cyanide, phenols, hydrocarbons and limited soil leachate analysis;

- Provision of background and reassurance asbestos air monitoring by Lucion Environmental Ltd analyst; and
- Supervision of banksman with jet wash bowser to dampen all soil arisings and minimise dust generation during the intrusive work.

The ground investigation was designed to target areas of historical industrial use within the Phase 5 site area, consequently the trial pits were positioned in the southwest of the Phase 5 area based on an approximate 20m grid.

An Exploratory Hole Location Plan is provided as Figure 4 and exploratory hole logs are provided within Appendix A.

Ground Conditions

The typical succession of strata across the site identified during the ground investigation is summarised in Table 4.1 below:

Table 4.1: Sequence of Typical Strata Encountered During the Investigation

Stratum	Typical description	Range of depth encountered (mbgl)	Range thickness (m)
Made Ground	Brown and grey sandy silty GRAVEL and sandy gravelly CLAY . Gravel is flint, concrete and brick. Rare wood, plastic and ceramics. Evidence of discrete asbestos containing materials present in approximately 50% of the locations. <i>Unit encountered across the whole site - decreasing in thickness from south to north from up to 2.50m to 0.40m in thickness.</i>	Ground Level -1.50	0.40-2.50
	Brown sandy CLAY [Historical Land Raising Fill Material] <i>Encountered in 4No. locations only in the south of the Phase 5 area. Typically from around ~0.20m to 1.30m in thickness.</i>	Ground Level	0.10-1.30
Cohesive superficial deposits Alluvium	Grey to dark grey silty CLAY . <i>Typically encountered across most the site. Maximum thicknesses encountered in northern areas. Unit thickness only proven in RTP721 at 0.60m thick.</i>	0.60-2.70	0.60*
Granular superficial deposits River Terrace Deposits	Grey silty sandy GRAVEL of flint. <i>Only encountered in 3No. locations stratigraphically below the alluvium. Unit thickness unproven.</i>	0.90-2.20	>0.70*

Notes: * depth not proved in all locations.

The ground conditions encountered broadly correspond to those described within the GPV Ground Contamination Interpretative Report, (Ramboll, 2016). Reported strata underlying the site are reported to be: Reading Formation of Lambeth Group (silty sandy clay), White Chalk Subgroup (Chalk with flint).

In addition to the trial pits, an area containing *obvious demolition material was present* within the vicinity of RTP701, RTP702 and RTP703 and is shown on the Exploratory Hole Location Plan. Material from this area was described as grey and brown silty sandy cobbly sub-angular to sub-rounded fine to coarse GRAVEL of concrete, brick, metal, wood and plastic with occasional to frequent cobbles of concrete and aerated concrete blocks. A total of 4No. soil samples (RSP01-RSP04) of this material were obtained and analysed for the same suite of determinands as the samples from the trial pits. The origin of this material is unclear but is understood to have been revealed during on-site excavations (from 'turning the ground over') during an early stage of site clearance, and is considered likely to have resulted from burial of demolished structures in that location, or from another location.

Hydrogeology and Hydrology

Groundwater was encountered in 2No. trial pit locations, RTP710 at 2.40mbgl rising to 2.20mbgl and RTP721 at 1.60mbgl rising to 1.50mbgl. As reported within the GPV Contamination Interpretative Report (Ramboll 2016) the River Terrace Deposits and the Reading Formation unit underlying the site are classified as Secondary A aquifer and the White Chalk Subgroup is classified as a Principal Aquifer.

A disused (but actively licenced) potable water supply abstraction is located approximately 50m south of the Phase 5 site area. This abstraction point has been decommissioned as part of the wider site development plans.

Immediately west of the Phase 5 area is a flooded former gravel working referred to as Trout Lakes. Immediately east there is an unlabelled drainage ditch (understood to be infilled during early site enabling works) understood to flow in a southerly direction. Also, immediately north there is another unlabelled drainage ditch which is understood to flow in an easterly direction. Is it considered likely that the local surface water features ultimately join Foundry Brook, approximately 600m southeast of the Phase 5 area which flows to the northeast.

Visual and Olfactory Observation of Potential Contamination

The following visual/olfactory evidence gross ground contamination was noted during site works:

Table 4.2: Summary Visual and Olfactory Observation of Potential Contamination

Exploratory Hole	Depth Range of Impact mbgl	Description
RTP701	0.10-1.70	Occasional cement bonded ACM
RTP702	0.00-0.60	Frequent cement bonded ACM
RTP703	1.50-2.50	Occasional cement bonded ACM
RTP704	0.60-0.60	Frequent cement bonded ACM
RTP705	0.80-1.90	Single cement bonded ACM
RTP706	0.30-0.90	Single cement bonded ACM and single AIB ACM
RTP711	1.00-1.40	Iridescent (hydrocarbon) sheen on water (small volume) from broken drainage pipe. No free phase product.
RTP713	0.00-0.80	Single cement bonded ACM
RTP716	0.00-1.10	Frequent cement bonded ACM
RTP716A	0.00-0.60	Single cement bonded ACM
RTP718	0.00-0.40	Occasional cement bonded ACM
RSP01	N/A	Frequent cement bonded ACM
RSP03	N/A	Frequent cement bonded ACM
RSP04	N/A	Frequent cement bonded ACM

Notes: ACM = Asbestos Containing Material, AIB = Asbestos Insulation Board.

The hydrocarbon contaminated groundwater from the broken drainage pipe encountered in RTP711 was of a sufficiently small volume and considered likely to be residual build up from within the pipework that it was unlikely to represent any future risk to human health or the local water environment. However, the recovered soil sample from RTP11 at 1.10mbgl was subsequently impacted with this drain water, and as such concentrations recorded in this sample will not accurately represent that of the wider underlying soils.

5. Ground Contamination - Generic Quantitative Risk Assessment

This ground contamination assessment has been undertaken in accordance with the current UK framework and comprises a generic quantitative risk assessment (GQRA) as defined in CLR 11 (EA, 2004). Further details of the UK Legislative Content are provided in Appendix D.

In order to assess the significance of the asbestos concentrations reported, generic assessment criteria (GAC) must be selected based on the critical receptors identified at the site. Receptors are considered in relation to Human Health (e.g., current, future and adjacent site users) and the water environment (e.g., water resources).

Human Health Assessment - Soil Screening Analysis

Details of the UK framework for human health risk assessment and GAC are provided in Appendix D. Contaminant concentrations below the adopted GAC are considered not to warrant

further risk assessment. Where any concentrations are recorded above the GAC consideration of the contaminant distribution is undertaken.

Current UK guidance is provided in the Defra/EA CLR framework which sets out standard land uses for which GAC are derived for individual contaminants. The Phase 5 area is development plans indicate a combination of public open spaces and residential properties therefore comparison has been made to GAC for a residential with plant uptake end use, as a preliminary worst case scenario.

For asbestos contamination there is no generally accepted GAC, as such the threshold for initial consideration for further assessment is any detection of asbestos fibres.

The soil analysis results are presented in comparison to the GAC in Appendix C. Table 5.1 below summarises the contaminants of concern identified at concentrations above the GAC in one or more samples.

Table 5.1: Summary of Elevated Chemical Concentrations in Soil

Determinand	GAC	Units	No. of Samples	No. of Exceedences	Maximum Concentration mg/kg
Benzo(a)pyrene	5	mg/kg	11	3	12 (RTP715 & RSP01)
Lead	200	mg/kg	11	3	1,400 (RSP715)
TPH Aromatic C12-C16	140	mg/kg	2	1	180 (RPT711)
TPH Aromatic C16-C21	260	mg/kg	2	1	360 (RTP711)
Asbestos	Presence	N/A	30	26	Chrysotile, Amosite & Crocidolite [1]

NOTES: GAC – residential with plant uptake
Soil organic matter content of 1% assumed.
[1] Further consideration for asbestos contamination is given in Section 6

The identified Impacts are considered further in relation to vertical and lateral distribution across the site.

Benzo(a)pyrene

Three samples were recorded at concentrations exceeding the Category 4 Screening Level (C4SL) surrogate marker GAC of 5 mg/kg. Measured exceeding concentrations were 12 mg/kg (RTP715 at 0.60mbgl), 12 mg/kg (RSP01) and 8.2 mg/kg (RSP04) and all within Made Ground soils

The exceedences are within one order of magnitude of the GAC, and are isolated,

Lead

Three samples were recorded at concentrations exceeding the C4SL GAC of 200 mg/kg. Measured exceeding concentrations were 350 mg/kg (RTP711 at 1.10mbgl), 1,400 mg/kg (RTP713 at 0.2mbgl) and 1,300 mg/kg (RTP715 at 0.60mbgl) within Made Ground soils.

Two of the exceedances are one order of magnitude above the GAC and 1No. within one order of magnitude and predominantly located within the central area of the Phase 5 area.

Hydrocarbons

Two exceedances of the GAC for TPH aromatic C12-C16 (140 mg/kg), and C16-C21 (260 mg/kg) were recorded within RTP711 at 1.10 mbgl at concentrations of 180 mg/kg and 360 mg/kg respectively. As previously disused the soil sample recovered from 1.10 mbgl was tainted with hydrocarbon impacted drain effluent and therefore it is not considered representative of the wider soils.

The exceedances are within an order of magnitude of the GAC, isolated and not indicative of the wider soil ground conditions.

Asbestos

A total of 32 No. soil samples were analysed for asbestos fibres, of which, 30 No. samples detected the presence of asbestos fibres. These samples were then submitted for further asbestos quantification. The soils where asbestos fibres were detected were Made Ground soils located across the majority of the Phase 5 site area.

Further discussion of the soil asbestos analysis, on site observations of contamination and the asbestos air monitoring analysis are discussed below.

Waters Assessment – Soil Leachate Analysis

GAC for waters must be selected to assess potential risks to identified human health and environmental receptors. The site is underlain by the River Terrace Deposits and the Reading Formation unit are classified as Secondary A aquifer and the White Chalk Subgroup is classified as a Principal Aquifer. The nearest surface water features are Trout Lake immediately to the west, and unlabelled drainage ditches immediately north and east of the Phase 5 area.

Adopting a conservative approach (and on the basis that the licensed potable abstraction located 40m south of the site has been decommissioned as part of the redevelopment), comparison of concentrations of determinants in the leachate samples have been made to Environmental Quality Standards (EQS) for freshwater and, where these are not available, to UK Drinking Water Standards (DWS). The GAC used in the assessment of controlled waters are also provided in Appendix D.

Further details of the UK legislative context are provided in Appendix D.

Leachate analysis was undertaken on 4No. soil samples, 3No. from Made Ground soils and 1No. from natural River Terrace Deposits to assess the potential leachate of *inter alia*: metals, phenols, hydrocarbons and sulphate.

The chemical analysis screening summary tables are included in Appendix D. Measured concentrations above the recommended GAC in one or more sample are summarised in Table 5.2.

Table 5.2: Summary of Elevated Chemical Concentrations in Soil Leachate

Determinand	GAC	Units	No. of Samples	No. of Exceedences	Maximum
Calculated leachable bioavailable Lead	1.20	µg/	4	1	1.22 (RTP721)

NOTES: GAC based on most conservative of WFD DWS and Freshwater EQS
Bioavailability calculations undertaken in accordance with industry best practice.

Bioavailable Lead

One exceedance of the GAC of 1.20 µg/ for bioavailable lead was recorded from the sample RTP721 at 0.10mbgl within Made Ground soils.

The exceedance marginally exceeds the GAC and is isolated.

Summary

The following impacts have been identified at the Phase 5 site area:

- Localised benzo(a)pyrene, lead and aromatic hydrocarbons (TPH) within shallow Made Ground soils;
- Site wide asbestos impacts within Made Ground soils; and
- Localised (RTP721 at 0.10mbgl) impact of leachable bioavailable lead within Made Ground soils.

It should be noted that due to the lack of onsite borehole motoring standpipes, no assessment of potential impacts to groundwater or of the effect of ground gases has been possible. As such these remain as potential sources of contamination at this time.

6. Asbestos Contamination

The location soil analysis, Ramboll soil analysis and the Lucion air monitoring analysis are presented below:

Lucion Environmental Soil Analysis – Visibly Discrete Fragments of ACM

In addition to the ACM materials identified by Ramboll, Lucion Environmental site personnel also identified the presence of ACMs within the trial pit locations. These samples were submitted to the Lucion laboratory for asbestos analysis. The results of the Lucion sampling exercise are provided within Appendix B as Lucion Bulk Sample Report 121834 (July 2016) and Lucion Bulk Sample Location Plan Berkley Housing Development – 121834 (July 2016).

In summary, combining the Ramboll site descriptions and Lucion laboratory analysis confirmation, visible discrete (/bulk as per Lucion terminology) ACMs were identified in the majority of the trial pit locations, including in the samples of demolition material. The asbestos materials identified typically comprised single to multiple fragments of cement-bound ACMs (sheet and pipe materials) but included 3No. occurrences of asbestos insulation board (AIB) materials (in RTP703 and RTP706, of board, sheet and pipe fragments). Asbestos fibre types detected were typically chrysotile (white asbestos) with 3No. occurrences of amosite (brown asbestos) detected in the AIB samples.

Ramboll / i2 Laboratory Analysis

The Ramboll site engineer took representative soils samples across all trial pit locations and from the area of demolition material and submitted them to i2 Analytical Services Ltd for laboratory analysis. If the presence of asbestos was detected, these samples were also submitted for asbestos quantification analysis. This analysis provides the amount of asbestos contained within the total soil matrix expressed as a percentage weight for weight of the entire sample (% w/w).

The results of the i2 laboratory analysis for asbestos and other determinands are provided in Appendix C. A summary from the asbestos soil analysis is provided below in Table 6.1.

Table 6.1 Summary of i2 Asbestos Laboratory Analysis Results – Residual Soil Matrix Results.

Exploratory Hole	Sample Depth	Asbestos Containing Material Types Detected	PLM Results	Total Asbestos in Sample
	mbgl	(ACM)		% w/w
RTP701	1.4	Loose Fibres	Chrysotile	< 0.001
RTP702	0.00-0.10	Loose Fibres & Insulation Lagging	Chrysotile & Amosite	0.01
RTP703	1.7	Loose Fibres & Insulation Lagging	Amosite	0.006
RTP704	0.3	Loose Fibres & Insulation Board/Tile	Chrysotile & Amosite	0.003
RTP704	0.6	Loose Fibres	Chrysotile & Amosite	< 0.001
RTP706	0.1	Loose Fibres	Chrysotile & Crocidolite	< 0.001
RTP706	0.4	Loose Fibres	Amosite	< 0.001
RTP707	0.1	Loose Fibres & Insulation Board/Tile	Chrysotile	0.557
RTP708	0.1	Loose Fibres	Chrysotile	< 0.001

Exploratory Hole	Sample Depth	Asbestos Containing Material Types Detected	PLM Results	Total Asbestos in Sample
	mbgl	(ACM)		% w/w
RTP709	0.1	Insulation Board/Tile	Chrysotile	< 0.001
RTP710	0.6	Hard/Cement Type Material & Loose Fibres	Chrysotile & Amosite	0.050
RTP710	1.2	Loose Fibres	Amosite	< 0.001
RTP711	0.6	Loose Fibres	Chrysotile & Amosite	< 0.001
RTP711	1.1	Loose Fibres	Chrysotile & Amosite	< 0.001
RTP712	0.1	Insulation Board/Tile	Amosite	< 0.001
RTP713	0.2	Loose Fibres & Insulation Lagging & Hard/Cement Type Material	Chrysotile & Amosite	0.016
RTP714	0.1	Insulation Lagging & Hard/Cement Type Material	Chrysotile	0.174
RTP715	0.6	Loose Fibres	Chrysotile & Amosite	< 0.001
RTP716	0.2	Loose Fibres	Chrysotile	< 0.001
RTP716	0.5	Loose Fibres	Chrysotile	< 0.001
RTP717	0.1	Loose Fibres & Insulation Lagging & Bitumen	Chrysotile & Amosite	0.017
RTP718	0.1	Loose Fibres & Insulation Lagging & Insulation Board/Tile	Chrysotile & Amosite	0.004
RTP721	0.1	Loose Fibres	Chrysotile & Amosite	< 0.001
RTP722	0.6	Loose Fibres	Chrysotile	< 0.001
RTP716A	0.1	Loose Fibres	Chrysotile	< 0.001
RTP716A	0.7	Loose Fibres & Insulation Lagging	Chrysotile & Amosite	< 0.001
RSP01	N/A	Insulation Lagging & Loose Fibres	Chrysotile & Amosite	0.004
RSP02	N/A	Loose Fibres	Amosite	< 0.001
RSP03	N/A	Insulation Lagging & Loose Fibres	Chrysotile & Crocidolite & Amosite	0.008
RSP04	N/A	Insulation Lagging & Insulation Board/Tile	Chrysotile & Amosite	0.013

Notes: PLM = Polarised Light Microscopy, % w/w = Percent weight for weight.

In summary, asbestos-containing materials were encountered in all but 2No. sample locations (RSP705 and RTP720). A total of 47% of samples contained asbestos insulation lagging or asbestos insulating board materials within the soil matrix and the remainder contained loose fibres of cement type ACMs or bitumen ACMs. A total of 2No. samples (RTP706 and RSP03) were found to contain crocidolite fibres ('blue asbestos') with the remainder found to contain predominately chrysotile ('white asbestos') and limited amounts of amosite ('brown asbestos'). Asbestos concentrations were found to range from below laboratory detection limits (<0.001%), up to 0.557% w/w.

The i2 asbestos results provided above refer to the amounts and types of asbestos contained within the soil matrix **only**. The types of ACMs described within Table 6.1 refers to ACM samples *not visually distinguishable by eye and are typically smaller than the diameter of a 5 pence piece* (i2 Laboratory personal correspondence, July 2016). The results of the i2 analysis are herein referred to as residual asbestos material contained within the soil matrix. The ACMs described in Table 4.2 and the Lucion results are referred to as visibly discrete fragments of ACM.

Lucion Air Monitoring Results

Lucion Environmental provided two types of air monitoring during the ground investigation works: static air monitoring and personal air monitoring.

The static air monitoring equipment can be placed in any location on site and are typically moved around the site to provide a representative spread of data but are also used to obtain data under worst-case scenarios, such as might be expected immediately down-wind of the excavation. The personal air monitors are typically worn by those site personnel considered to be at highest risk from inhalation of airborne fibres, and are therefore typically worn by excavator operators, those dampening-down the soil arisings, or those supervising the operation in close proximity for example.

A total of 27No. air samples were analysed during the site works comprising 20No. static air monitoring samples and 7No. personal air monitoring samples. Copies of the Lucion air monitoring data are provided in Appendix B.

During the static air monitoring, both background and operational reassurance monitoring was undertaken. The fibre count ranged from 2 to 8 fibres and the reported fibres per millilitre (f/ml) concentration was always <0.01 f/ml (the reporting limit of the analytical technique).

Similarly, during the personal air monitoring the reported fibre count ranged from 3 to 9 fibres and the reported fibre concentrations was always <0.02 f/ml (the reporting limit of the analytical technique).

For an initial review, the results of the static air monitoring were compared against a 0.01 fibres per millilitre of air (0.01 f/ml) threshold concentration. This threshold concentration is known as the 'clearance indicator' for asbestos removal works in an enclosed space, and as described by the Health and Safety Executive (HSE):

A clearance indicator of 0.01 f/ml in air is used in the UK for assessing whether it is safe to take down an enclosure after the asbestos removal has been completed and the area thoroughly cleaned.

It is considered therefore that 0.01 f/ml can reasonably be described as a conservative threshold for fibre concentrations in outside air, and that concentrations below this level are unlikely to be a cause for significant concern.

The results of the 20No. static air monitoring events undertaken during the ground investigation works show that the 0.01 f/ml threshold concentration was not exceeded.

For **personal** air monitoring the HSE recommend comparison against the asbestos 'Control Limit' of 0.1 fibres per millilitre of air (0.1 f/ml). The control limit refers to the concentration of asbestos fibres in any localised atmosphere, measured and averaged over a continuous period of four hours, in accordance with the 1997 World Health Organisation's recommended method.

The results of the 7No. personal air monitoring events undertaken during the ground investigation works show that the 0.1 f/ml asbestos control limit was not exceeded. Thus as the personal air monitoring results indicated that the control limit was not exceeded it is considered that the control measures employed on site were appropriate.

Note that, in accordance with the relevant guidance, there is no distinction made between asbestos fibres and any other type of fibre that is observed in the air sample, so this is a measure of the concentration of *total fibres* in air, and is not necessarily a measure of *asbestos fibres* in air.

7. Risk Evaluation

The information presented in the previous sections of this report have been collated and evaluated to refine the initial conceptual site model for the site as presented within the GPV Contamination Interpretative Report (Ramboll 2016)

This conceptual model is based on the site as it stands at present, *i.e.*, disused and on the provided site development plans. A revised assessment would be required should the development significant alters from those provided.

Sources of contamination

The potential contamination sources have been considered in relation to specific receptors within the GQRA above. The sources, impacts and associated receptors identified as potentially at risk are summarised in Table 7.1 below.

Table 7.1: Potential Sources

Source	Receptor	Comments
Soil impacts	Human Health	Visibly discrete fragments of asbestos containing materials were found in the majority of the site soils, typically comprising single to multiple cement-bound ACMs (sheet and pipe materials) and 3No. occurrences of

Source	Receptor	Comments
		AIB materials. Asbestos fibres within the soil matrix across the majority of the site. Typically comprising loose fibres, cement type/ bitumen ACMS, insulating and lagging materials (47% of samples containing asbestos). % w/w concentrations range from <0.001% to 0.557% w/w. Neither the 0.01 f/ml 'clearance indicator' nor 0.1 f/ml 'Control Limit' were exceeded on any occasion during the asbestos air monitoring. Localised minor impacts of benzo(a)pyrene and lead within Made Ground soils. B(a)P and lead concentrations are typically within one order of magnitude of the GAC. Isolated impact of aromatic TPHs within small volume of drain effluent impacted Made Ground soil.
	Water Environment	Localised minor impact of leachable bioavailable lead within Made Ground soils.
Groundwater impacts	Water Environment	Potential sources not identified due to absence of monitoring standpipes. Conservatively assumed to present a potential risk in the absence of additional data.
Ground gas impacts	Human Health	

Receptors

In order for the contaminants identified in this site investigation to reach potential receptors, there has to be a viable pathway for the contaminant. Potential pathways identified are discussed further in Table 7.2 below in relation to the identified source impacts and receptors identified.

Table 7.2: Potential Receptors

Feature	Details
ON SITE	
Current site users [construction workers]	Risks to current site users including construction workers during development. Access to the site is understood to be limited to St Edward Homes site personnel only.
Future site users	Proposed residential housing and public open space within Phase 5 site area.
Underlying aquifers	River Terrace Deposits and the Reading Formation unit underlying the site are classified as Secondary A aquifer and the White Chalk Subgroup is classified as a principal aquifer.
OFF SITE	
Adjacent Site Users	Housing developments immediately south and east of the site. Further developments, public open spaces and a school within the wider GPV site.
Surface waters	Trout Lake and unlabelled drainage ditches present immediately north, east and west of the site.

Notes: *Current site users* considered to be present and near future site users based on the wider construction works being undertaken on the GPV site.
Risks to construction materials such as foundations or water supply pipes are outside of the scope of this report and therefore not assessed.

Pathways

In order for the contaminants identified in this ground investigation to reach potential receptors, there has to be a viable pathway for the contaminant. Potential pathways identified are discussed further in Table 7.3 below in relation to the identified source impacts and receptors identified.

Table 7.3: Potential Pathways

Receptor	Pathway	Comments
Human health	Direct contact with contaminated soils	Potential for direct contact by construction workers during site development and land raising activities [1]
	Inhalation of asbestos fibres	Potential for inhalation of asbestos fibres following disturbance of surface ACMs or impacted soils. The mechanism for generating airborne asbestos fibres typically requires agitation of surface ACMs or exposure of belowground ACMs to the surface. Therefore the limiting factor for asbestos fibre generation is the scale of site related development and land raising activities [1].
	Inhalation of vapours and dusts	Potential for inhalation of vapours and dusts from the agitation of soils. As above the mechanism for generating dusts will be limited by land raising activities [1].
	Inhalation of ground gases and build up in confined spaces	Mechanism for migration of ground gases to be assessed following receipt of ground gas monitoring data, as such a conservative assumption that the pathway is viable is made.
Water environment	Leaching and vertical migration to groundwater	Following on site land raising the placement of compacted clay fill material, the potential for leachate generation within the Made Ground soils will be limited [1]
	Migration of contaminants via groundwater to surface water courses and underlying aquifer	Due to the lack of groundwater data, a full assessment of the risks to surface waters and underlying ground water is not possible, as such a conservative assumption that the pathway is viable is made.

Notes: [1] Following development of the site, the onsite Made Ground soils (including asbestos impacted soils) are understood to be buried under between 1.0m and 1.5m of vibro compacted clay fill material. Following placement of the clay fill material the corresponding pathways pathway will be effectively broken.

Qualitative Risk Assessment

Potential pollutant linkages are identified using the source-pathway-receptor framework detailed above. An assessment of the potential significance of each linkage is then made by consideration of the likely magnitude and mobility of the source, the sensitivity of the receptor and nature of the migration/exposure pathways.

This qualitative hazard assessment has been undertaken in accordance with NHBC and Environment Agency, 2008. Further details of which are provided in Appendix D including definition of risk categories.

Table 7.4 summarises the pollutant linkages and risk ratings associated with the proposed development.

Table 7.4: Risk Assessment

Hazard / Pollutant	Pathway	Receptor	Potential Severity	Probability of Risk	Level of Risk
Visibly discrete fragments of asbestos containing materials <i>predominantly cement bound & isolated AIB.</i>	Inhalation	Current site users [Construction workers]	Severe	Likely	HIGH [1] - risk mitigation and management measures required
		Future site users	Severe	Likely	HIGH [2] - risk mitigation and management measures required
		Adjacent site users	Severe	Unlikely	MODERATE / LOW [2] - risk mitigation and management measures required
Asbestos fibres within the soil matrix including insulation, lagging, loose fibres and cement bound ACMs	Inhalation	Current site users [Construction workers]	Severe	Low	HIGH [1] - risk mitigation and management measures required
		Future site users	Severe	Likely	HIGH [2] - risk mitigation and management measures required
		Adjacent site users	Severe	Unlikely	MODERATE / LOW [2] - risk mitigation and management measures required
Localised minor impacts of benzo(a)pyrene, lead & TPH within Made Ground soils	Direct contact & Inhalation of dust & vapours	Current site users [Construction workers]	Medium	Low	MODERATE / LOW [2] - risk mitigation and management measures required
		Future site users	Medium	Unlikely	LOW
		Adjacent site users	Medium	Unlikely	LOW
Localised minor impact of leachable bioavailable lead within Made Ground soils.	Leaching and vertical migration to groundwater	Secondary Aquifers (River Terrace Deposits and Lambeth Group)	Mild	Low	VERY LOW
		Principal Aquifer (Chalk)	Mild	Unlikely	LOW
		Surface water – Trout Lakes and ditches	Mild	Unlikely	VERY LOW

Hazard / Pollutant	Pathway	Receptor	Potential Severity	Probability of Risk	Level of Risk
Potential groundwater impacts as yet not investigated	Migration of contaminants via groundwater to surface water courses and underlying aquifer	Secondary Aquifers (River Terrace Deposits and Lambeth Group)	Medium	Low	MODERATE /LOW [3]
		Principal Aquifer (Chalk)			
		Surface water – Trout Lakes and ditches			
Potential ground gas source as yet not investigated	Migration of ground gases and build up in confined spaces	Current site users [Construction workers]	Medium	Low	MODERATE /LOW [3]
		Future site users	Medium	Low	
		Adjacent site users	Medium	Low	

Notes: Assessment completed assuming site in current conditions. Should site levels be altered significantly over those presented in Section 3 then further assessment would be required.

[1] Given the use of appropriate personal protective equipment (PPE) and on-site health and safety precautions and use of suitable control measures, the risk to site construction workers would be reduced to **LOW**/MODERATE.

[2] Should site levels be raised as outlined within the site development plans, the risk to future site users and adjacent site users would be reduced to **LOW** / MODERATE due to the pollutant linkage being broken by the effective removal of the inhalation pathway.

[3] Due to the absence of data, both the severity and probability of risk are estimated on likely ground conditions. Following receipt of site specific data the corresponding levels of risk can be reassessed.

Implication of Human Health Risk Assessment & Remedial Options

Table 7.5 below summarises the pollutant linkages which require further consideration and potential remedial action.

Table 7.5: Significant Pollutant Linkages

Pollutant linkage	Additional Actions Required
Site wide visibly discrete fragments of asbestos containing materials and asbestos fibres within the soil matrix presenting a risk to human health via inhalation.	Risk management measures required to address potential risks to human health during construction. Risk to offsite receptors and future site users mitigate by land raising activities.
Localised minor impacts of benzo(a)pyrene, lead & TPH within Made Ground soils presenting a risk to human health via direct contact	Further investigation recommended within Phase 5 area to delineate extent of asbestos contamination.
Potential groundwater and ground gas sources as yet not investigated	Installation and monitoring of borehole standpipe required to be undertaken within Phase 5 site area. Following receipt of the site specific data additional analysis and risk assessment can be undertaken.

The risks from the recorded concentrations of asbestos to construction workers is assessed as being **HIGH** but can be reduced to **LOW/MODERATE** with the appropriate use of PPE and on-site health and safety precautions and suitable control measures. Details of indicative site requirements are provided in Section 8 below.

The risks to future site users (e.g., residents) from asbestos contamination is assessed as **HIGH** but are reduced to **LOW/MODERATE** based on the proposed importation of clay fill material to raise site levels to between 1.0m and 1.5m above existing levels, creating a barrier between the impacted soil and the receptor thereby effectively removing the inhalation pollution linkage.

The risks to adjacent site users (e.g., local residents downwind of Phase 5) from asbestos contamination is assessed as **MODERATE/LOW** but are reduced to **LOW/MODERATE** based on the proposed land raising works thereby effectively removing the inhalation pollution linkage.

The results of this risk assessment and the suitability for the use of the land raising works fill material as an effective cover layer system require approval from Reading Borough Council Environmental Health.

Further details of the Remediation Strategy are provided within Section 9 below. It should be noted that site works undertaken during this phase of ground investigation did not fully delineate the area of asbestos impacts; as such, it is considered highly likely that additional phases of ground investigation are required within the Phase 5 area.

It should be noted that alternative remediation options are potentially viable for the site; the most likely alternative option is bulk excavation of the impacted soils (following additional delineation work) and removal from site to an appropriately licenced waste facility.

8. Asbestos Regulations and On-Site Risk Mitigation Measures

Under HSE guidance, work with asbestos is divided into three scenarios based on the likelihood of exposure to asbestos fibres in the air:

1. Non-Licensed Works (NLW);
2. Notifiable Non-Licensed Work (NNLW);
3. Licensed works (LW).

The criteria for classifying the type of works is based on the potential for the exposure limits of asbestos fibres in the air to be exceeded which is typically assessed using the material type found and if ACMs are visually identifiable.

As discussed above within the Phase 5 area there were two categories of asbestos found:

- Visibly discrete fragments of ACMs such as pieces of asbestos cement sheets/pipes and limited fragments of asbestos insulating board (AIB); and
- Residual asbestos within the soil matrix – typically expressed as either loose free fibres or pieces of ACM 'smaller than a 5p piece'.

Cement-bound ACMs are classified as being of a lower risk due to the asbestos fibres typically being bound within the cement matrix. Cement ACMs tend to have an asbestos content of between 10-15%, whereas the asbestos fibres within insulation material are typically less tightly bound and therefore more friable, and have an asbestos content of between 20-45%. Asbestos lagging materials are considered highly friable with an asbestos content of up to 100%. Insulation and lagging are considered higher risk materials and depending on the quantities present on site, the management strategies differ significantly in terms of HSE regulations, *etc.*

Discrete fragments of ACMs were identified in the Phase 5 area, comprising cement-bound ACMs with 3No. occurrences of asbestos insulation board (AIB) materials. These discrete fragments were not identified in all locations.

Within the soil matrix, asbestos was encountered as a mixture of insulation and lagging-type fibres and loose and cement-bound asbestos, in all but 2No. sampling locations.

The reassurance air monitoring results did not indicate any exceedances of the relevant thresholds for any on-site activities, nor any significant changes from background concentrations during the physical excavation of the trial pit soils. This indicates that, under controlled conditions, the potential for fibre generation is relatively low.

Implications for Phase 5 – Site Works/Workers

While high risk asbestos containing materials such as insulation board and lagging were found, they were typically encountered within the soil matrix (*i.e.*, less than the size of a 5p piece) with only infrequent visually identifiable discrete fragments of this material type.

Due to the low fibre generation potential of the material, as shown during the trial pitting investigation (albeit **under controlled conditions**), Ramboll would classify any likely future works as **Non-Licensed Works**.

Please note that this classification is based on strict adherence to the control measures listed below and that should either the quantities, type or condition of the asbestos change during the works, any classification is subject to change.

Non-Licensed Works Recommended Control Measures:

- Demarcation of asbestos impacted area with warning signs;
- Implementation of clean and dirty working area with decontamination equipment and wheel/plant washing facilities;
- Background boundary, operational and personal air monitoring testing (typically 1 to 2 days before and after, and during all site works);
- Use of appropriate PPE and RPE; and
- Watching brief role by a suitably qualified competent person *e.g.*, Ramboll Engineer to produce asbestos management plan, to review and ensure adherence to all RAMS, on site identification of asbestos and to provide tool box talks to all site personnel working in the demarked area.

Should the site conditions change and the works become Notifiable Non-Licensed Work (NNLW) then a HSE ASB NNLW1 notification is required (no hold period), medical surveillance of site personal and additional controls would be required.

Should the site works become Licensed Work (LW) then only a licenced asbestos contactor can supervise the site works with asbestos impacted soils, a HSE ASB5 LW notification is required (14 days hold period), heightened medical surveillance and control measures are be required.

For all scenarios it is imperative that all asbestos risk assessments are dynamic and reviewed and amended where required regularly.

9. Conclusions and Recommendations

As part of the development works proposed at the Green Park Village site and following on-site observations of surface asbestos containing materials, an initial phase of ground investigation works was proposed and undertaken in July 2016 by Ramboll. The site works comprised 22No.

machine-excavated trial pits and sampling, attendance of asbestos specialists for sampling and air monitoring and subsequent laboratory analysis.

Ground investigation works identified the presence of visibly discrete asbestos fragments across the majority of the site typically presenting as cement type materials with isolated asbestos insulation boards fragments. Residual asbestos fibres within the soil matrix were also identified across the majority of the site typically presenting as insulation/lagging type materials, cement type materials and loose fibres.

The reassurance air monitoring results did not indicate any exceedances of the relevant thresholds for any on-site activities, nor any significant changes from background concentrations during the physical excavation of the trial pit soils. This indicates that, under controlled conditions, the potential for fibre generation is relatively low.

Localised exceedances of the GAC for benzo(a)pyrene, lead, TPH and leachable bioavailable lead were encountered in shallow Made Ground soils.

The human health risk assessment highlighted potential risks to construction workers, future site users and adjacent site users but these are suitably mitigated with appropriate site health and safety management and the proposed land raising activities (subject to Local Authority approval).

Potential risks from groundwater impacts and ground gas sources have not been suitably assessed due to a lack of data and further ground investigation is recommended.

In relation to the risks identified during this phase of ground investigation the following elements of work are recommended:

- Liaison with Reading Borough Council Environmental Health department to discuss the findings of this phase of investigation and the following remediation strategy;
- Further delineation of asbestos-impacted soils within the Phase 5 site area;
- Installation and monitoring of groundwater/gas borehole standpipe (likely as part of additional ground investigation works on the Green Park Village site); and
- Production of an Asbestos Management Plan with details of the control measures required to mitigate the risks from the identified and potentially unexpected asbestos contamination on the Green Park Village site.

Please note that no consideration has been made within this report to classify any of the on-site soils in terms of waste. Should this be required, it can be provided at a later date.

10. Phase 5 Outline Remediation Strategy

The details of the Phase 5 outline remediation strategy are provided herein to support the design and satisfy the requirements of Part (2) of Condition 42 of Planning Permission ref 10/01461/OUT dated 13th July 2011 which states that:

Prior to the commencement of each phase of development approved by this planning permission (or such other date or stage in development as may be agreed in writing with the Local Planning Authority), the following components of a scheme to deal with the risks associated with contamination in relation to that phase of development shall each be submitted to and approved, in writing by the local planning authority:

- 1. A site investigation scheme, based on the Phase 1 desk top study to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off-site.*
- 2. The site investigation results and the detailed risk assessment and, based on these, and options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken. The remediation measures shall include an implementation timetable and a remediation verification methodology. The remedial scheme must be carried out before the development commences unless otherwise agreed in writing by the local planning authority.*

The aims of this outline remediation strategy are to:

- Provide details of the additional ground investigation works required;
- Provide details of the risk mitigation measures required during the enabling works;
- Specify a plan for verifying the remedial works on site on completion of the ground works phase of the development; and
- Detail the site soil management measures at the site.

Specific Activities Required During Earthworks

This section provides the outline remediation strategy for development within Phase 5 as a whole. The initial stage of works in relation to the asbestos impacts identified in the western part of Phase 5 will include a period of earthworks to remove obstructions. This initial stage of works is required to facilitate the raising of ground levels for flood alleviation and to allow ground improvement works via vibro-stone columns to proceed without this risk of termination due to obstructions. The specific activities required during the earthworks stage are summarised below and should be read in conjunction with Figure 4 and the additional provided in the subsequent sections.

- At commencement of works a series of trial pits are to be undertaken (RTP21 to RTP28) to delineate the full extent of Made Ground area. Should asbestos impacts be more widespread additional trial pits will be excavated.

- All Made Ground within the eastern part of Phase 5 (as shown on Figure 4) will be excavated and sorted/separated into material suitable for re-compaction, oversize material suitable for crushing and unsuitable materials. Oversize materials shall be those exceeding 125mm in accordance with Table 6/2 of Specification for Highways Works Series 600. Note: as this work has the potential to generate air borne asbestos fibres suitable dust suppression **MUST** be used during these earthworks.
- Made Ground within the eastern part of Phase 5 (as shown on Figure 4) is to be turned over for obstruction/concrete clearance ahead of ground improvement works. Turnover will be undertaken to the full depth of Made Ground (~1.5 m below ground level). Note: as this work has the potential to generate air borne asbestos fibres suitable dust suppression **MUST** be used during these earthworks.
- Any obstructions encountered shall be excavated, removed and over-dug by a minimum of 500mm.
- Material suitable for backfill will be placed and compacted in accordance with Glanville Drawings 4160518-SK1202 to 4160518-SK1205 and the Ramboll Specification for Earthworks (2016). Note that a brightly coloured teram (or similar) membrane shall be laid across entire asbestos impacted Made Ground surface prior to filling.
- The earthworks in general, are required to be undertaken in accordance with Ramboll Green Park Village Specification for Earthworks (2016) with specific reference shall be made to:
 - Table 6/2 of Specification for Highways Works Series 600 as no materials >125mm are to be re-used as part of earthworks.
 - The method of compaction to be confirmed by the Contractor following additional geotechnical analysis (to be undertaken by the Contractor).
- Excavated concrete / obstructions are to be transported to stockpile holding area for visual inspection for asbestos ahead of crushing/sorting. Crushing activities to be undertaken in Earthworks Area.
- Clean service corridors are to be created in the centre of the main spine roads in Phase 5 as shown in Glanville Drawings 4160518-SK1204 and 4160518-SK1205.

Following earthworks and filling in accordance with the Environmental Permit the finished ground surface will be in accordance with Glanville Drawings 4160518-SK1202 and 4160518-SK1203.

- All works shall be undertaken in strict accordance with Ramboll Asbestos Management Plan (2016) under controlled conditions.

Roles and responsibilities

The Contractor will be required to develop this outline Remediation Strategy to produce detailed protocols and management plans, including method statements for the works to be undertaken defining how potentially contaminated soils will be managed and handled onsite and how the associated environmental risks will be managed.

An Asbestos Management Plan is to be provided by Ramboll to assist the contractor with regard to site specific controls and protocols required for working with the impacted asbestos soils.

The details of these protocols will need to be agreed with the Regulators at Reading Borough Council and the Environment Agency before works commence at the site, and confirmation of this approval by the Regulator shall form part of the Verification Report which will need to be prepared on completion of the ground works.

During the site works the Contractor will be responsible for obtaining and maintaining a record of information required for the Verification Report. The Contractor will need to provide a copy of these records on completion of the ground works to the Engineer and deal with any queries arising during the verification process.

General Site Environmental Controls

An outline of the expectations of the Contractor, in order to ensure environmental compliance throughout the enabling and remedial works is provided in Appendix E. The Contractor should adhere to the general guidance provided as part of this strategy and should undertake works in an environmentally sound manner, in accordance with industry best practice.

Site specific controls regarding asbestos contamination are to be provided under separate cover as part of an Asbestos Management Plan.

Site Clearance and Removal Works

The Phase 5 site area is understood to be clear of existing above ground structures however as part of the site clearance works, areas of vegetation (including potential for invasive species) and surface waste materials may be present, as such the Contractor is responsible for the removal of these. Additional testing may require to appropriate classify these materials.

As part of the site clearance, the Contractor will be responsible for the removal of vegetation and any fly-tipped material at the site. Ramboll understand that the Contractor is required to commence site enabling works on the 16th August which comprises obstruction clearance works within the onsite Made Ground soil areas inclusive of dust suppression. Works are also intended to create clean corridor working areas and will comprise localised excavation below and 2m wide

within the centre of the new proposed roadways. Site works are provisionally programmed to last for approximately 2No. weeks.

Due to the historical industrial nature of the site there is the potential that the enabling works may encounter limited subsurface structures, underground bulk storage tanks, cesspits, foundations, ductwork, interceptors, sumps and pipework *etc.* These structures have the potential to contain potentially contaminative solids and liquids and where encountered they should be assessed by competent persons prior to their penetration and removal. Should contaminative materials be present in these structures, or in the soils immediately surrounding them, the structures and surrounding soils should be dealt with in accordance with the unforeseen contamination protocol described in below.

Any encountered structures or obstructions should be removed and segregated for recycling, with excavations over-dug by a minimum to 500mm to ensure the area is clear.

Unforeseen Contamination Protocol

The Contractor shall be required to provide a method statement relating to any unexpected areas of contamination encountered during demolition and/or earthworks.

Potentially contaminated materials are those which via visual or olfactory evidence may be suspected to be contaminated (*i.e.*, the presence of staining, odours or deleterious materials).

The unforeseen contamination protocol is likely to include:

- The Contractor stopping work in that area and immediately informing St Edward Homes Ltd or their representative and Ramboll to discuss the proposed action;
- The Contractor liaising with the statutory authorities including the EA and Reading Borough Council to agree proposals for dealing with this material;
- The implementation of measures to remove contaminated materials (where feasible) for segregation, storage or stockpiling (of soils) within a bunded and polythene covered area whilst testing is undertaken. Contaminated liquids should be stored in suitable containers;
- A record should be made of the volume of material removed and the location and extent of any required excavation;
- The full extent of the contaminated material must be excavated (with a minimum 0.5m overdig) and furthermore validated by a suitably qualified engineer;
- Undertake laboratory testing of representative samples from the base and sides of the excavation (minimum of 1 sample per 25m³) and testing of the material for a suitable suite of contaminants. The suite and chemical criteria for verification are to be defined in consultation with Ramboll and the regulatory authorities based on the nature of the contamination encountered;
- If the material fails comparison against the re-use thresholds this material should be excluded from the re-use strategy and alternative scenarios should be sought for re-use.

The last option should be disposal off-site in accordance with current waste regulations.

Records including laboratory analytical certificates, waste transfer notes, consignment notes and volumes requiring removal should be retained by the Contractor; and

- If the material passes comparison with re-use thresholds (and is geo-technically suitable), the contractor should determine and record the location for placement of the material.

It will be necessary to retain all records relating to testing, quantity, depth and location of the material identified. Where such material is re-used, it will be necessary to demonstrate suitability through appropriate chemical testing and to retain records on where this material was placed.

If this material is removed off-site, then in addition to records on the source area outlined above, it will also be necessary to retain Duty of Care records relating to waste transfer notes, quantities and the receiving site.

Asbestos Management Procedures

Site specific protocols for dealing with unforeseen asbestos contamination are to be provided under separate cover as part of a site specific Asbestos Management Plan.

Clean Service Corridors

As part of the site enabling workings clean corridor working areas are to be created in the locations of the proposed roadways. In these locations material will be excavated to 1.5m below sewer invert level and to a width of 2m in the centre of the proposed roadways. Following this a brightly coloured membrane separator is to be placed to the base and sides of the corridor and filled with material compliant with the environment permit as described above. The location of clean corridor and depth of excavation required is shown on Glanville Drawings 4160518-SK1204 and 4160518-SK1205.

Re-Use Of Material On-Site

Ramboll understand that reuse of soils will be undertaken within the Phase 5 site area in accordance with the CL:AIRE Waste Code of Practice. This will be limited to incorporation of Made Ground in basal layers of land raise at depth of greater than 1mbgl following re-profiling of existing ground surface (shown in Drawings 4160518-SK1204 and 4160518-SK1205.) in advance of filling works and construction of the roadways/drainage.

From the limited testing undertaken to date the site soils are generally considered only to be suitable to be placed beneath the land raise or at a depth greater than 1m (whichever is deeper), considering that the soils used within the land raise will be inert and suitable for use in accordance with the requirements of the Environmental Permit. Filling activities should be

completed in accordance with the levels shown on Drawings 4160518-SK1202 and 4160518-SK1203.

Should the material be considered for use elsewhere then additional environmental testing, analysis and protocols are applicable. Details of which can be supplied upon required

All material movements must be undertaken in accordance with a Material Management Plan which Ramboll understand is to be produced by an external party.

Any re-used materials should be placed in accordance with the Ramboll Specification for Earthworks (Ramboll, 2016). This will involve the contractor undertaking geotechnical testing to determine the appropriate compaction methodology.

Should waste materials require disposal to landfill, documentary evidence of the soil types and relevant soil testing data should be provided to the landfill operator in order to determine acceptance at the landfill and associated costs. Waste handling and disposal must be undertaken in such a way as to be compliant with all relevant Waste Management and Duty of Care regulations. It will also be necessary to retain records relating to waste transfer notes or consignment notes, quantities and the receiving site with supporting chemical data. These records will need to be kept on site within a designated file, and made available for the inclusion within a validation report once the ground-works at the site are complete.

Material Import, Cover Systems, Soft Landscaping and Planting

Soil imported to the site for the flood alleviation land raise and for use within the clean corridors is to be undertaken under a waste recovery environmental permit ref EPR DB3206HL and the suitability for use as inert waste will be demonstrated in accordance with the Ramboll Specification for Earthworks (Ramboll, 2015) which forms part of that application.

Any material over and above this imported to the site for use within the cover system in private gardens and soft landscaped areas) shall be analysed chemically to ensure it is suitable for use (it will be necessary to determine that the material is also geotechnically suitable, however, geotechnical considerations are outside of the scope of this document). This should be undertaken prior to bringing any such material onto the site. The following sampling frequency is required:

- Natural source of topsoil/subsoil: one sample per 250m³ where the soils are from a natural source with a minimum of three samples required; and
- Recycled or manufactured topsoil, or where the source of the soil is unknown, a sampling frequency of one sample per 100m³.

It will be necessary to ensure imported materials do not exceed the relevant assessment criteria, which are provided in Tables 6 to 9 of Appendix 6/15 of the Ramboll Specification for Earthworks (Ramboll, 2015).

If topsoil is imported this should be free from asbestos, metals, plastic, wood, glass, tarmac, paper and odours associated with contaminated soils and comply with the requirements of BS 3882:2015 – Specification for topsoil and requirements for use.

All chemical testing shall be undertaken at an appropriately accredited laboratory (UKAS, with testing undertaken to MCERTS standards where relevant).

The use of chemical testing results provided solely by the supplier to determine suitability would not be considered acceptable. If chemical test results exceed the assessment criteria then the frequency of testing shall be increased as required to determine the reasons for the exceedances and confirm that the materials are suitable for use or an alternative source used.

Documentation on the source, quantity and testing results shall be retained onsite for inspection and subsequent inclusion in the Verification Report. The Contractor shall retain records on the location, depth of excavations and how/where any imported material is placed.

All topsoil/subsoil should be placed to a minimum depth of 500mm within private gardens and 300mm in soft landscaping areas, separated from the ground below by a geotextile marker layer which cannot be easily penetrated during digging activities for planting and gardening.

Following initial discussions with Reading Borough Council Environmental Health Department the cover system will comprise a minimum thickness of 1m which will include the topsoil/subsoil requirements outlined above. A brightly coloured terram (or similar) marker layer will be laid on the excavated surface prior to filling under the Environmental Permit. Material used in addition to topsoil/subsoil will be that imported under the environmental permit. As part of an initial agreement in principle there is no requirement for a hard "no dig" layer (see Appendix F).

Waste Management and Stockpiles

In the event that any unsuitable material is identified (that cannot be treated for re-use) or there is a surplus of material during the course of the site demolition and enabling works, all material for off-site disposal would be considered to be waste.

The Contractor shall be responsible for obtaining any necessary licenses or exemptions with respect to the generation, storage, treatment/sorting and removal from site of waste materials. The Contractor will need to provide testing results to the waste receiving facility or waste contractor to determine waste acceptance protocols and disposal costs. Depending on the nature and quantity of materials to be disposed of, additional testing may be found to be necessary prior to disposing of waste.

Any unsuitable excavated materials to be disposed of should be segregated and stored separately according to their type. Soils which appear to be contaminated should be separated from other Made Ground, non-contaminated natural soils and demolition material.

Soils that are surplus to requirements must be removed off-site to an appropriately licensed facility under appropriate Duty of Care, including the use of approved waste carriers and the maintaining of documentary records (*e.g.* consignment notes) of waste movements.

Stockpiled soils should be placed upon an impermeable membrane, and covered with impermeable sheeting. This is to reduce risks of transmitting contaminated material via wind-blown dusts or via leaching. The stockpiles will need to be designed to contain any leachate, should this seep to the bottom of the stockpile, and as such, it may be necessary for a bund to be created around the perimeter of the stockpile prior to placing the impermeable base membrane.

Separate, clearly marked and identifiable stockpiles shall be created for clean materials passing re-use thresholds, quarantined materials for testing and materials destined for landfill.

Allowance may need to be made for space on site to stockpile waste materials prior to their disposal for analysis and classification.

Site specific protocols for dealing with asbestos contamination are to be provided under separate cover as part of an asbestos management plan.

Additional Ground Investigation

The following outline items are recommended to be undertaken to fully assess the outstanding potential risks present on the Phase 5 site area:

At the onset of earthworks the following are required to further delineate the works are:

- Additional shallow trial pitting north of RTP720, RTP721 and RTP722 to delineate the extent of potential asbestos contaminated soils; and
- Additional shallow trial pitting to the east of RTP719 and RTP712 to delineate the extent of potential asbestos contaminated soils;

Further to this, and in order to close out the geoenvironmental investigation across Phase 5 as a whole, the following are required to be undertaken. Note that these works will be undertaken at a later date following filling activities within the Phase.

- Installation of a series ground gas monitoring standpipes in selected locations and a minimum of 4No rounds of monitoring to characterise the gas risks; and

- Installation of a series of ground water monitoring standpipes in selected locations and a minimum of 2No rounds of monitoring and sampling to characterise any potential groundwater impacts.

Groundwater and Surface Water Management

Where groundwater is encountered during earthworks it may be necessary to obtain a licence from the Environment Agency to undertake any de-watering activities, should quantities of water removed be greater than 20m³ per day.

Should either groundwater or perched water be identified as contaminated from visual/olfactory assessment, the contractor should follow the unforeseen contamination protocol.

Whilst not anticipated, should waters be impacted by free phase hydrocarbons, they should be treated with absorbent materials or a surface skimmer pump. If impacts are encountered to be more extensive then alternative methods such as an oil water separator or similar may be preferable.

Any impacted waters should be stored in a controlled manner for subsequent testing and characterisation prior to disposal.

Should disposal to surface water or public sewer be deemed appropriate, the contractor will be responsible for any pre-treatment, additional sampling and monitoring. Any specific testing requirements will need to be agreed with the receiving site, the Environment Agency for discharges to surface water, or if to public sewer, with the local authority & water authority, prior to any disposal/discharge taking place.

Water accumulated at the surface must be prohibited from entering directly into the adjacent surface water bodies.

The Contractor shall ensure that any discharges are only made with the appropriate discharge consents. It is the Contractor's responsibility to obtain the required Environmental Permit from the Environment Agency and/or local water authority.

The Contractor shall ensure regular inspection of all discharge points and associated pipe work, drainage systems, collection ditches, lagoons, oil separator (and drip-trays) and watercourses to check that these are in good order. Observations will be reported within weekly site inspection records.

The Contractor shall comply with BS 6031:2009, Code of Practice regarding the general control of site drainage.

Foundation Works Risk Assessment

Where foundation works penetrate into the Secondary A Aquifers of the River Terrace Deposits and Lambeth Group or Principal Aquifer of the Chalk Formation a foundation works risk assessment is required to be prepared in accordance with Environment Agency's document 'Piling and penetrative ground improvement methods on land affected by contamination: Guidance on pollution prevention' ref. NC/99/73. This will be required to be submitted to the Environment Agency prior to works commencing.

Ground Gas Protection

Specific control measures regarding ground gas protection are likely to be required. The details of which will be supplied in an updated Remediation Strategy following receipt of the proposed ground gas monitoring data.

Buried Services and Construction Materials

New water supply pipes will require specification and installation in accordance with the requirements of the local Water Authority i.e. Thames Water. The Contractor shall ensure installed water supply pipes are in accordance with Thames Water requirements. This could include the use of appropriate water supply pipe materials.

11. Verification Plan

Planning Condition 42 Part (2) requires the production of a verification plan providing details of the data that will be collected in order to demonstrate that the works set out within this Remediation Strategy are complete and to identify any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.

In order to meet these requirements, the Contractor shall be required to obtain all necessary information for Ramboll to complete a Verification Report, including (but not limited) to the following:

- Quantities of material imported to or re-used on site;
- Chemical testing results and information on any imported or re-used soils and plans showing where this material has been used;
- Chemical testing results and information on the source of any imported material or re-used soils and plans showing where this material has been used;
- Plan showing location of any additional samples obtained for testing along with any delineation of materials and quantities;
- Results of any additional chemical and WAC testing undertaken along with method of sample collection and transportation to laboratory, laboratory quality assurance and accreditation;

- Quantities of any material disposed off-site as waste classification and details of the receiving site/s and copies of all Waste Transfer Notes;
- Records of the asbestos management, dust control and vibration control measures employed;
- Records of the ground gas protection measures installed at the site (including inspection records and photographs) and independent verification in accordance with CIRIA C735;
- Details of any areas of unexpected contamination and the actions undertaken;
- Details of any water removed from excavations or surface water, including chemical testing results and details of where these were disposed of;
- Details and demonstration of any relevant permits or exemptions required by the Environment Agency for re-using material or importing material, particularly where there is the potential for material being considered waste; and
- Details on any protection measures installed for contamination and monitoring (if applicable) of such measures – in particular records will be required to confirm whether protection measures were required for contaminants present in excavations or water supply pipes following consultation with Thames Water.

On completion, the report should be submitted to the Local Planning Authority for approval. A copy of the Verification Report will need to be retained on-site within the health and safety file.

It is recommended that periodic site audits are conducted by Ramboll to ensure adequate site records and documentation is being maintained throughout the construction works. The purpose of which will be to monitor whether sufficient data collection is being collected for the purposes of completing the site Verification Report.

Appendix A - Exploratory Hole Logs

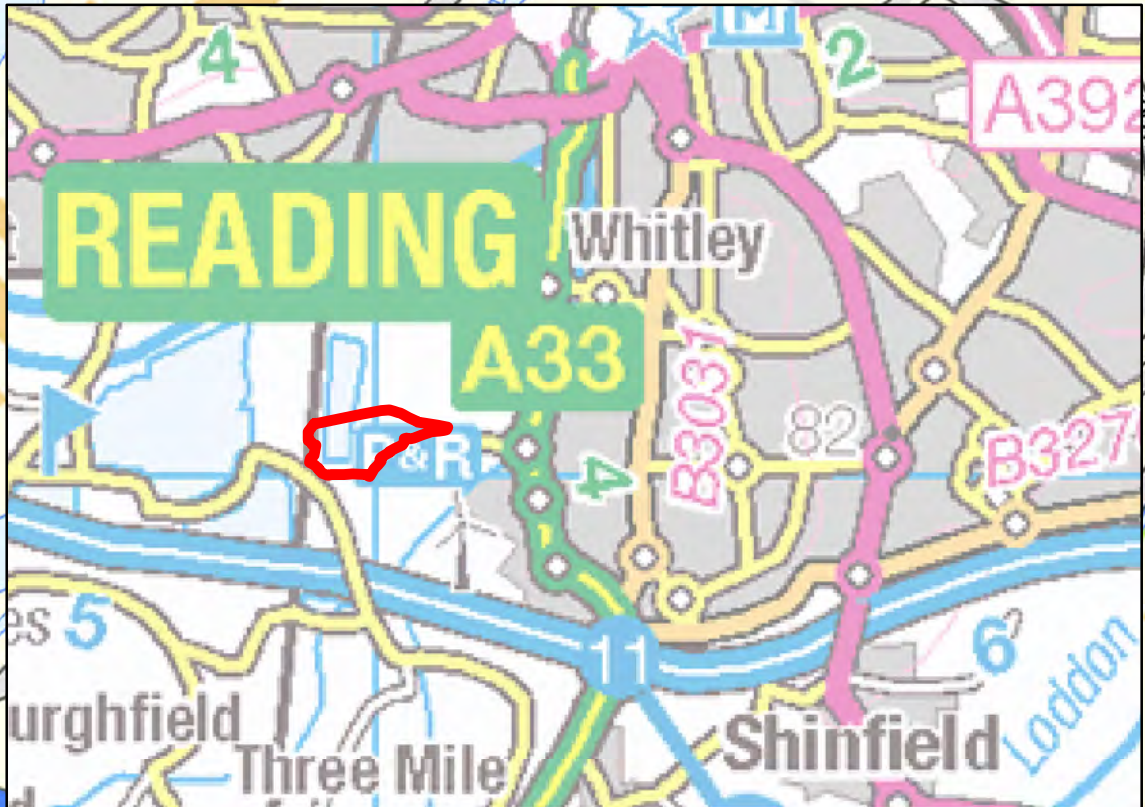
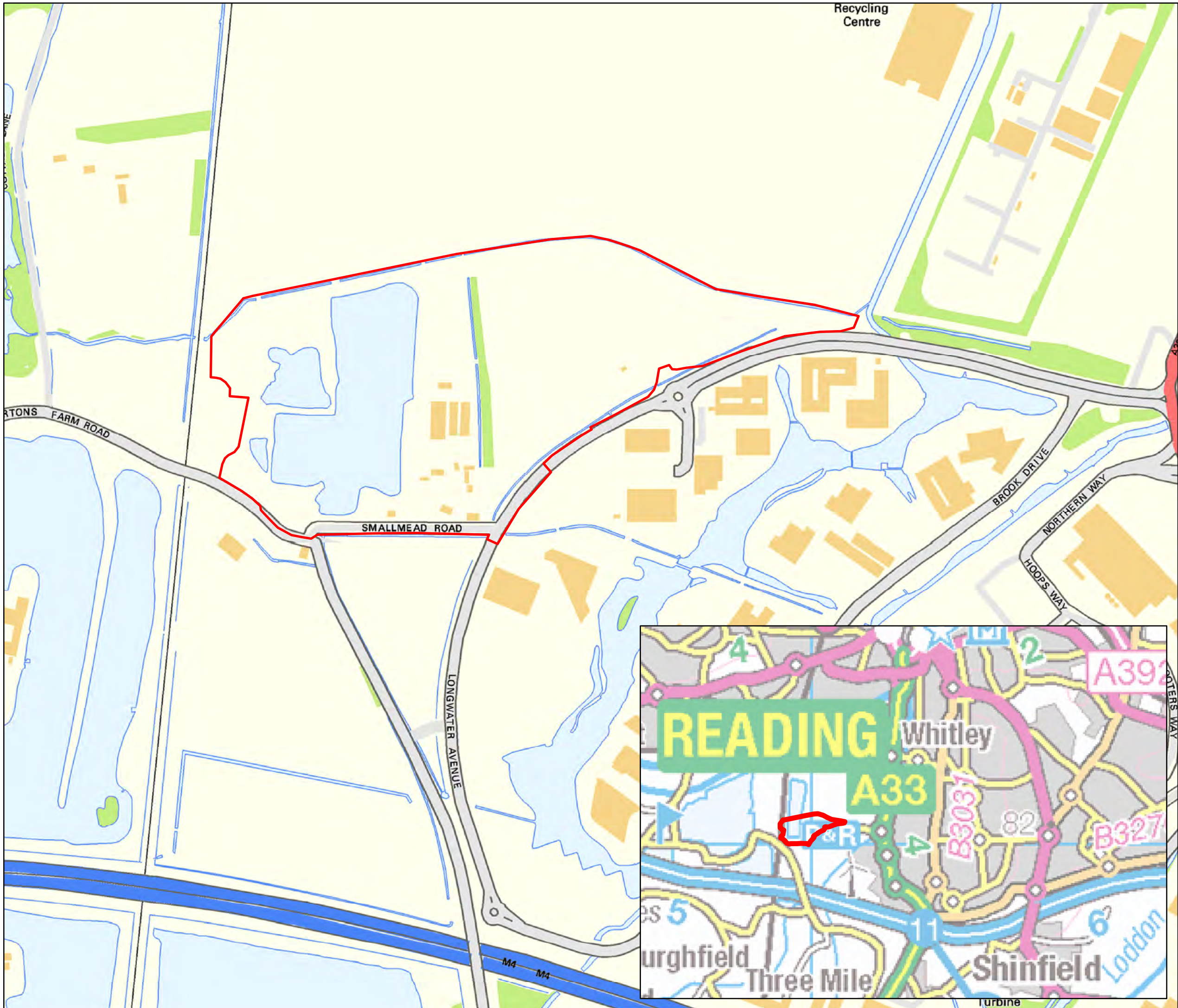
Appendix B - Lucion Environmental Ltd Records

Appendix C - i2 Analytical Services Ltd Soil Records.

Appendix D - Legislative Context and Ground Contamination Assessment Methodologies,
Screening Sheet and GAC

Appendix E – General Site Environmental Controls

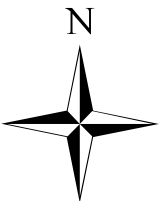
FIGURES



Site Boundary

1:5,000

1:50,000



Drawn at A3

Reproduced from Ordnance Survey
digital map data © Crown copyright
2015 All rights reserved.
Licence number 100040631

Client

**St Edward
Homes Ltd**

Project Title

Green Park Village

Project Number

1620000492

Figure Title

Site Location Plan



Tel: 023 8081 7500
Fax: 023 8081 7600

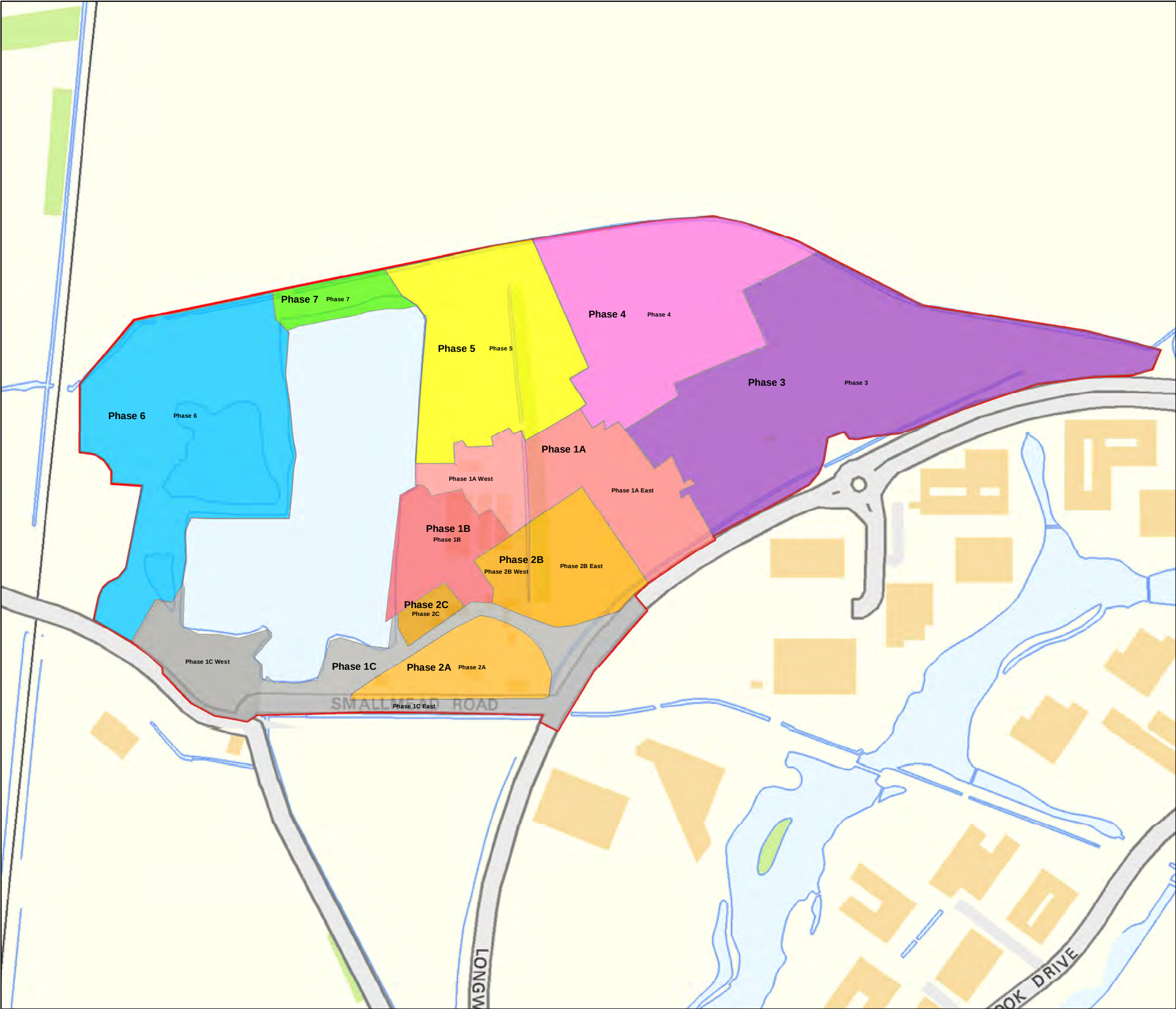
southampton@ramboll.co.uk
www.ramboll.co.uk

Date
March 2016

Prepared By
BH

Figure No.
Figure 1

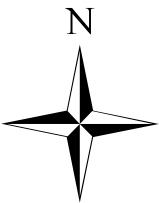
Revision
01



Site Boundary

Phase

- Phase 1A
- Phase 1B
- Phase 1C
- Phase 2A
- Phase 2B
- Phase 2C
- Phase 3
- Phase 4
- Phase 5
- Phase 6
- Phase 7



1:3,000
Drawn at A3
Reproduced from Ordnance Survey
digital map data © Crown copyright
2015 All rights reserved.
Licence number 100040631

Client

St Edward
Homes Ltd

Project Title

Green Park Village

Project Number

1620000492

Figure Title

Phase Plan



Tel: 023 8081 7500
Fax: 023 8081 7600

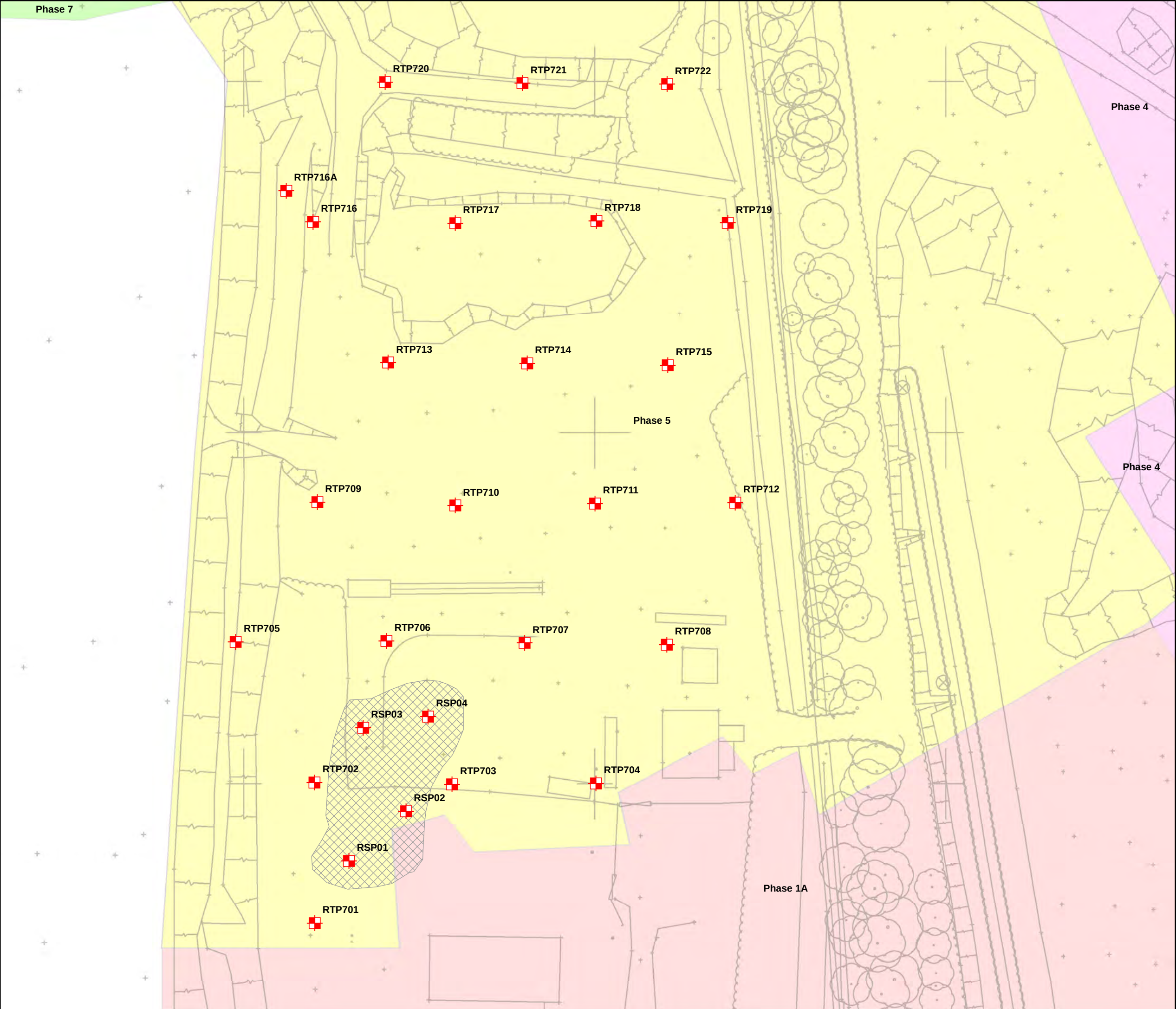
southampton@ramboll.co.uk
www.ramboll.co.uk

Date
March 2016

Prepared By
BH

Figure No.
Figure 2

Revision
01



- Trial Pit
- Asbestos Impacted Stockpile
- Phase 1A
- Phase 1B
- Phase 1C
- Phase 2A
- Phase 2B
- Phase 2C
- Phase 3
- Phase 4
- Phase 5
- Phase 6
- Phase 7

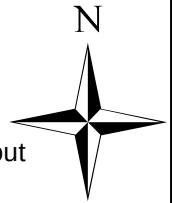
Notes

Locations are indicative and are to be finalised onsite following service clearance by Woolridge Ecotec.

Works to proceed under the watching brief of an asbestos specialist only.

Trial pit locations are based on a 20 m sampling grid. These are to be referred onsite based on observations during the site works.

Scale: 1:500
Drawn at A3
Baseplan adopted from BroadwayMalyanSite Layout Drawing PL-P1-002 rev P



Client
St Edward Homes Ltd

Project Title
Green Park Village

Project Number
1620000492

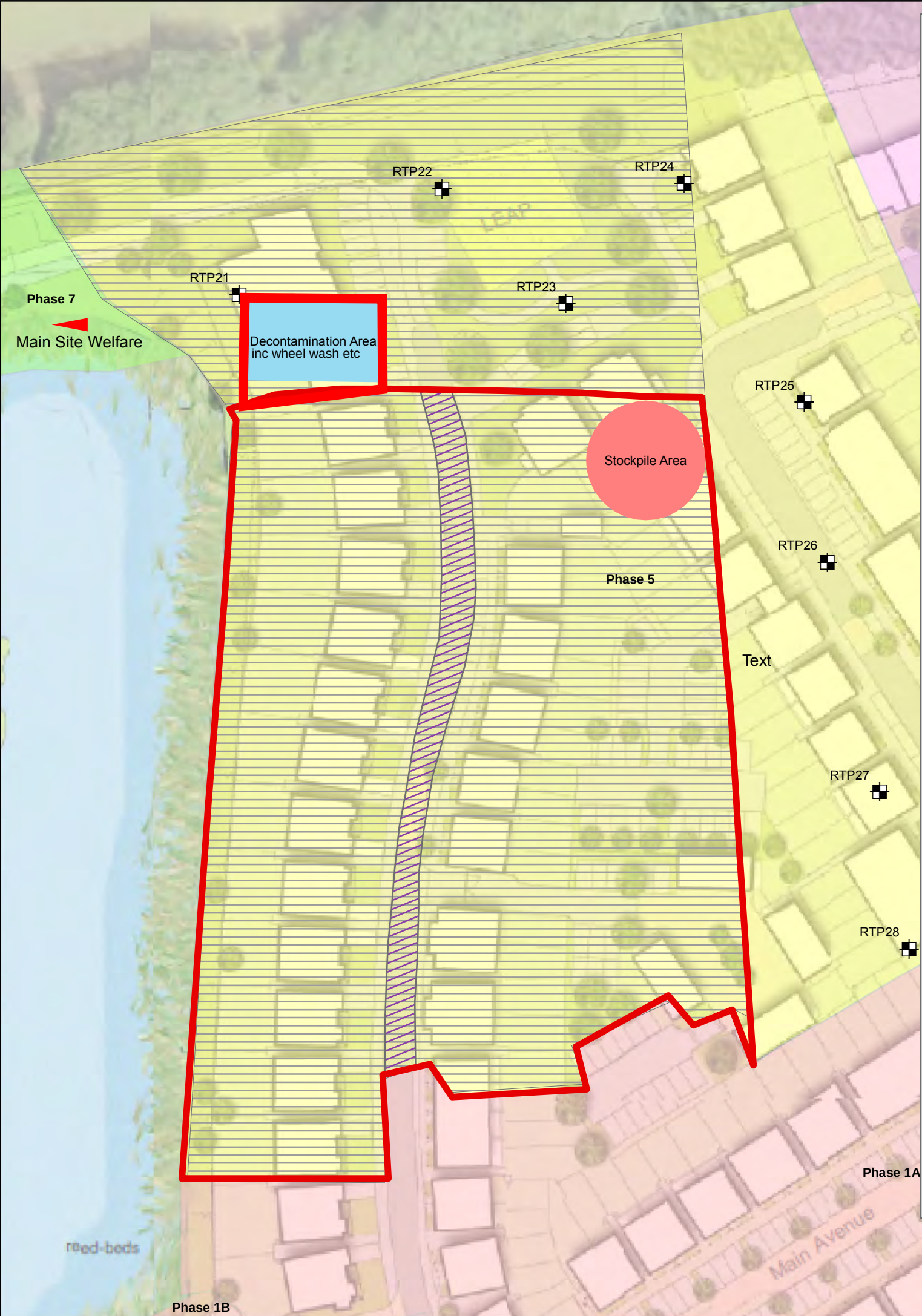
Figure Title
Phase 5 - Asbestos Ground Investigation Plan

Tel: 023 8081 7500
Fax: 023 8081 7600

southampton@ramboll.co.uk
www.ramboll.co.uk

Date	26/07/2016	Prepared By	BH
------	------------	-------------	----

Figure No.	Figure 3	Revision	01
------------	----------	----------	----



Summary Plan of Works

1. At commencement of works a series of trial pits shall be undertaken (RTP21 to RTP28) to delineate the full extent of the Made Ground area. Should asbestos impacts be more widespread additional trial pits will be required.

2. All Made Ground shall be excavated and sorted/separated into material suitable for re-compaction, oversize material suitable for crushing and unsuitable materials. Oversize materials shall be those exceeding 125mm in accordance with Table 6/2 of Specification for Highways Works Series 600.

3. Made Ground in hatched area to be turned over for obstruction/concrete clearance ahead of ground improvement works. Turnover shall be undertaken to the full depth of Made Ground (~1.5 m below ground level).

4. Any encountered obstructions shall be excavated, removed and over-dug by a minimum of 500mm.

5. Clean service corridors are to be created in accordance with Glanville Drawings 4160518-SK1204 and 4160518-SK1205. see cross -hatched areas

6. Material suitable for backfill as defined in (2) shall be placed and compacted in accordance with Glanville Drawings 4160518-SK1202 to 4160518-SK1205 and the Ramboll Specification for Earthworks (2016). Note that a brightly coloured teram (or similar) membrane shall be laid across entire asbestos impacted Made Ground surface prior to filling.

7. Earthworks shall be undertaken in accordance with Ramboll Green Park Village Specification for Earthworks (2016). Specific reference shall be made to:
- In accordance with Table 6/2 of Specification for Highways Works Series 600 no materials >125mm shall re-used as part of earthworks.
- Method of compaction to be confirmed by the contractor following additional geotechnical analysis (to be undertaken by the contractor).

8. Excavated concrete / obstructions to be transported to stockpile holding area for visual inspection for asbestos ahead of crushing/sorting. Crushing activities to be undertaken in Earthworks Area.

9. All works shall be undertaken in accordance with Ramboll Technical Note Phase 5 Ground Investigation Findings and Remedial Options (2016).

10. All works shall be undertaken in strict accordance with Ramboll Asbestos Management Plan (2016) under controlled conditions.

11. Following remediation the area is to be filled in accordance with the Environmental Permit ref PR/DB3206HL and Glanville Drawings 4160518-SK1202 and 4160518-SK1203. Note that the levels shown on these drawings shall be considered as maximum levels not to be exceeded with Made Ground only to be replaced within the "KnownArea of Asbestos Impact".

Trial Pit Co-ordinates:

Trial Pit

Easting (m)

Northing (m)

RTP21

469847.929

170371.4077

RTP22

469881.1607

170388.7247

RTP23

469901.4279

170369.9789

RTP24

469920.7954

170389.664

RTP25

469940.4804

170353.8393

RTP26

469944.3434

170327.5926

RTP27

469952.863

170289.9158

RTP28

469957.7313

170264.1983

Key

Additional Deliniation Trial Pits

Known Area of Asbestos Impact

Clean Corridor Area

Stockpile Holding Area

Decontamination & Wheel Wash Area

Proposed Area for Earthworks

Phase

Phase 1A

Phase 1B

Phase 1C

Phase 2A

Phase 2B

Phase 2C

Phase 3

Phase 4

Phase 5

Phase 6

Phase 7

Scale: 1:750

Drawn at A3

Baseplan adopted from
BroadwayMalyanSite Layout
Drawing PL-P1-002 rev P

N

Client

St Edward
Homes Ltd

Project Title

Green Park Village

Project Number

1620000492

Figure Title

Phase 5 - Earthworks
Plan

RAMBOLL

www.ramboll.co.uk

Tel: 023 8081 7500
Fax: 023 8081 7600

southampton@ramboll.co.uk
www.ramboll.co.uk

Date

08/08/2016

Prepared By

TS

Figure No.

Figure 4

Revision

01

Contractors are not to scale dimensions from this drawing

The internal layouts within apartments will be subject to design development. The precise location of walls and internal doors and the detailed layout of bathroom and kitchen areas will be subject to non-minimal changes and may vary from the internal layouts set out in these plans.

These minor alterations will not affect the position and arrangement to external doors and windows nor will they affect the relative relationship between habitable room and windows.

The survey information shown on this drawing is based on a topographical survey prepared by a third party and Broadway Malyan Limited accept no responsibility for accuracy or completeness of the survey.



LANDSCAPING SHOWN IS INDICATIVE
SEE 'PLACE' LANDSCAPE PROPOSALS FOR DETAILS

P.	Issued for Planning Application	DC	CL	CL	03
105	Description	Drawn	Chkd	Appd	

BroadwayMalayan^{BM}

Architecture Urbanism Design

Box House, 10 High Street
Beckwith
Rd 7 2AN

T: +61 (0)115 932 3456
F: +61 (0)115 932 3461
E: Rd@BroadwayMalayan.com

www.BroadwayMalayan.com

St. Edward Homes
Project
Green Park Village

Illustrative masterplan

PLANNING APPLICATION

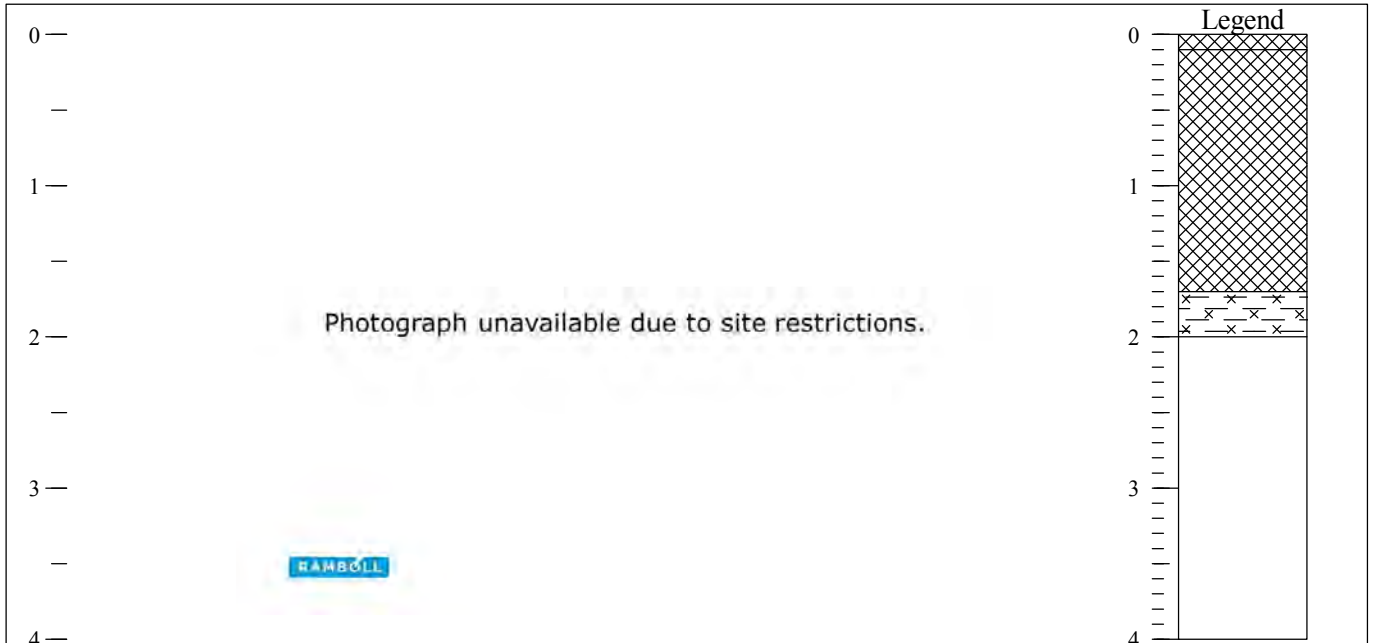
Scale	Drawn	Date
1:1000@A0	dc	May 2
Job number	Drawing number	Revision
27429	PI-MPI-005	P-

Original size 100mm © AD Copyright Broadway Malyon Limited

APPENDIX A – EXPLORATORY HOLE LOGS

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP701
Job No 1620000492	Date 05-07-16 05-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		MADE GROUND. Brown sandy gravelly CLAY. Gravel of brick [LAND RISE].			
0.10-1.70		MADE GROUND. Dark grey sandy GRAVEL of brick, glass ceramics, metal and occasional cement ACM.			
1.70-2.00		Dark grey silty CLAY [ALLUVIUM].	1.40	ES	
2.00		Trial pit completed at 2.0mbgl and backfilled with arisings.	1.80	ES	

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded [excluding asbestos - see log]. Groundwater was not encountered. Trial pit backfilled with arisings.	
--	--	--	--	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	---	--	-----------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP702
Job No 1620000492	Date 05-07-16 05-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		MADE GROUND. Grey sandy GRAVEL of brick, concrete and [Need Frequency] cement ACM.	0.00	ES	
0.10-0.60		MADE GROUND. Grey sandy GRAVEL of brick, concrete, cobbles, polystyrene, metal and [need frequency] cement ACM.	0.10	ES	
0.60-0.90		Dark grey silty CLAY [ALLUVIUM].	0.70	ES	
0.90		Trial pit completed at 0.9mbgl and backfilled with arisings.			

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded [excluding asbestos - see log]. Groundwater was not encountered. Trial pit backfilled with arisings.	
--	--	--	--	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	--	---	------------------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP703
Job No 1620000492	Date 05-07-16 05-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



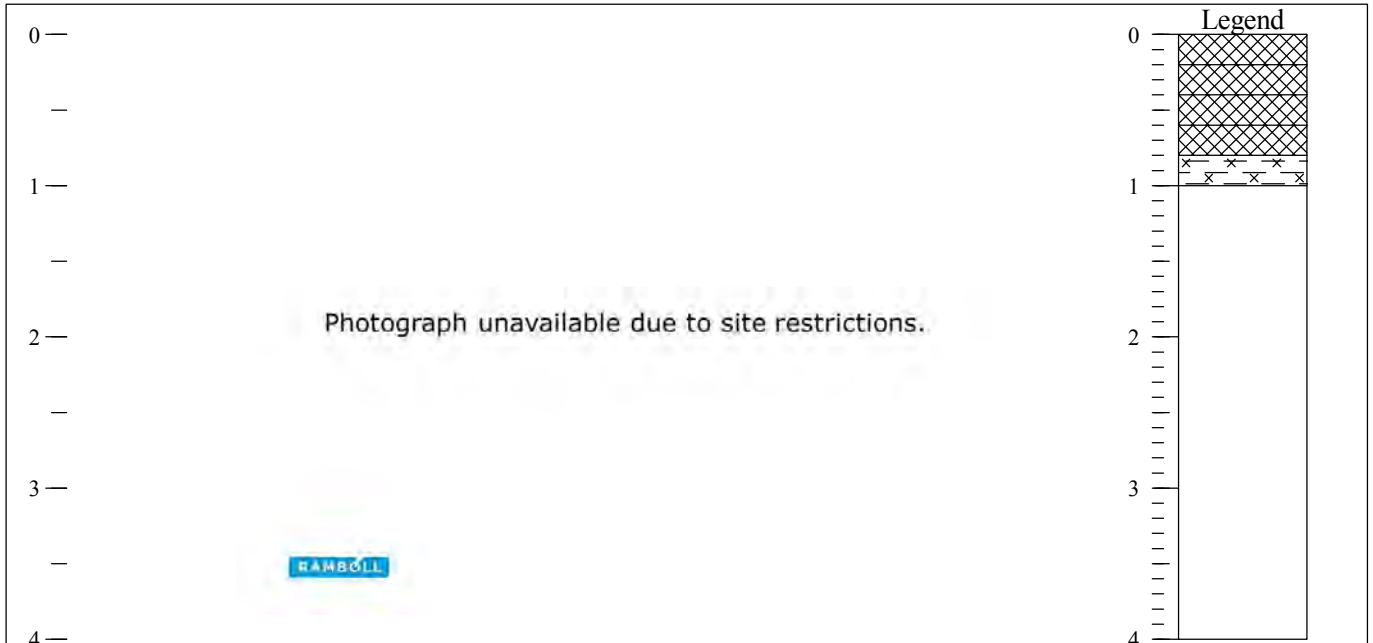
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.30		MADE GROUND. Brown sandy CLAY [LAND RISE]			
1.30-1.50		MADE GROUND. CONCRETE slab.			
1.50-2.50		MADE GROUND. Grey sandy GRAVEL of brick, concrete and occasional cement ACM. At 2.0mbgl 2No. Large curb stones.	1.70	ES	
			2.10	ES	
2.50-2.70		Grey silty CLAY [ALLUVIUM].	2.60	ES	
2.70		Trial pit completed at 2.7mbgl and backfilled with arisings.			

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded [excluding asbestos - see log]. Groundwater was not encountered. Trial pit backfilled with arisings.	
--	--	--	--	--

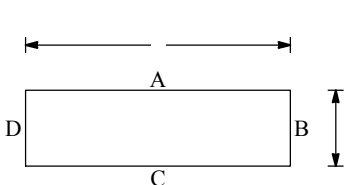
All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	--	---	------------------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP704
Job No 1620000492	Date 06-07-16 06-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		MADE GROUND. Brown silty CLAY [LAND RISE].			
0.20-0.40		MADE GROUND. Brown silty sandy GRAVEL of brick, concrete, flint and glass.			
0.40-0.60		MADE GROUND. CONCRETE slab.	0.30	ES	
0.60-0.80		MADE GROUND. Brown to grey silty sandy GRAVEL of concrete, brick and metal fragments.	0.60	ES	
0.80-1.00		Frequent cements ACMs.	0.80	ES	
1.00		Dark grey silty CLAY [ALLUVIUM].			
		Trial pit completed at 1.0mbgl and backfilled with arisings.			

Shoring/Support: Stability:			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded [excluding asbestos - see log]. Groundwater was not encountered. Trial pit backfilled with arisings.

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	---	--	-----------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP705
Job No 1620000492	Date 05-07-16 05-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.80		MADE GROUND. Brown CLAY [LAND RISE].			
0.80-1.90		MADE GROUND. Brown slightly gravelly silty CLAY. Gravel of flint and occasional brick. At 0.9mbgl 1No. fragment of cement ACM.	1.00	ES	
1.90-2.20		Brown silty CLAY [ALLUVIUM].			
2.20		Trial pit completed at 2.2mbgl and backfilled with arisings.			

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded [excluding asbestos - see log]. Groundwater was not encountered. Trial pit backfilled with arisings.	
--	--	--	--	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	--	---	------------------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP706
Job No 1620000492	Date 05-07-16 05-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



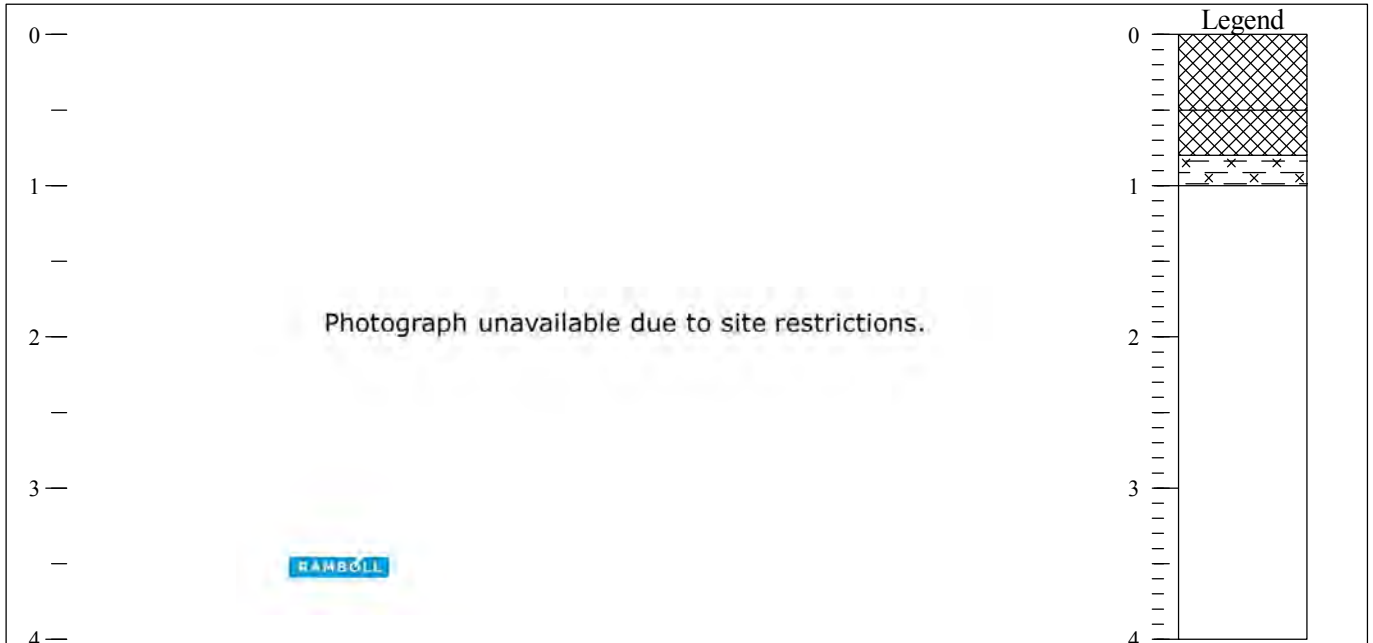
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		MADE GROUND. Brownish red sandy silty GRAVEL of brick and concrete.	0.10	ES	
0.30-0.90		MADE GROUND. Dark grey slightly clayey sandy GRAVEL of brick, concrete with frequent rebar. At 0.30mbgl 1No. fragment of cement ACM and 1No. 0.5mbgl 1No. fragment of degraded AIB (<5cm in length).	0.40	ES	
0.90-1.00		Grey Sandy GRAVEL [RIVER TERRACE DEPOSITS].	1.00	ES	
1.00		Trial pit completed at 1.0mbgl and backfilled with arisings.			

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded [excluding asbestos - see log]. Groundwater was not encountered. Trial pit backfilled with arisings.	
--	--	--	--	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	---	--	-----------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP707
Job No 1620000492	Date 06-07-16 06-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.50		MADE GROUND. Grey sandy GRAVEL of brick, concrete and flint.	0.10	ES	
0.50-0.80		MADE GROUND . Silty sandy GRAVEL of brick, concrete, metal and wood.	0.60	ES	
0.80-1.00		Light grey gravelly silty CLAY [ALLUVIUM].	0.90	ES	
1.00		Trial pit completed at 1.0mbgl and backfilled with arisings.			

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded. Groundwater was not encountered. Trial pit backfilled with arisings.	
------------------------------------	--	--	---	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	--	--	-----------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP708
Job No 1620000492	Date 06-07-16 06-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



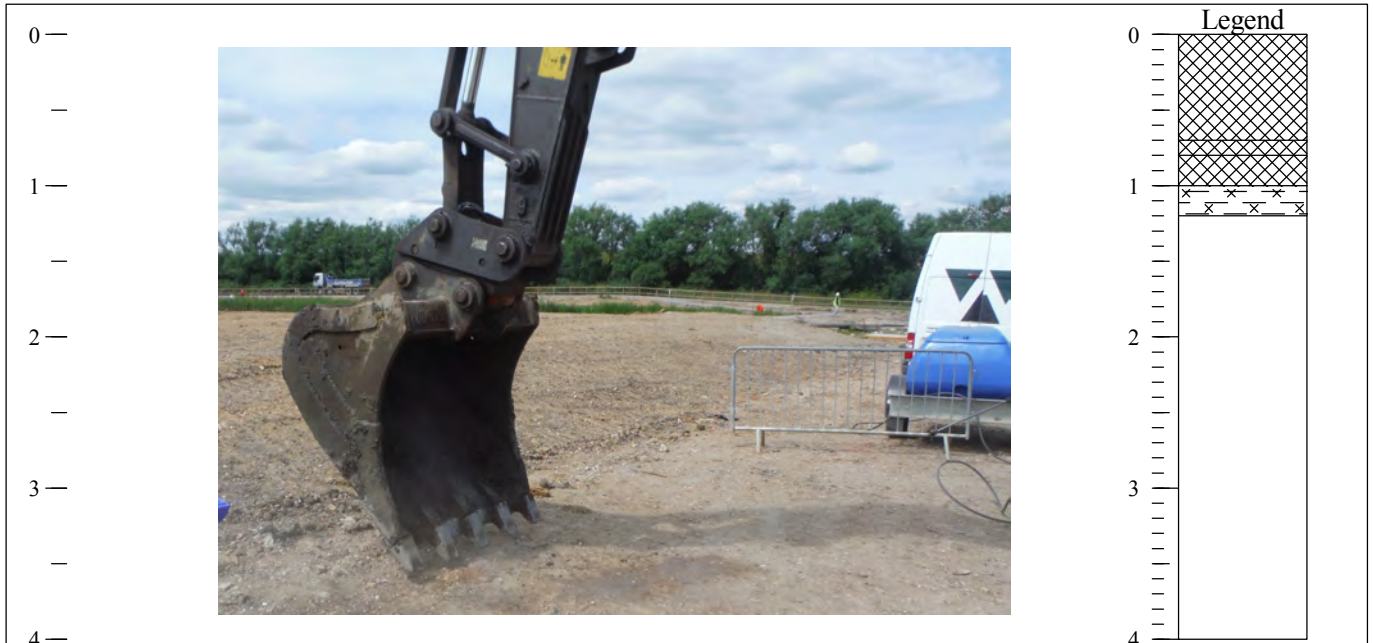
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		MADE GROUND. Brown silty sandy GRAVEL of brick, concrete and metal.	0.10	ES	
0.30-0.80		MADE GROUND. Brown silty sandy GRAVEL of brick, concrete and metal.	0.60	ES	
0.80-0.90		Grey silty CLAY [ALLUVIUM].			
0.90		Trial pit completed at 0.9mbgl and backfilled with arisings.			

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded. Groundwater was not encountered. Trial pit backfilled with arisings.	
--	--	--	---	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	---	--	-----------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP709
Job No 1620000492	Date 06-07-16 06-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.70		MADE GROUND. Brown soft silty GRAVEL of brick, concrete, flint, wood and tarmacadam.	0.10	ES	
0.70-0.80		MADE GROUND. Light grey silty CLAY [REWORKED].	0.60	ES	
0.80-1.00		MADE GROUND. CONCRETE slab.			
1.00-1.20		Grey silty CLAY [ALLUVIUM].			
1.20		Trial pit completed at 1.2mbgl and backfilled with arisings.			

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded. Groundwater was not encountered. Trial pit backfilled with arisings.	
--	--	--	---	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	--	---	------------------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP710
Job No 1620000492	Date 06-07-16 06-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		MADE GROUND. Grey sandy silty GRAVEL of brick, concrete, flint, wood and tarmacadam.	0.20	ES	
0.30-1.10		MADE GROUND. Grey sandy clayey GRAVEL of brick, concrete, metal, wood and glass.	0.60	ES	
1.10-2.20		MADE GROUND. Light grey to brown silty CLAY [SUSPECTED REWORKED ALLUVIUM].	1.20	ES	
2.20-2.50		Light grey silty sandy GRAVEL [RIVER TERRANCE DEPOSITS].			
2.50		Trial pit completed at 2.5mbgl and backfilled with arisings.			

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded. Groundwater was not encountered. Trial pit backfilled with arisings.	
--	--	--	---	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	--	---	------------------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP711
Job No 1620000492	Date 06-07-16 06-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.50		MADE GROUND. Brown sandy clayey GRAVEL of brick, concrete and plastic.	0.20	ES	
0.50-0.70		MADE GROUND. Grey sandy clayey GRAVEL of brick, concrete and ash, frequent cobbles of brick.	0.60	ES	
0.70-1.00		MADE GROUND. Drainage pipe encountered.			
1.00-1.40		MADE GROUND. Black sandy GRAVEL of brick, cobbles and wood. Hydrocarbon sheen on water (small volume) from drainage pipe. No free phase product.	1.10	ES	
1.40-1.60		Grey silty CLAY [ALLUVIUM].	1.50	ES	
1.60		Trial pit completed at 1.6mbgl and backfilled with arisings.			

Shoring/Support: Stability: 			GENERAL REMARKS Hydrocarbon sheen noted on water following seepage from broken drainage pipe at 0.70mbgl.	
--	--	--	---	--

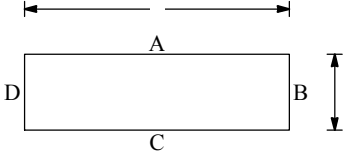
All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	---	--	-----------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP712
Job No 1620000492	Date 07-07-16 07-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



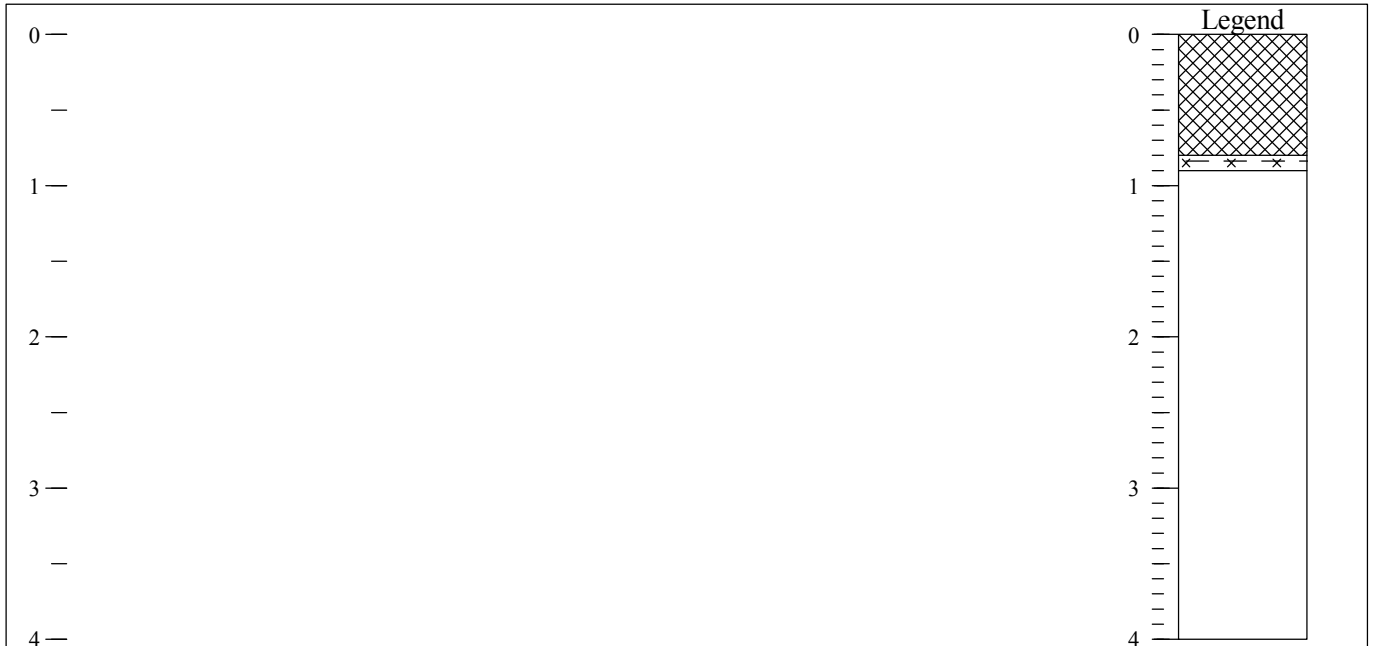
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		MADE GROUND. TARMACADAM	0.10	ES	
0.10-1.10		MADE GROUND. Brown sandy silty GRAVEL of brick, concrete, ceramics and chalk.	0.60	ES	
1.10-1.40		Dark Grey silty CLAY [ALLUVIUM].	1.20	ES	
1.40		Trial pit completed at 1.4mbgl and backfilled with arisings.			

Shoring/Support: Stability:			GENERAL REMARKS	
			No olfactory or visual evidence of gross contamination recorded. Groundwater was not encountered. Trial pit backfilled with arisings.	

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	--	---	------------------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP713
Job No 1620000492	Date 07-07-16 07-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.80		MADE GROUND. Grey Sandy GRAVEL of brick, concrete, plastic, wood and 1No fragment of cement ACM.	0.20	ES	
0.80-0.90		Light grey silty CLAY [ALLUVIUM].	0.70	ES	
0.90		Trial pit completed at 0.9mbgl and backfilled with arisings.			

Shoring/Support: Stability:	GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded [excluding asbestos - see log]. Groundwater was not encountered. Trial pit backfilled with arisings.
--	---

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	--	---	------------------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP714
Job No 1620000492	Date 07-07-16 07-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.60		MADE GROUND. Brown sandy GRAVEL of brick, concrete and rubber.	0.10	ES	
0.60-1.30		MADE GROUND. Dark grey silty SAND with occasional fine brick gravel.	0.70	ES	
1.30-1.40		Grey silty CLAY [ALLUVIUM].			
1.40		Trial pit completed at 1.4mbgl and backfilled with arisings.			

Shoring/Support: Stability:			GENERAL REMARKS		
			No olfactory or visual evidence of gross contamination recorded. Groundwater was not encountered. Trial pit backfilled with arisings.		

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	---	--	-----------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP715
Job No 1620000492	Date 07-07-16 07-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.50		MADE GROUND. Grey sandy GRAVEL of brick and concrete.	0.10	ES	
0.50-1.10		MADE GROUND. GREY sandy GRAVEL of brick concrete, wood and brick cobbles. At 0.80mbgl frequent wood fragments.	0.60	ES	
1.10-1.50		Grey silty CLAY [ALLUVIUM].	1.30	ES	
1.50		Trial pit completed at 1.5mbgl and backfilled with arisings.			

Shoring/Support: Stability:		N	GENERAL REMARKS
A D B C			No olfactory or visual evidence of gross contamination recorded. Groundwater was not encountered. Trial pit backfilled with arisings.

No olfactory or visual evidence of gross contamination recorded.
 Groundwater was not encountered.
 Trial pit backfilled with arisings.

All dimensions in metres
 Scale 1:50

Client **Berkeley Homes (Western) Ltd.**

Method/
 Plant Used **Tracked 360 Excavator**

Logged By
JP

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP716
Job No 1620000492	Date 07-07-16 07-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



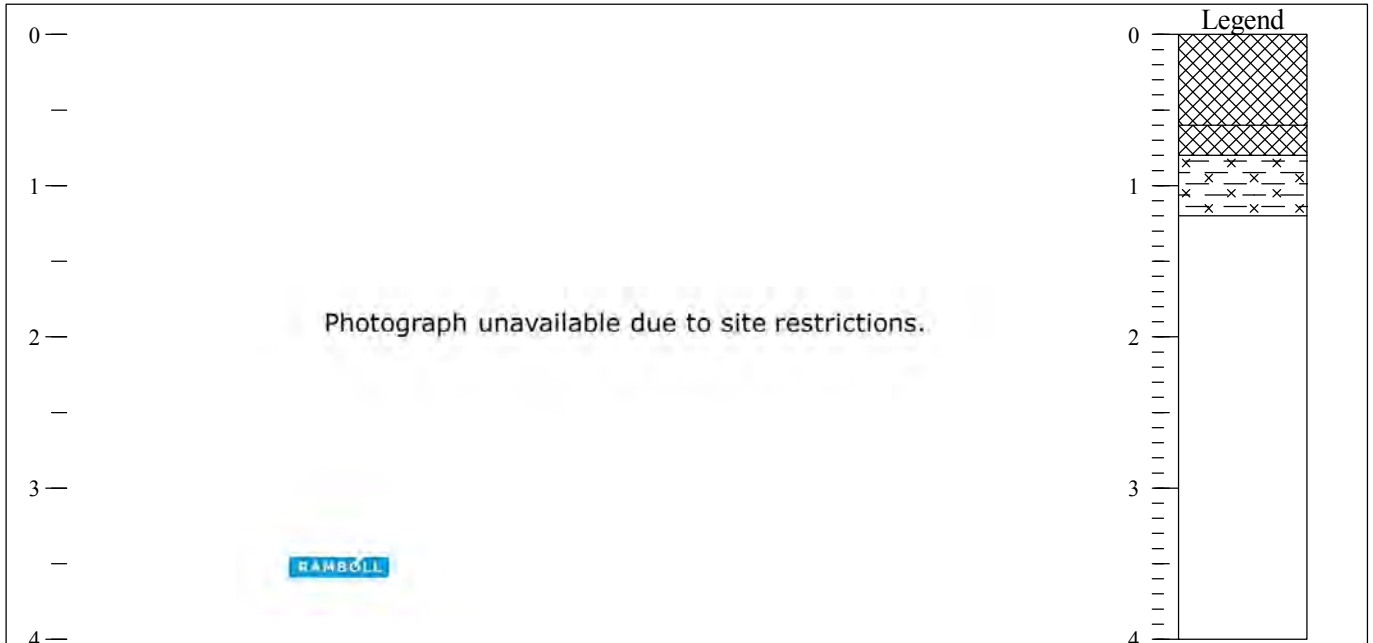
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.10		MADE GROUND. Slightly gravelly silty CLAY. Gravel of brick and flint. At 0.2mbgl 1No. fragment of cement ACM. At 0.5mbgl frequent fragments of cement ACM in north and west pit faces.	0.20	ES	
			0.50	ES	
1.10-1.30		Dark grey silty CLAY [ALLUVIUM]			
1.30		Trial pit completed at 1.3mbgl and backfilled with arisings.	1.20	ES	

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded [excluding asbestos - see log]. Groundwater was not encountered. Trial pit backfilled with arisings.	
--	--	--	--	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	--	---	------------------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP716A
Job No 1620000492	Date 07-07-16 07-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



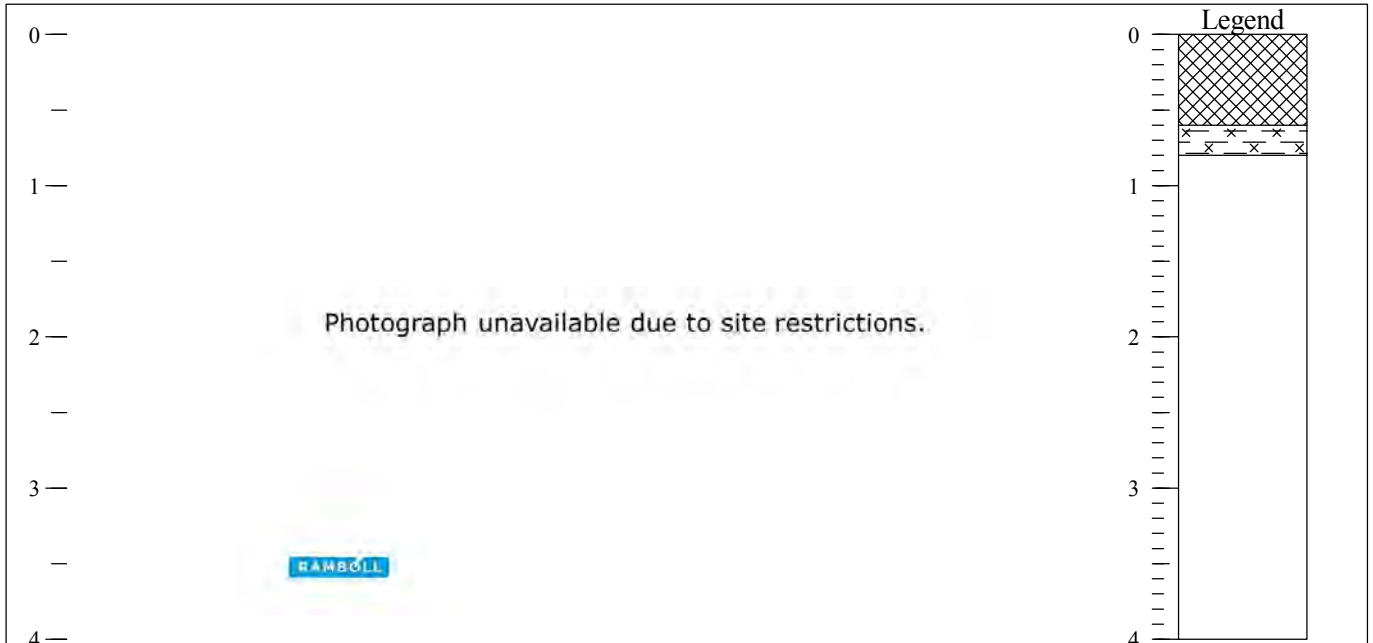
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.60		MADE GROUND. Brown sandy gravelly CLAY. Gravel of brick and flint. At 1.0mbgl 1No. fragment of cement ACM.			
0.60-0.80		MADE GROUND. Brown sandy gravelly CLAY. Gavel of brick, flint and ash.			
0.80-1.20		Brown sandy gravelly CLAY. Gravel of flint [ALLUVIUM]. From 1.10mbgl becoming grey.			
1.20		Trial pit completed at 1.2mbgl and backfilled with arisings.			

Shoring/Support: Stability: 	GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded [excluding asbestos - see log]. Groundwater was not encountered. Trial pit backfilled with arisings.
--	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	--	---	------------------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP717
Job No 1620000492	Date 07-07-16 07-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



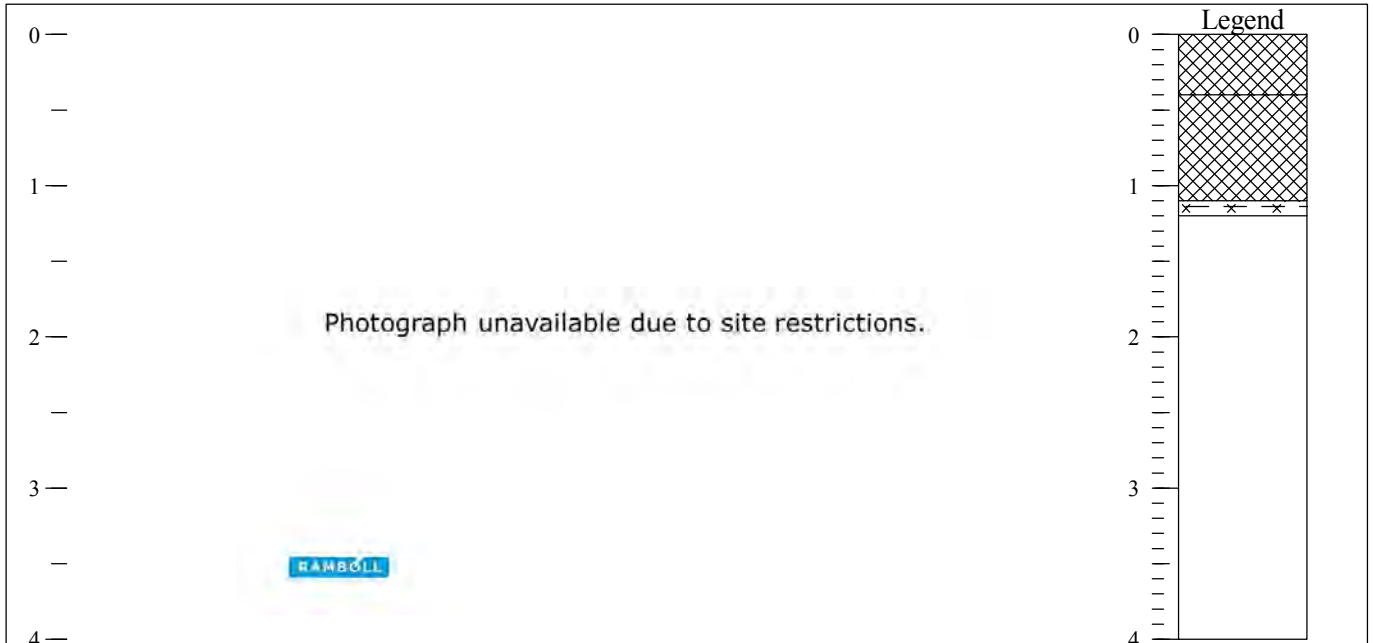
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.60		MADE GROUND. Brown clayey sandy GRAVEL of brick, concrete, breeze blocks and metal.	0.10	ES	
0.60-0.80		Brown silty CLAY [ALLUVIUM].	0.70	ES	
0.80		Trial pit completed at 0.8mbgl and backfilled with arisings.			

Shoring/Support: Stability: 		GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded. Groundwater was not encountered. Trial pit backfilled with arisings.
--	--	---

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	---	--	-----------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works]				TRIAL PIT No RTP718
Job No 1620000492	Date 07-07-16 07-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



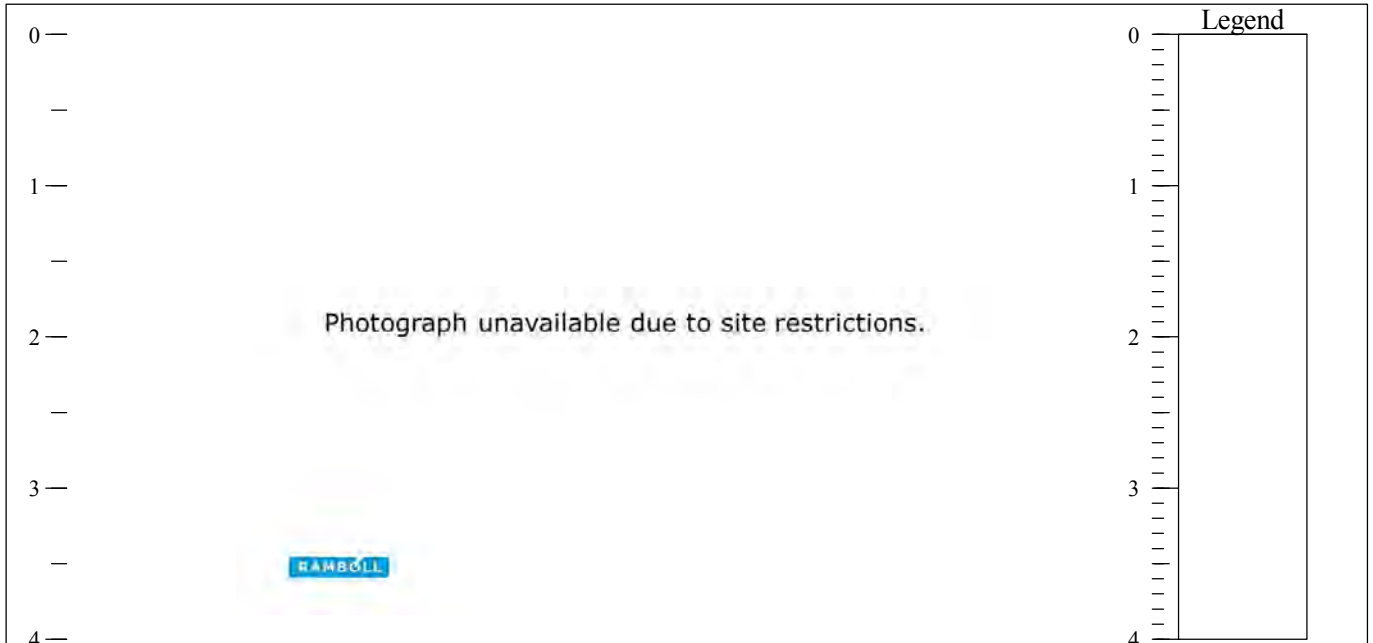
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		MADE GROUND. Dark grey sandy GRAVEL of brick, concrete, metal ,and occasional fragments of cement ACM.	0.10	ES	
0.40-1.10		MADE GROUND. Dark grey sandy GRAVEL of brick, concrete, and cobbles of brick.	0.60	ES	
1.10-1.20		Dark grey slightly gravelly silty CLAY [ALLUVIUM].			
1.20		Trial pit completed at 1.2mbgl and backfilled with arisings.			

Shoring/Support: Stability:			GENERAL REMARKS		
			No olfactory or visual evidence of gross contamination recorded [excluding asbestos - see log]. Groundwater was not encountered. Trial pit backfilled with arisings.		

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	---	--	-----------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works]				TRIAL PIT No RTP719
Job No 1620000492	Date	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



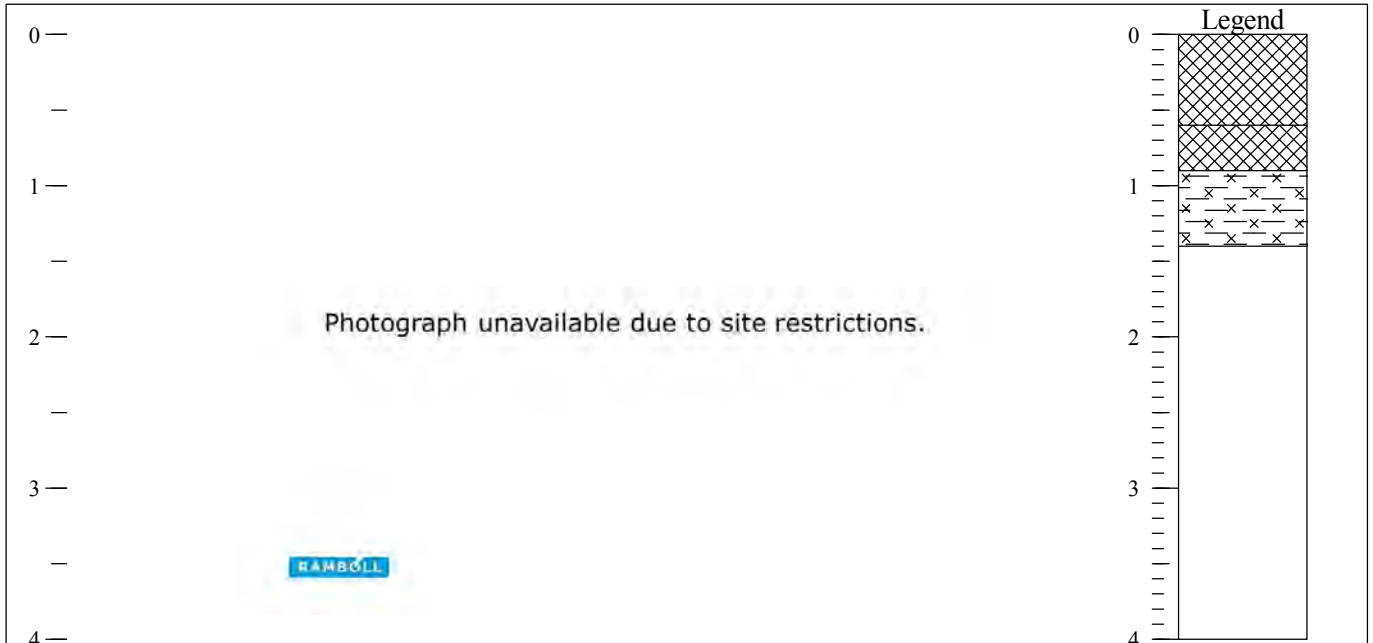
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.00		BOREHOLE NOT UNDERTAKEN			

Shoring/Support: Stability:		GENERAL REMARKS
		NOT COMPLETED

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used	Logged By
--	--	-----------------------	-----------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP720
Job No 1620000492	Date 07-07-16 07-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.60		MADE GROUND. Brown gravelly sandy CLAY. Gravel of flint and occasional brick.	0.20	ES	
0.60-0.90		MADE GROUND. Grey slightly gravelly silty CLAY. Gravel of brick and wood [SUSPECTED REWORKED].	0.70	ES	
0.90-1.40		Grey slightly gravelly silty CLAY [ALLUVIUM],	1.10	ES	
1.40		Trial pit completed at 1.4mbgl and backfilled with arisings.			

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded. Groundwater was not encountered. Trial pit backfilled with arisings.	
--	--	--	---	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	---	--	-----------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP721
Job No 1620000492	Date 07-07-16 07-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1



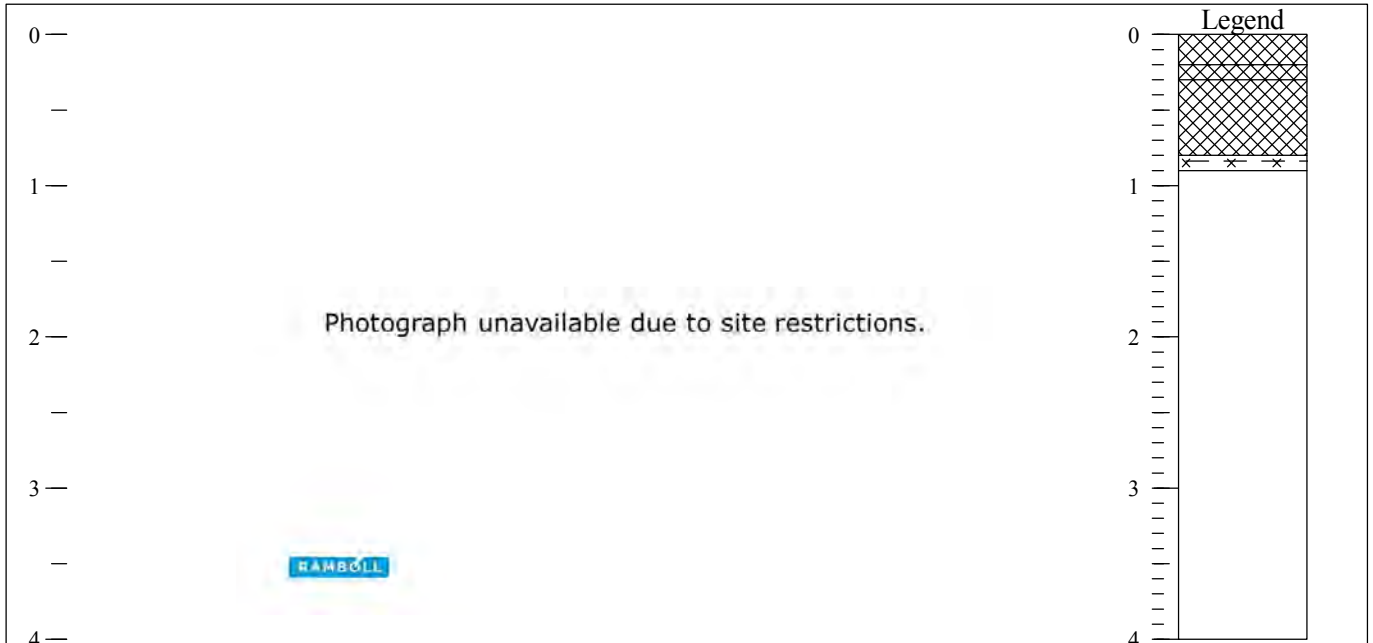
STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		MADE GROUND. Brown sand gravelly CLAY. Gravel of chalk, flint, brick, glass. At 0.1mbgl concrete boulder.	0.10	ES	
0.40-1.00		Grey silty gravelly CLAY. Gravel of flint [ALLUVIUM].	0.50	ES	
1.00-1.70		Grey silty sandy GRAVEL of flint [RIVER TERRACE DEPOSITS].			
1.70		Trial pit completed at 1.7mbgl and backfilled with arisings.	1.60	ES	

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded. Groundwater was not encountered. Trial pit backfilled with arisings.	
--	--	--	---	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	---	--	-----------------

TRIAL PIT LOG

Project Green Park Village - Phase 5 (Asbestos Works)				TRIAL PIT No RTP722
Job No 1620000492	Date 07-07-16 07-07-16	Ground Level (m)	Co-Ordinates ()	
Contractor Ramboll Environ Ltd				Sheet 1 of 1

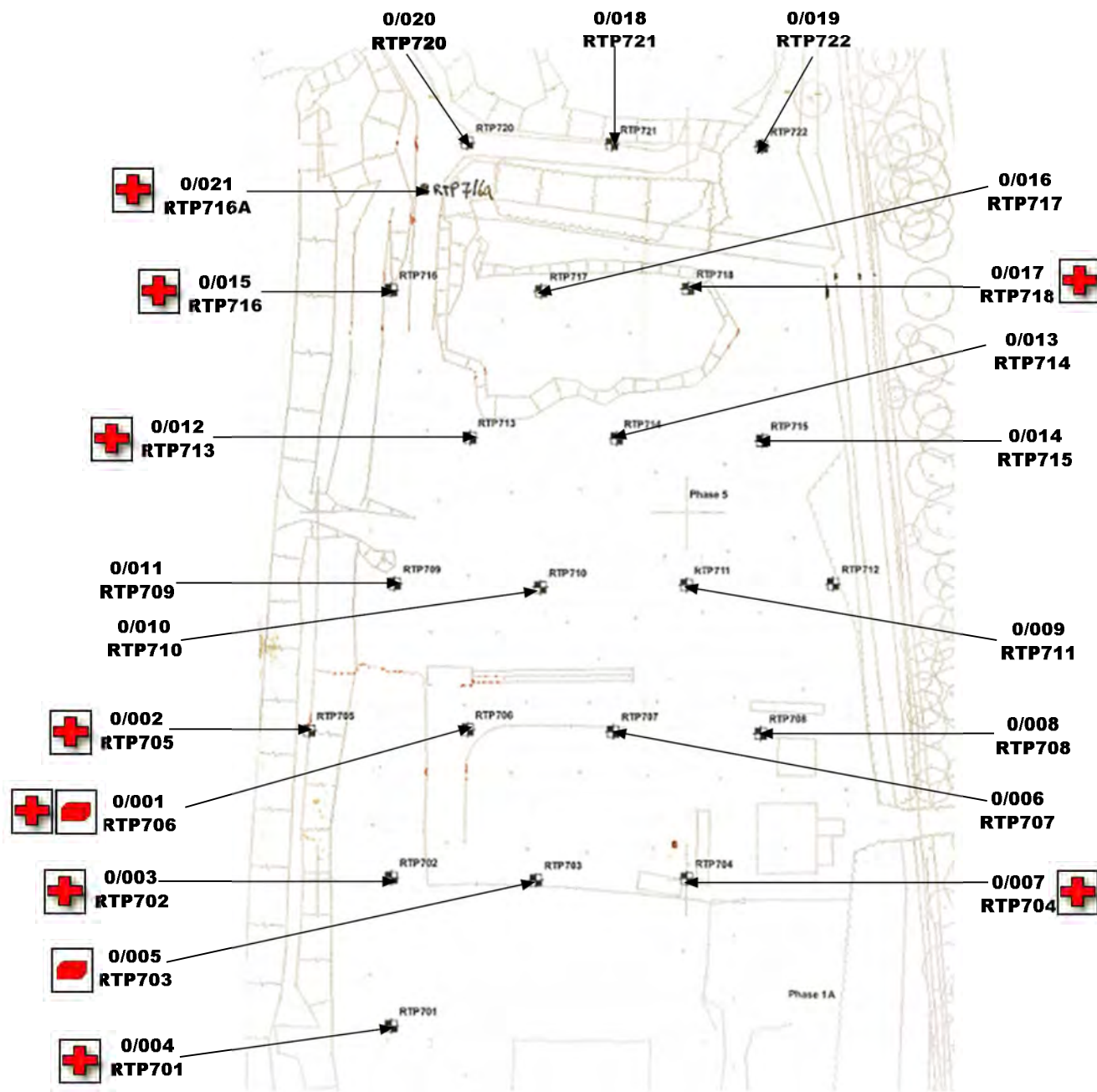


STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		MADE GROUND. Brown sandy gravelly CLAY. Gravel of flint and occasional brick.	0.10	ES	
0.20-0.30		MADE GROUND. Mottled red and blue brown slightly gravelly CLAY. Gravel of flint.			
0.30-0.80		MADE GROUND. Brown sandy gravelly CLAY. Gravel of flint and occasional brick.	0.60	ES	
0.80-0.90		Dark grey slightly gravelly silty CLAY. Gravel of flint [ALLUVIUM].			
0.90		Trial pit completed at 0.9mbgl and backfilled with arisings.			

Shoring/Support: Stability: 			GENERAL REMARKS No olfactory or visual evidence of gross contamination recorded. Groundwater was not encountered. Trial pit backfilled with arisings.	
------------------------------------	--	--	---	--

All dimensions in metres Scale 1:50	Client Berkeley Homes (Western) Ltd.	Method/ Plant Used Tracked 360 Excavator	Logged By JP
--	---	--	-----------------

APPENDIX B – LUCION ENVIRONMENTAL LTD RECORDS.



Lucion Report	121834
Survey Location	Berkeley Housing Development Site
Plan Location	Phase 5 - Green Park Village
Survey Date	05/07/2016
Surveyor(s)	S Landells, J Gibbs
Material Symbols	
Asbestos containing bituminous product	
Asbestos containing cement	
Asbestos containing composite product	
Asbestos containing gasket	
Asbestos containing insulation	
Asbestos containing insulating board	
Asbestos containing paper product	
Asbestos containing sprayed coating	
Asbestos containing textured coating	
Asbestos containing woven product	
Asbestos containing debris of unknown origin	
No Access Area - Asbestos Presumed Present	
No Access Item - Asbestos Presumed Present	
Survey Area	
Please note: Asbestos containing material symbol locations are only INDICATIVE of the area of location; not the exact position of the material; refer to report register for details. Drawing NOT to scale.	

Asbestos Analyst's Certificate Report

Job Ref No: **121835**, Cert Ref No: **20957**, Account Ref No: **17752**, Contract Ref No: **15997**

Nearest postcode is: RG30 3UR. Refer to notes for directions.



on site photo



general works area photo

Building	Level	Works-Area	Enclosure Used?	Certificate Issue Date
Berkeley Homes	0	Green Park Village Phase 5	No	Thursday, 7th July, 2016

Overall Certificate Status	Passed Tests	Failed Tests	WARNINGS
PASSED	0	0	0

Intro

Sampling & Evaluation Methods

In-house methods TOP02.08 & TOP02.09 in accordance with HSG 248 Asbestos - The Analyst's Guide to Sampling, Analysis and Clearance Procedures.

Notes: The samples referred to in this report will be retained for 6 months unless requested otherwise. Unless otherwise stated, there are no departures from the sampling and evaluation methods specified. Results detailed in this report relate only to the time, and corresponding conditions prevailing, when the sampling and examination were undertaken.

Notes to Test Accuracy

Airflow measured on site is recorded against a correction chart. Flow meters are calibrated against a UKAS certified master flow meter accurate to $\pm 0.5\%$. In accordance with HSG248, if the combined effect of ambient temperature and pressure between calibration and sampling location exceeds 5% a correction is applied to the air sample volume. The calculated fibre concentration is given for each air sample taken. Where the corresponding reported fibre concentration is preceded by "<", the lower limit of quantification (LOQ) of the method has not been reached. For a 480 litre air sample with 200 graticule areas counted, the (LOQ) of this method is 0.010 fibres per cubic centimetre of air; samples of less volume/graticules will be reported to a lower LOQ (refer count sheet). While counting randomly distributed fibres, an expected degree of variation of 1.5 standard deviations from the mean count may occur. At clearance indicator level (0.01 fibres per cubic centimetre of air) a 480-litre air sample yielding a count of 20 fibres over 200 fields would have an expected standard deviation of ± 8 fibres.

Sampling

When testing within an Enclosure and conducting a 4-Stage Clearance - the number of samples (Ns) is calculated by $A^{1/3}-1$. Where enclosure is less than 3m in height: A is denoted by area. Where enclosure is greater than 3m in height: A is denoted by volume/3. Refer air sampling and fibre counting sheet.

When testing within a decontamination unit (DCU) - where the combined floor area of shower and dirty areas is less than 10m²; 1 air test has been carried out. During this test the door between these areas has been propped open. For combined floor areas exceeding 10m² a sample in each area (i.e. shower and dirty end) will be taken.

For tests other than those associated with 4-Stage Clearance testing the analyst will apply the principles of current HSE guidance and experience combined with situational circumstances.

Where a photograph of the completed decontamination unit certificate appears in this report the analyst has completed an abridged report to be left inside the DCU; this abridged report should not be used in lieu of this comprehensive report.

Where sampling plans have been supplied; please note these are not to scale.

Where a sample filter has been deemed uncountable or biased the analyst will record this as "uncountable" in the count-sheet.

Field Blanks - Where site sampling and counting is carried out in a field laboratory a field blank is carried out by the analyst prior to the start of sampling and counting. The field blank constitutes a filter taken from a loaded but unused filter head that is mounted and subsequently counted. Acceptance is met by a count of less than 3 fibres per 100 fields. Such filters are reported as "field blank" in the sample location column of the count sheet.

Disclaimers

Any opinions and interpretations expressed herein are outside the scope of UKAS accreditation. This certificate is valid only when it bears the signature of an authorised member of Lucion personnel. Please note the witnessing of smoke tests is outwith the scope of UKAS accreditation.

Representatives Signature - The signatory on report acknowledgement agrees to findings of this report being accurate and correct and Lucion Environmental Ltd issuing this report to the email address held on record for the job and does not require a copy of this report to be left on site. Furthermore Lucion Environmental Ltd cannot be held responsible for any actions undertaken following the issue of this report.

This certificate *may* be part of a series of works and should be read in conjunction with the Asbestos Analyst's Job Summary Report.

Report Contents

Test: Background (121835-1)	6
Sample: Field Blank (121835-1-1)	7
Sample: Adjacent to pit 701 (121835-1-1)	7
Sample: Adjacent to site van next to pit 706 (121835-1-2)	7
Test: Reassurance (121835-3)	8
Sample: Adjacent to pit 706 while being dug (121835-3-1)	9
Sample: Adjacent to pit 702 while being dug (121835-3-2)	9
Sample: Adjacent to pit 701 while being dug (121835-3-3)	9
Sample: Adjacent to pit 703 while being dug (121835-3-4)	9
Test: Leak Testing (121835-4)	10
Test: Personal (121835-5)	11
Sample: On Operative Jonathan Gibbs during dampening down of soil when pitts being dug (121835-5-1)	12
Sample: On Operative Scott Landells during dampening down and checking rubble when pits being dug (121835-5-1)	12
Test: Background (121835-6)	14
Sample: Location around pit 717 (121835-6-1)	15
Sample: Location around pit 714 (121835-6-2)	15
Test: Personal (121835-7)	16
Sample: On Operative Jonathan Gibbs during checking excavation pitts (121835-7-1)	17
Sample: Field Blank (121835-7-1)	17
Sample: On Rambolls Operative during inspection of excavation pitts (121835-7-2)	17
Sample: On Lucion Operative Jonathan Gibbs while checking excavation pits (121835-7-3)	17
Test: Reassurance (121835-8)	19
Sample: Adjacent to pit 704 (121835-8-1)	20
Sample: Between pits 709 and 710 (121835-8-2)	20
Sample: On path line next to lake (121835-8-3)	20
Sample: Adjacent to pit 714 (121835-8-4)	20
Sample: Adjacent to pit 715 (121835-8-5)	20
Test: Background (121835-9)	21
Sample: Field Blank (121835-9-1)	22
Sample: Behind skips near pits 716 and 717 (121835-9-2)	22
Test: Reassurance (121835-10)	23

Sample: Adjacent to Pit 716 (121835-10-1)24

Sample: Adjacent to path next to lake (121835-10-2)24

Sample: Adjacent to Pit 717 (121835-10-3)24

Sample: Pathway Adjacent to pit 712 (121835-10-4)24

Sample: Adjacent to pit 722 (121835-10-5)24

Sample: Adjacent to pit 712 (121835-10-6)24

Test: Personal (121835-11)25

Sample: On Lucion Operative Jonathan Gibbs while checking excavation pits (121835-11-1)26

Sample: On Rambolls Operative during inspection of excavation pits (121835-11-2)26

Test: Background (121835-1)

Air sample results	All air samples gave results below 0.01 fibres per cc of air.
Stage Warning?	No
Analyst Signature Signature Date	 Tuesday, 5th July, 2016 @ 18:09:50

Test: Background (121835-1) - Count Sheet

Lucion Report Number				Test Date				Sampled By				Counted By			
121835-1				Tuesday, 5th July, 2016				Scott Landells				Scott Landells			
Air Volume Correction Detail															
T Cal (K)				T Site (C)				T Pcal (hPa)							
293				22				1013							
Microscope & Calculation Detail															
P Site (hPa)		Correction Required		Micro No.		Graticule Dia (µm)		Test Slide Result (Grid No.)		Filter Dia. Exposed (mm)					
1016		1		MS21		100		5		22.5					
Instrument Detail															
Thermometer, Barometer, Timepiece		Flow (Hi)		Flow (Low)		HSE/NPL		Graticule Slide							
WS57		FM39		FM50		4443		SM25							
Sample Details															
Sample No.	Sample Location	Head No.	Pump No.	Time On (hh:mm)	Time Off (hh:mm)	Run Time (mins)	Start Flow (lmin-1)	Int Flow (lmin-1)	End Flow (lmin-1)	Calc. Volume (l)	Corr. Volume (l)	Fibres	Fields	Calc. Conc. (Fibres cm ⁻³)	Report. Conc. (Fibres cm ⁻³)
121835-1-1	Field Blank	177										0.5	200		
121835-1-1	Adjacent to pit 701	133	107	10:10:00	11:15:00	65	8.1		8.1	527	527	7.5	200	0.004	<0.01
121835-1-2	Adjacent to site van next to pit 706	130	133	10:00:00	11:05:00	65	8.1		8.1	527	527	6.0	200	0.003	<0.01

Test: Reassurance (121835-3)

Air sample results	All air samples gave results below 0.01 fibres per cc of air.
Stage Warning?	No
Analyst Signature Signature Date	 Tuesday, 5th July, 2016 @ 18:25:18

Test: Reassurance (121835-3) - Count Sheet

Lucion Report Number				Test Date				Sampled By				Counted By			
121835-3				Tuesday, 5th July, 2016				Scott Landells				Scott Landells			
Air Volume Correction Detail															
T Cal (K)				T Site (C)				T Pcal (hPa)							
293				22				1013							
Microscope & Calculation Detail															
P Site (hPa)		Correction Required		Micro No.		Graticule Dia (µm)		Test Slide Result (Grid No.)		Filter Dia. Exposed (mm)					
1016		1		MS21		100		5		22.5					
Instrument Detail															
Thermometer, Barometer, Timepiece		Flow (Hi)		Flow (Low)		HSE/NPL		Graticule Slide							
WS57		FM39		FM50		443		SM25							
Sample Details															
Sample No.	Sample Location	Head No.	Pump No.	Time On (hh:mm)	Time Off (hh:mm)	Run Time (mins)	Start Flow (lmin-1)	Int Flow (lmin-1)	End Flow (lmin-1)	Calc. Volume (l)	Corr. Volume (l)	Fibres	Fields	Calc. Conc. (Fibres cm ⁻³)	Report. Conc. (Fibres cm ⁻³)
121835-3-1	Adjacent to pit 706 while being dug	161	113	12:05:00	12:40:00	35	15.1		15.1	529	529	8.0	200	0.004	<0.01
121835-3-2	Adjacent to pit 702 while being dug	160	113	13:00:00	13:36:00	36	15.1		15.1	544	544	6.5	200	0.003	<0.01
121835-3-3	Adjacent to pit 701 while being dug	177	91	15:00:00	15:35:00	35	15.1		15.1	529	529	7.0	200	0.003	<0.01
121835-3-4	Adjacent to pit 703 while being dug	161	113	16:05:00	16:39:00	34	15.1		15.1	513	513	7.5	200	0.004	<0.01

Test: Leak Testing (121835-4)

Air sample results	All air samples gave results below 0.01 fibres per cc of air.
Stage Warning?	No
Analyst Signature Signature Date	 Tuesday, 5th July, 2016 @ 18:40:30

Test: Personal (121835-5)

Air sample results	All air samples gave results below 0.01 fibres per cc of air.
Stage Warning?	No
Analyst Signature Signature Date	 Tuesday, 5th July, 2016 @ 18:43:42

Test: Personal (121835-5) - Count Sheet

Lucion Report Number		Test Date		Sampled By		Counted By									
121835-5		Tuesday, 5th July, 2016		Scott Landells		Scott Landells									
Air Volume Correction Detail															
T Cal (K)		T Site (C)		T Pcal (hPa)											
293		22		1013											
Microscope & Calculation Detail															
P Site (hPa)	Correction Required	Micro No.	Graticule Dia (µm)	Test Slide Result (Grid No.)	Filter Dia. Exposed (mm)										
1016	1	MS21	100	5	22.5										
Instrument Detail															
Thermometer, Barometer, Timepiece	Flow (Hi)	Flow (Low)	HSE/NPL	Graticule Slide											
WS57	FM39	FM50	4443	SM25											
Sample Details															
Sample No.	Sample Location	Head No.	Pump No.	Time On (hh:mm)	Time Off (hh:mm)	Run Time (mins)	Start Flow (lmin-1)	Int Flow (lmin-1)	End Flow (lmin-1)	Calc. Volume (l)	Corr. Volume (l)	Fibres	Fields	Calc. Conc. (Fibres cm ⁻³)	Report. Conc. (Fibres cm ⁻³)
121835-5-1	On Operative Jonathan Gibbs during dampening down of soil when pits being dug	177	37	12:30:00	13:35:00	65	4.1		4.1	267	267	7.5	200	0.007	<0.02
121835-5-1	On Operative Scott Landells during dampening down and checking rubble when pits being dug	130	37	15:20:00	16:35:00	75	4.1		4.1	308	308	7.0	200	0.006	<0.02

Test: Background (121835-6)

Air sample results	All air samples gave results below 0.01 fibres per cc of air.
Stage Warning?	No
Analyst Signature Signature Date	 Wednesday, 6th July, 2016 @ 12:05:18

Test: Background (121835-6) - Count Sheet

Lucion Report Number		Test Date		Sampled By		Counted By									
121835-6		Wednesday, 6th July, 2016		Scott Landells		Scott Landells									
Air Volume Correction Detail															
T Cal (K)		T Site (C)		T Pcal (hPa)											
293		21		1013											
Microscope & Calculation Detail															
P Site (hPa)	Correction Required	Micro No.	Graticule Dia (µm)	Test Slide Result (Grid No.)	Filter Dia. Exposed (mm)										
1020	1	MS21	100	5	22.5										
Instrument Detail															
Thermometer, Barometer, Timepiece	Flow (Hi)	Flow (Low)	HSE/NPL	Graticule Slide											
WS57	FM39	FM50	4443	SM25											
Sample Details															
Sample No.	Sample Location	Head No.	Pump No.	Time On (hh:mm)	Time Off (hh:mm)	Run Time (mins)	Start Flow (lmin-1)	Int Flow (lmin-1)	End Flow (lmin-1)	Calc. Volume (l)	Corr. Volume (l)	Fibres	Fields	Calc. Conc. (Fibres cm ⁻³)	Report. Conc. (Fibres cm ⁻³)
121835-6-1	Location around pit 717	133	117	08:30:00	09:34:00	64	8.1		8.1	518	518	7.0	200	0.003	<0.01
121835-6-2	Location around pit 714	130	92	08:31:00	09:34:00	63	8.1		8.1	510	510	5.0	200	0.002	<0.01

Test: Personal (121835-7)

Air sample results	All air samples gave results below 0.01 fibres per cc of air.
Stage Warning?	No
Analyst Signature Signature Date	 Wednesday, 6th July, 2016 @ 13:05:57

Test: Personal (121835-7) - Count Sheet

Lucion Report Number				Test Date				Sampled By				Counted By			
121835-7				Wednesday, 6th July, 2016				Scott Landells				Scott Landells			
Air Volume Correction Detail															
T Cal (K)				T Site (C)				T Pcal (hPa)							
293				21				1013							
Microscope & Calculation Detail															
P Site (hPa)		Correction Required		Micro No.		Graticule Dia (µm)		Test Slide Result (Grid No.)		Filter Dia. Exposed (mm)					
1020		1		MS21		100		5		22.5					
Instrument Detail															
Thermometer, Barometer, Timepiece		Flow (Hi)		Flow (Low)		HSE/NPL		Graticule Slide							
WS57		FM39		FM50		4443		SM							
Sample Details															
Sample No.	Sample Location	Head No.	Pump No.	Time On (hh:mm)	Time Off (hh:mm)	Run Time (mins)	Start Flow (lmin-1)	Int Flow (lmin-1)	End Flow (lmin-1)	Calc. Volume (l)	Corr. Volume (l)	Fibres	Fields	Calc. Conc. (Fibres cm ⁻³)	Report. Conc. (Fibres cm ⁻³)
121835-7-1	On Operative Jonathan Gibbs during checking excavation pits	133	37	10:30:00	11:30:00	60	4.1		4.1	246	246	9.0	200	0.009	<0.02
121835-7-1	Field Blank	177										1.0	200		
121835-7-2	On Rambolls Operative during inspection of excavation pits	161	37	12:30:00	13:30:00	60	4.1		4.1	246	246	7.5	200	0.008	<0.02

table continued from previous page...

Sample Details															
121835-7-3	On Lucion Operative Jonathan Gibbs while checking excavation pits	130	37	14:30:00	15:30:00	60	4.1		4.1	246	246	5.0	200	0.005	<0.02

Test: Reassurance (121835-8)

Air sample results	All air samples gave results below 0.01 fibres per cc of air.
Stage Warning?	No
Analyst Signature Signature Date	 Wednesday, 6th July, 2016 @ 13:22:38

Test: Reassurance (121835-8) - Count Sheet

Lucion Report Number				Test Date				Sampled By				Counted By			
121835-8				Wednesday, 6th July, 2016				Scott Landells				Scott Landells			
Air Volume Correction Detail															
T Cal (K)				T Site (C)				T Pcal (hPa)							
293				22				1013							
Microscope & Calculation Detail															
P Site (hPa)		Correction Required		Micro No.		Graticule Dia (µm)		Test Slide Result (Grid No.)		Filter Dia. Exposed (mm)					
		1		MS21		100		5		22.5					
Instrument Detail															
Thermometer, Barometer, Timepiece		Flow (Hi)		Flow (Low)		HSE/NPL		Graticule Slide							
WS57		FM39		FM50		4443		SM25							
Sample Details															
Sample No.	Sample Location	Head No.	Pump No.	Time On (hh:mm)	Time Off (hh:mm)	Run Time (mins)	Start Flow (lmin-1)	Int Flow (lmin-1)	End Flow (lmin-1)	Calc. Volume (l)	Corr. Volume (l)	Fibres	Fields	Calc. Conc. (Fibres cm ⁻³)	Report. Conc. (Fibres cm ⁻³)
121835-8-1	Adjacent to pit 704	133	117	10:30:00	11:05:00	35	15.1		15.1	529	529	4.0	200	0.002	<0.01
121835-8-2	Between pits 709 and 710	133	103	13:00:00	13:33:00	33	15.1		15.1	498	498	3.5	200	0.002	<0.01
121835-8-3	On path line next to lake	161	103	14:41:00	15:15:00	34	15.1		15.1	513	513	2.0	200	0.001	<0.01
121835-8-4	Adjacent to pit 714	133	117	14:50:00	15:26:00	36	15.1		15.1	544	544	4.0	200	0.002	<0.01
121835-8-5	Adjacent to pit 715	133	117	15:10:00	15:45:00	35	15.1		15.1	529	529	2.5	200	0.001	<0.01

Test: Background (121835-9)

Air sample results	All air samples gave results below 0.01 fibres per cc of air.
Stage Warning?	No
Analyst Signature Signature Date	 Thursday, 7th July, 2016 @ 09:22:15

Test: Background (121835-9) - Count Sheet

Lucion Report Number		Test Date		Sampled By		Counted By									
121835-9		Thursday, 7th July, 2016		Scott Landells		Scott Landells									
Air Volume Correction Detail															
T Cal (K)		T Site (C)		T Pcal (hPa)											
293		25		1013											
Microscope & Calculation Detail															
P Site (hPa)	Correction Required	Micro No.	Graticule Dia (µm)	Test Slide Result (Grid No.)	Filter Dia. Exposed (mm)										
1017	1	MS21	100	5	22.5										
Instrument Detail															
Thermometer, Barometer, Timepiece	Flow (Hi)	Flow (Low)	HSE/NPL	Graticule Slide											
WS57	FM39	FM50	4443	SM25											
Sample Details															
Sample No.	Sample Location	Head No.	Pump No.	Time On (hh:mm)	Time Off (hh:mm)	Run Time (mins)	Start Flow (lmin-1)	Int Flow (lmin-1)	End Flow (lmin-1)	Calc. Volume (l)	Corr. Volume (l)	Fibres	Fields	Calc. Conc. (Fibres cm ⁻³)	Report. Conc. (Fibres cm ⁻³)
121835-9-1	Field Blank	133										0.5	200		
121835-9-2	Behind skips near pits 716 and 717	161	117	08:05:00	09:10:00	65	8.1		8.1	527	527	4.0	200	0.002	<0.01

Test: Reassurance (121835-10)

Air sample results	All air samples gave results below 0.01 fibres per cc of air.
Stage Warning?	No
Analyst Signature Signature Date	 Thursday, 7th July, 2016 @ 09:23:39

Test: Reassurance (121835-10) - Count Sheet

Lucion Report Number		Test Date		Sampled By		Counted By									
121835-10		Thursday, 7th July, 2016		Scott Landells		Scott Landells									
Air Volume Correction Detail															
T Cal (K)		T Site (C)		T Pcal (hPa)											
293		26		1013											
Microscope & Calculation Detail															
P Site (hPa)	Correction Required	Micro No.	Graticule Dia (µm)	Test Slide Result (Grid No.)	Filter Dia. Exposed (mm)										
1015	1	MS21	100	5	22.5										
Instrument Detail															
Thermometer, Barometer, Timepiece	Flow (Hi)	Flow (Low)	HSE/NPL	Graticule Slide											
WS57	FM39	FM50	4443	SM25											
Sample Details															
Sample No.	Sample Location	Head No.	Pump No.	Time On (hh:mm)	Time Off (hh:mm)	Run Time (mins)	Start Flow (lmin-1)	Int Flow (lmin-1)	End Flow (lmin-1)	Calc. Volume (l)	Corr. Volume (l)	Fibres	Fields	Calc. Conc. (Fibres cm ⁻³)	Report. Conc. (Fibres cm ⁻³)
121835-10-1	Adjacent to Pit 716	133	91	08:45:00	09:20:00	35	15.1		15.1	529	529	5.5	200	0.003	<0.01
121835-10-2	Adjacent to path next to lake	130	117	10:17:00	11:20:00	63	8.1		8.1	510	510	6.0	200	0.003	<0.01
121835-10-3	Adjacent to Pit 717	161	91	10:15:00	10:50:00	35	15.1		15.1	529	529	3.5	200	0.002	<0.01
121835-10-4	Pathway Adjacent to pit 712	133	117	10:03:00	11:05:00	62	8.1		8.1	502	502	2.0			
121835-10-5	Adjacent to pit 722	161	117	11:36:00	12:10:00	34	15.1		15.1	513	513	3.5	200	0.002	<0.01
121835-10-6	Adjacent to pit 712	133	103	12:50:00	13:24:00	34	15.2		15.2	517	517	3.0	200	0.001	<0.01

Test: Personal (121835-11)

Air sample results	All air samples gave results below 0.01 fibres per cc of air.
Stage Warning?	No
Analyst Signature Signature Date	 Thursday, 7th July, 2016 @ 09:26:23

Test: Personal (121835-11) - Count Sheet

Lucion Report Number		Test Date		Sampled By		Counted By									
121835-11		Thursday, 7th July, 2016		Scott Landells		Scott Landells									
Air Volume Correction Detail															
T Cal (K)		T Site (C)		T Pcal (hPa)											
293		26		1013											
Microscope & Calculation Detail															
P Site (hPa)	Correction Required	Micro No.	Graticule Dia (µm)	Test Slide Result (Grid No.)	Filter Dia. Exposed (mm)										
1016	1	MS21	100	5	22.5										
Instrument Detail															
Thermometer, Barometer, Timepiece	Flow (Hi)	Flow (Low)	HSE/NPL	Graticule Slide											
WS57	FM39	FM50	4443	SM25											
Sample Details															
Sample No.	Sample Location	Head No.	Pump No.	Time On (hh:mm)	Time Off (hh:mm)	Run Time (mins)	Start Flow (lmin-1)	Int Flow (lmin-1)	End Flow (lmin-1)	Calc. Volume (l)	Corr. Volume (l)	Fibres	Fields	Calc. Conc. (Fibres cm ⁻³)	Report. Conc. (Fibres cm ⁻³)
121835-11-1	On Lucion Operative Jonathan Gibbs while checking excavation pits	177	37	08:45:00	09:45:00	60	4.1		4.1	246	246	5.5	200	0.006	<0.02
121835-11-2	On Rambolls Operative during inspection of excavation pits	133	34	11:36:00	12:38:00	62	4.1		4.1	254	254	3.5	200	0.003	<0.02

Asbestos Analyst's Job Summary Report

Job Ref No: **121835**, Account Ref No: **17752**, Contract Ref No: **15997**

Nearest postcode is: RG30 3UR. Refer to notes for directions.

Title: PCM Air Monitoring During Asbestos in Soils Support, Phase 5, Green Park Village



on site photo

Passed Certificates	Failed Certificates
1	0

First Visit to Site: Tuesday, 5th July, 2016, **Last Visit to Site:** Thursday, 7th July, 2016

Intro

This document is a summary of findings relating to asbestos analytical works at **Nearest postcode is: RG30 3UR. Refer to notes for directions.** from **Tuesday, 5th July, 2016 to Thursday, 7th July, 2016**. It is intended to give an overview of testing and must be read only in conjunction with the certificates it references. The document should never be read in isolation as asbestos analysts reports often contain additional notes and advice that should be referred to.

Furthermore, this document contains a summary of analyst notes and comments made in relation to works at this site.

Please note this document may contain findings from more than one analyst on more than one date.

Key to Air-Test Icons

To aid ease of reading the following icons have been used in this document to reference commonly undertaken activities.

-  Clearance Stage 1
-  Clearance Stage 2
-  Clearance Stage 3
-  Clearance Stage 4
-  Reassurance
-  Background
-  Leak Testing
-  Personal
-  Smoke Test Witness
-  Report Acknowledgement

A **WARNING** is used by the analyst to draw the readers attention to a particular area of the report.

Overview of Works

To view a complete air-certificate, follow the relevant link

Certificate: Green Park Village Phase 5				Building: Berkeley Homes		Level: 0		Passed 	
View the Full Certificate Here: http://web.lucion.co.uk/air_cert/20957?s=16051f367150ad40f3c96e79e2a40844									
Type	Test-ID	Start Time	End Time	Date	Operative	# Samples			
 Background	121835-1			05-07-2016	 Scott Landells	3			
 Reassurance	121835-3			05-07-2016	 Scott Landells	4			
 Leak Testing	121835-4			05-07-2016	 Scott Landells	--			
 Personal	121835-5			05-07-2016	 Scott Landells	2			
 Background	121835-6			06-07-2016	 Scott Landells	2			
 Personal	121835-7			06-07-2016	 Scott Landells	4			
 Reassurance	121835-8			06-07-2016	 Scott Landells	5			
 Background	121835-9			07-07-2016	 Scott Landells	2			
 Reassurance	121835-10			07-07-2016	 Scott Landells	6			
 Personal	121835-11			07-07-2016	 Scott Landells	2			

Job Notes

Operative	Note	Date
 Scott Landells <i>Lead Surveyor</i>	Personal Decontamination Area 	Thursday, 7th July, 2016
 Scott Landells <i>Lead Surveyor</i>	JCB hosed down 	Thursday, 7th July, 2016

Attachments

The following documents accompany this report and should be regarded as an integral part of this report.

They can be downloaded from <http://web.lucion.co.uk/reports/121835/attachments>.

- [Method Statement \[http://web.lucion.co.uk/method_statements/121835?s=7f3de17d8f38b3c26b03d069e51ce838 \]](http://web.lucion.co.uk/method_statements/121835?s=7f3de17d8f38b3c26b03d069e51ce838)
- [Risk Assessment \[http://web.lucion.co.uk/risk_assessment/121835?s=443c17a98ad0f88704c7c4e89c985e4b \]](http://web.lucion.co.uk/risk_assessment/121835?s=443c17a98ad0f88704c7c4e89c985e4b)
- [A4-Plan_121834_Berkeley-Housing-Development-Site-\(1\).pdf](#)
- [Figure-3-Phase-Plan-\(1\).pdf](#)
- [Site_location_Figure-1-\(1\).pdf](#)

Asbestos Fibre Identification Material Test Certificate

Job Ref No: **121834**, Account Ref No: **17752**, Contract Ref No: **15997**

This certificate is for the attention of	Andrew West Berkeley Homes (Western) Limited 200 Longwater Avenue Green Park Reading Berkshire RG2 6GB
Contract Title	Asbestos in Soils Support, Green Park Village
Site Address	Nearest postcode is: RG30 3UR. Refer to notes for directions.
Sampled Buildings	Berkeley Housing Development Site
Analyst(s)	Freya Jones
Analyst signature(s)	
Analysis date	Thursday, 14th July, 2016
Approved signatory	Kevan O'Neill
Approved signature	
Approval date	Friday, 15th July, 2016
Report Rendered on	Mon 18 Jul 2016 @ 13:57:19

Analysis method - In-house method TOP01.03 in accordance with HSG 248 - Asbestos: The Analysts' Guide For Sampling, Analysis and Clearance Procedures H.S.E. 2005. All analysis carried out at Lucion's Head Office laboratory.

Lucion bear no responsibility for sample collection or sample description related information provided by the client.

Where Lucion Environmental Ltd has not undertaken sampling; any prior sampling activity is beyond the company's responsibility. Where Lucion Environmental Ltd has sampled the test material, this has been done in accordance with in-house method TOP01.02. Any opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The results quoted in this report relate to:

1. Samples analysed in accordance with methods described above
2. Samples analysed and not necessarily to the material from which the samples were taken
3. The time during which sampling took place and to the conditions prevailing during that time

The samples referred to in this report will be retained for 6 months unless requested otherwise.

Total Samples	No Asbestos Detected	Asbestos-Containing Samples
15	2	13

Fibre Identification Analysis Results

Sample No.	Building	Level	Location	Item / Product Examined	Material Description	Analyst Comments	Fibre Identification
121834-1	Berkeley Housing Development Site	0	001/ Trench RTP 706	Sheet fragment	Asbestos-containing cement		Chrysotile
121834-2	Berkeley Housing Development Site	0	001/ Trench RTP 706	Board fragment	Asbestos-containing insulating board		Chrysotile, Amosite
121834-3	Berkeley Housing Development Site	0	002/ Trench RTP 705	Pipe fragment	Asbestos-containing cement		Chrysotile
121834-4	Berkeley Housing Development Site	0	003/ Trench RTP 702	Pipe fragments	Asbestos-containing cement		Chrysotile
121834-5	Berkeley Housing Development Site	0	004/ Trench RTP 701	sheet fragment	Asbestos-containing cement		Chrysotile
121834-6	Berkeley Housing Development Site	0	005/ Trench RTP 703	Roof tile fragment	cement		NAD
121834-7	Berkeley Housing Development Site	0	005/ Trench RTP 703	Sheet fragment	Asbestos-containing insulating board		Chrysotile, Amosite
121834-8	Berkeley Housing Development Site	0	005/ Trench RTP 703	Pipe fragment	Asbestos-containing insulating board		Chrysotile, Amosite
121834-9	Berkeley Housing Development Site	0	007/ Trench RTP 704	Pipe fragment	Asbestos-containing cement		Chrysotile
121834-10	Berkeley Housing Development Site	0	010/ Trench RTP 710	Paper backed linoleum	paper		NAD
121834-11	Berkeley Housing Development Site	0	012/ Trench RTP 713	Sheet fragment	Asbestos-containing cement		Chrysotile
121834-12	Berkeley Housing Development Site	0	015/ Trench RTP 716	Sheet fragment	Asbestos-containing cement		Chrysotile
121834-13	Berkeley Housing Development Site	0	015/ Trench RTP 716	Pipe fragment	Asbestos-containing cement		Chrysotile
121834-14	Berkeley Housing Development Site	0	017/ Trench RTP 718	Sheet fragment	Asbestos-containing cement		Chrysotile
121834-15	Berkeley Housing Development Site	0	021/ Trench RTP 716a	Sheet fragment	Asbestos-containing cement		Chrysotile

Attached files

These can be downloaded from <http://web.lucion.co.uk/reports/121834/attachments>.

- [A4-Plan_121834_Berkeley-Housing-Development-Site.pdf](#)
- [Figure-3-Phase-Plan.pdf](#)
- [Site_location_Figure-1.pdf](#)

APPENDIX C – I2 ANALYTICAL SERVICES LTD RECORDS



4041



Environmental Science

Jorn Pace
Ramboll
240 Blackfriars Road
London
SE1 8NW

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

t: 0207 631 5291

e: jorn.pace@ramboll.co.uk

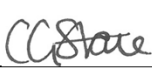
t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 16-22251

Project / Site name:	Green Park Village	Samples received on:	07/07/2016
Your job number:	1620000492	Samples instructed on:	12/07/2016
Your order number:		Analysis completed by:	19/07/2016
Report Issue Number:	1	Report issued on:	19/07/2016
Samples Analysed:	2 bulk samples - 4 leachate samples - 34 soil samples		

Signed: 

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

Signed: 

Emma Winter
Assistant Reporting Manager
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.



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599271	599272	599273	599274	599275
Sample Reference				RTP701	RTP702	RTP703	RTP704	RTP704
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.40	0.00-0.10	1.70	0.30	0.60
Date Sampled				05/07/2016	05/07/2016	05/07/2016	06/07/2016	06/07/2016
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	-
Moisture Content	%	N/A	NONE	14	-	-	9.4	-
Total mass of sample received	kg	0.001	NONE	1.1	-	-	1.1	-

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile	Chrysotile & Amosite	Amosite	Chrysotile & Amosite	Chrysotile & Amosite
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Detected	Detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	< 0.001	0.010	0.006	0.003	< 0.001
Asbestos Quantification Total	%	0.001	ISO 17025	< 0.001	0.010	0.006	0.003	< 0.001

General Inorganics

pH	pH Units	N/A	MCERTS	7.7	-	-	9.7	-
Free Cyanide	mg/kg	1	MCERTS	< 1	-	-	< 1	-
Organic Matter	%	0.1	MCERTS	2.8	-	-	1.2	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	-
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	-	-	0.76	-
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	-	-	< 0.10	-
Fluorene	mg/kg	0.1	MCERTS	< 0.10	-	-	< 0.10	-
Phenanthrene	mg/kg	0.1	MCERTS	0.68	-	-	2.4	-
Anthracene	mg/kg	0.1	MCERTS	< 0.10	-	-	1.1	-
Fluoranthene	mg/kg	0.1	MCERTS	2.5	-	-	9.5	-
Pyrene	mg/kg	0.1	MCERTS	2.2	-	-	9.3	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	0.87	-	-	5.1	-
Chrysene	mg/kg	0.05	MCERTS	0.99	-	-	3.4	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	1.3	-	-	6.2	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	0.91	-	-	3.1	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	1.1	-	-	4.8	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	0.53	-	-	2.7	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	-	-	0.59	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.73	-	-	3.9	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	11.7	-	-	52.5	-
-----------------------------	-------	-----	--------	------	---	---	------	---

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	35	-	-	17	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.9	-	-	0.5	-
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	-	< 4.0	-
Chromium (III)	mg/kg	1	NONE	53	-	-	86	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	53	-	-	86	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	130	-	-	100	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	140	-	-	180	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.7	-	-	0.4	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	26	-	-	63	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.1	-	-	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	40	-	-	29	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	330	-	-	170	-



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599271	599272	599273	599274	599275
Sample Reference				RTP701	RTP702	RTP703	RTP704	RTP704
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.40	0.00-0.10	1.70	0.30	0.60
Date Sampled				05/07/2016	05/07/2016	05/07/2016	06/07/2016	06/07/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics

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

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	390	-	-	920	-
---------------	-------	----	--------	-----	---	---	-----	---

TPH2 (C6 - C10)	mg/kg	0.1	NONE	< 0.1	-	-	< 0.1	-
-----------------	-------	-----	------	-------	---	---	-------	---

TPH C6 - C40	mg/kg	10	NONE	390	-	-	920	-
--------------	-------	----	------	-----	---	---	-----	---

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599276	599277	599278	599279	599280
Sample Reference				RTP705	RTP706	RTP706	RTP707	RTP707
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.10	0.40	0.10	0.90
Date Sampled				05/07/2016	05/07/2016	05/07/2016	06/07/2016	06/07/2016
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
Moisture Content	%	N/A	NONE	-	-	-	-	11
Total mass of sample received	kg	0.001	NONE	-	-	-	-	1.2

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile & Crocidolite	Amosite	Chrysotile	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Detected	Detected	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	< 0.001	0.557	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	< 0.001	0.557	-

General Inorganics

pH	pH Units	N/A	MCERTS	-	-	-	-	8.2
Free Cyanide	mg/kg	1	MCERTS	-	-	-	-	< 1
Organic Matter	%	0.1	MCERTS	-	-	-	-	0.8

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Fluorene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Anthracene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Pyrene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	-	-	-	-	< 1.60
-----------------------------	-------	-----	--------	---	---	---	---	--------

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	4.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	-	-	-	-	< 4.0
Chromium (III)	mg/kg	1	NONE	-	-	-	-	23
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	13
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	14
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	1.1
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	25
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	34



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599276	599277	599278	599279	599280
Sample Reference				RTP705	RTP706	RTP706	RTP707	RTP707
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.10	0.40	0.10	0.90
Date Sampled				05/07/2016	05/07/2016	05/07/2016	06/07/2016	06/07/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	-	-	-
Toluene	ug/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	ug/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	ug/kg	1	MCERTS	-	-	-	-	-
o-xylene	ug/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH2 (C6 - C10)	mg/kg	0.1	NONE	-	-	-	-	< 0.1
TPH C6 - C40	mg/kg	10	NONE	-	-	-	-	< 10
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599281	599282	599283	599284	599285
Sample Reference				RTP708	RTP709	RTP710	RTP710	RTP710
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.10	0.60	1.20	2.40
Date Sampled				06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016
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
Moisture Content	%	N/A	NONE	-	-	-	-	9.4
Total mass of sample received	kg	0.001	NONE	-	-	-	-	1.5

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile	Chrysotile	Chrysotile & Amosite	Amosite	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Detected	Detected	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	< 0.001	< 0.001	0.050	< 0.001	-
Asbestos Quantification Total	%	0.001	ISO 17025	< 0.001	< 0.001	0.050	< 0.001	-

General Inorganics

pH	pH Units	N/A	MCERTS	-	-	-	-	8.1
Free Cyanide	mg/kg	1	MCERTS	-	-	-	-	< 1
Organic Matter	%	0.1	MCERTS	-	-	-	-	0.3

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Fluorene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Anthracene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Pyrene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	-	-	-	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	-	-	-	-	< 1.60
-----------------------------	-------	-----	--------	---	---	---	---	--------

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	5.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	-	-	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	-	-	-	-	< 4.0
Chromium (III)	mg/kg	1	NONE	-	-	-	-	17
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	9.3
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	19
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	-	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	9.4
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	1.8
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	9.9
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	14



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599281	599282	599283	599284	599285
Sample Reference				RTP708	RTP709	RTP710	RTP710	RTP710
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.10	0.60	1.20	2.40
Date Sampled				06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	-	-	-
Toluene	ug/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	ug/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	ug/kg	1	MCERTS	-	-	-	-	-
o-xylene	ug/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH2 (C6 - C10)	mg/kg	0.1	NONE	-	-	-	-	< 0.1
TPH C6 - C40	mg/kg	10	NONE	-	-	-	-	< 10
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-



4041



Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599286	599287	599288	599289	599290
Sample Reference				RTP711	RTP711	RTP712	RTP713	RTP714
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	1.10	0.10	0.20	0.10
Date Sampled				06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016
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	-
Moisture Content	%	N/A	NONE	-	14	-	15	-
Total mass of sample received	kg	0.001	NONE	-	1.6	-	1.3	-

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile & Amosite	Chrysotile & Amosite	Amosite	Chrysotile & Amosite	Chrysotile
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Detected	Detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	< 0.001	< 0.001	< 0.001	0.016	0.174
Asbestos Quantification Total	%	0.001	ISO 17025	< 0.001	< 0.001	< 0.001	0.016	0.174

General Inorganics

pH	pH Units	N/A	MCERTS	-	8.7	-	8.9	-
Free Cyanide	mg/kg	1	MCERTS	-	< 1	-	< 1	-
Organic Matter	%	0.1	MCERTS	-	1.4	-	1.3	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Acenaphthylene	mg/kg	0.1	MCERTS	-	< 0.10	-	< 0.10	-
Acenaphthene	mg/kg	0.1	MCERTS	-	< 0.10	-	< 0.10	-
Fluorene	mg/kg	0.1	MCERTS	-	< 0.10	-	< 0.10	-
Phenanthrene	mg/kg	0.1	MCERTS	-	1.0	-	0.56	-
Anthracene	mg/kg	0.1	MCERTS	-	< 0.10	-	0.15	-
Fluoranthene	mg/kg	0.1	MCERTS	-	2.2	-	1.4	-
Pyrene	mg/kg	0.1	MCERTS	-	2.0	-	1.1	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	0.84	-	0.46	-
Chrysene	mg/kg	0.05	MCERTS	-	0.73	-	0.66	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	0.82	-	0.56	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	0.72	-	0.36	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	0.75	-	0.44	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	0.37	-	< 0.10	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	< 0.10	-	< 0.10	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.50	-	< 0.05	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	-	9.92	-	5.67	-
-----------------------------	-------	-----	--------	---	------	---	------	---

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	7.9	-	22	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	0.7	-	2.2	-
Chromium (hexavalent)	mg/kg	4	MCERTS	-	< 4.0	-	< 4.0	-
Chromium (III)	mg/kg	1	NONE	-	15	-	35	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	15	-	35	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	49	-	300	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	350	-	1400	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	0.4	-	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	13	-	23	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	23	-	29	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	280	-	550	-



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599286	599287	599288	599289	599290
Sample Reference				RTP711	RTP711	RTP712	RTP713	RTP714
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	1.10	0.10	0.20	0.10
Date Sampled				06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	< 1.0	-	-	-
Toluene	ug/kg	1	MCERTS	-	< 1.0	-	-	-
Ethylbenzene	ug/kg	1	MCERTS	-	< 1.0	-	-	-
p & m-xylene	ug/kg	1	MCERTS	-	< 1.0	-	-	-
o-xylene	ug/kg	1	MCERTS	-	< 1.0	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	< 1.0	-	-	-

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	-	1200	-	140	-
TPH2 (C6 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
TPH C6 - C40	mg/kg	10	NONE	-	1200	-	140	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	< 1.0	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	43	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	150	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	97	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	290	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	< 0.1	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	6.6	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	180	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	360	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	260	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	800	-	-	-



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599291	599292	599293	599294	599295
Sample Reference				RTP715	RTP716	RTP716	RTP717	RTP718
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	0.20	0.50	0.10	0.10
Date Sampled				06/07/2016	07/07/2016	07/07/2016	07/07/2016	07/07/2016
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	-	-
Moisture Content	%	N/A	NONE	16	-	7.9	-	-
Total mass of sample received	kg	0.001	NONE	1.2	-	1.3	-	-

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile & Amosite	Chrysotile	Chrysotile	Chrysotile & Amosite	Chrysotile & Amosite
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Detected	Detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	< 0.001	< 0.001	< 0.001	0.017	0.004
Asbestos Quantification Total	%	0.001	ISO 17025	< 0.001	< 0.001	< 0.001	0.017	0.004

General Inorganics

pH	pH Units	N/A	MCERTS	7.8	-	8.4	-	-
Free Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	-	-
Organic Matter	%	0.1	MCERTS	5.3	-	1.4	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	-
Acenaphthylene	mg/kg	0.1	MCERTS	0.50	-	< 0.10	-	-
Acenaphthene	mg/kg	0.1	MCERTS	1.2	-	< 0.10	-	-
Fluorene	mg/kg	0.1	MCERTS	2.3	-	< 0.10	-	-
Phenanthrene	mg/kg	0.1	MCERTS	24	-	< 0.10	-	-
Anthracene	mg/kg	0.1	MCERTS	5.4	-	< 0.10	-	-
Fluoranthene	mg/kg	0.1	MCERTS	41	-	< 0.10	-	-
Pyrene	mg/kg	0.1	MCERTS	30	-	< 0.10	-	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	16	-	< 0.10	-	-
Chrysene	mg/kg	0.05	MCERTS	13	-	< 0.05	-	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	16	-	< 0.10	-	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	6.9	-	< 0.10	-	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	12	-	< 0.10	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	5.6	-	< 0.10	-	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	1.3	-	< 0.10	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	7.1	-	< 0.05	-	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	182	-	< 1.60	-	-
-----------------------------	-------	-----	--------	-----	---	--------	---	---

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	-	8.7	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.8	-	< 0.2	-	-
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	-	-
Chromium (III)	mg/kg	1	NONE	19	-	30	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	-	30	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	190	-	23	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	1300	-	46	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	-	0.5	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14	-	20	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.1	-	< 1.0	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	31	-	28	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	640	-	100	-	-



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599291	599292	599293	599294	599295
Sample Reference				RTP715	RTP716	RTP716	RTP717	RTP718
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	0.20	0.50	0.10	0.10
Date Sampled				06/07/2016	07/07/2016	07/07/2016	07/07/2016	07/07/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	-	-	-
Toluene	ug/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	ug/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	ug/kg	1	MCERTS	-	-	-	-	-
o-xylene	ug/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	740	-	18	-	-
TPH2 (C6 - C10)	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	-
TPH C6 - C40	mg/kg	10	NONE	740	-	18	-	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-



4041



Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599296	599297	599298	599299	599300
Sample Reference				RTP720	RTP721	RTP722	RTP716A	RTP716A
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.10	0.60	0.10	0.70
Date Sampled				07/07/2016	07/07/2016	07/07/2016	07/07/2016	07/07/2016
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	-	-	-
Moisture Content	%	N/A	NONE	-	11	-	-	-
Total mass of sample received	kg	0.001	NONE	-	1.3	-	-	-

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

General Inorganics

pH	pH Units	N/A	MCERTS	-	7.9	-	-	-
Free Cyanide	mg/kg	1	MCERTS	-	< 1	-	-	-
Organic Matter	%	0.1	MCERTS	-	1.3	-	-	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Acenaphthylene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Acenaphthene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Fluorene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Phenanthrene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Anthracene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Fluoranthene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Pyrene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Benzo(a)anthracene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Benzo(a)pyrene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	-	< 0.10	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	-	< 1.60	-	-	-
-----------------------------	-------	-----	--------	---	--------	---	---	---

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	16	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	0.5	-	-	-
Chromium (hexavalent)	mg/kg	4	MCERTS	-	< 4.0	-	-	-
Chromium (III)	mg/kg	1	NONE	-	26	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	26	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	78	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	130	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	0.4	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	20	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	-	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	38	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	180	-	-	-



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599296	599297	599298	599299	599300
Sample Reference				RTP720	RTP721	RTP722	RTP716A	RTP716A
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.10	0.60	0.10	0.70
Date Sampled				07/07/2016	07/07/2016	07/07/2016	07/07/2016	07/07/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	-	-	-
Toluene	ug/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	ug/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	ug/kg	1	MCERTS	-	-	-	-	-
o-xylene	ug/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	-	73	-	-	-
TPH2 (C6 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	-	-
TPH C6 - C40	mg/kg	10	NONE	-	73	-	-	-
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599301	599302	599303	599304	
Sample Reference				RSP01	RSP02	RSP03	RSP04	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	
Date Sampled				05/07/2016	05/07/2016	05/07/2016	05/07/2016	
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	
Moisture Content	%	N/A	NONE	2.1	-	-	4.5	
Total mass of sample received	kg	0.001	NONE	1.1	-	-	1.2	

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile & Amosite	Amosite	Chrysotile & Crocidolite & Amosite	Chrysotile & Amosite	
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Detected	Detected	
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	0.004	< 0.001	0.008	0.013	
Asbestos Quantification Total	%	0.001	ISO 17025	0.004	< 0.001	0.008	0.013	

General Inorganics

pH	pH Units	N/A	MCERTS	10.1	-	-	10.0	
Free Cyanide	mg/kg	1	MCERTS	< 1	-	-	< 1	
Organic Matter	%	0.1	MCERTS	1.8	-	-	2.4	

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.31	-	-	0.49	
Acenaphthylene	mg/kg	0.1	MCERTS	0.58	-	-	1.1	
Acenaphthene	mg/kg	0.1	MCERTS	0.63	-	-	0.53	
Fluorene	mg/kg	0.1	MCERTS	0.99	-	-	1.1	
Phenanthrene	mg/kg	0.1	MCERTS	12	-	-	13	
Anthracene	mg/kg	0.1	MCERTS	3.9	-	-	2.9	
Fluoranthene	mg/kg	0.1	MCERTS	31	-	-	20	
Pyrene	mg/kg	0.1	MCERTS	26	-	-	17	
Benzo(a)anthracene	mg/kg	0.1	MCERTS	12	-	-	7.5	
Chrysene	mg/kg	0.05	MCERTS	11	-	-	8.7	
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	13	-	-	10	
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	8.6	-	-	4.0	
Benzo(a)pyrene	mg/kg	0.1	MCERTS	12	-	-	8.2	
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	6.1	-	-	4.2	
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	1.5	-	-	0.88	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	7.5	-	-	4.9	

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	148	-	-	104	
-----------------------------	-------	-----	--------	-----	---	---	-----	--

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	-	-	14	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.7	-	-	0.7	
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	-	< 4.0	
Chromium (III)	mg/kg	1	NONE	28	-	-	27	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	-	-	27	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	59	-	-	45	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	84	-	-	160	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	-	0.4	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	-	-	24	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	-	< 1.0	
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	26	-	-	31	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	180	-	-	200	



4041



Environmental Science

Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599301	599302	599303	599304	
Sample Reference				RSP01	RSP02	RSP03	RSP04	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	
Date Sampled				05/07/2016	05/07/2016	05/07/2016	05/07/2016	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	-	-	
Toluene	ug/kg	1	MCERTS	-	-	-	-	
Ethylbenzene	ug/kg	1	MCERTS	-	-	-	-	
p & m-xylene	ug/kg	1	MCERTS	-	-	-	-	
o-xylene	ug/kg	1	MCERTS	-	-	-	-	
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	-	-	

Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	1300	-	-	760	
TPH2 (C6 - C10)	mg/kg	0.1	NONE	< 0.1	-	-	< 0.1	
TPH C6 - C40	mg/kg	10	NONE	1300	-	-	760	
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	-	-	-	-	
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	-	-	-	-	
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	-	-	-	-	
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	-	-	-	-	
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	



Analytical Report Number: **16-22251**
Project / Site name: **Green Park Village**
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
599271	RTP701	1.40	140	Loose Fibres	Chrysotile	< 0.001	< 0.001
599272	RTP702	0.00-0.10	145	Loose Fibres & Insulation Lagging	Chrysotile & Amosite	0.010	0.010
599273	RTP703	1.70	140	Loose Fibres & Insulation Lagging	Amosite	0.006	0.006
599274	RTP704	0.30	135	Loose Fibres & Insulation Board/Tile	Chrysotile & Amosite	0.003	0.003
599275	RTP704	0.60	132	Loose Fibres	Chrysotile & Amosite	< 0.001	< 0.001
599277	RTP706	0.10	142	Loose Fibres	Chrysotile & Crocidolite	< 0.001	< 0.001
599278	RTP706	0.40	140	Loose Fibres	Amosite	< 0.001	< 0.001
599279	RTP707	0.10	136	Loose Fibres & Insulation Board/Tile	Chrysotile	0.557	0.557
599281	RTP708	0.10	137	Loose Fibres	Chrysotile	< 0.001	< 0.001
599282	RTP709	0.10	132	Insulation Board/Tile	Chrysotile	< 0.001	< 0.001
599283	RTP710	0.60	123	Hard/Cement Type Material & Loose Fibres	Chrysotile & Amosite	0.050	0.050
599284	RTP710	1.20	118	Loose Fibres	Amosite	< 0.001	< 0.001
599286	RTP711	0.60	137	Loose Fibres	Chrysotile & Amosite	< 0.001	< 0.001
599287	RTP711	1.10	140	Loose Fibres	Chrysotile & Amosite	< 0.001	< 0.001
599288	RTP712	0.10	125	Insulation Board/Tile	Amosite	< 0.001	< 0.001
599289	RTP713	0.20	129	Loose Fibres & Insulation Lagging & Hard/Cement Type Material	Chrysotile & Amosite	0.016	0.016
599290	RTP714	0.10	137	Insulation Lagging & Hard/Cement Type Material	Chrysotile	0.174	0.174



Analytical Report Number: 16-22251
Project / Site name: Green Park Village
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
599291	RTP715	0.60	126	Loose Fibres	Chrysotile & Amosite	< 0.001	< 0.001
599292	RTP716	0.20	135	Loose Fibres	Chrysotile	< 0.001	< 0.001



Analytical Report Number: 16-22251
Project / Site name: Green Park Village
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
599293	RTP716	0.50	129	Loose Fibres	Chrysotile	< 0.001	< 0.001
599294	RTP717	0.10	127	Loose Fibres & Insulation Lagging & Bitumen	Chrysotile & Amosite	0.017	0.017
599295	RTP718	0.10	134	Loose Fibres & Insulation Lagging & Insulation Board/Tile	Chrysotile & Amosite	0.004	0.004
599297	RTP721	0.10	139	Loose Fibres	Chrysotile & Amosite	< 0.001	< 0.001
599298	RTP722	0.60	130	Loose Fibres	Chrysotile	< 0.001	< 0.001
599299	RTP716A	0.10	121	Loose Fibres	Chrysotile	< 0.001	< 0.001
599300	RTP716A	0.70	119	Loose Fibres & Insulation Lagging	Chrysotile & Amosite	< 0.001	< 0.001
599301	RSP01		155	Insulation Lagging & Loose Fibres	Chrysotile & Amosite	0.004	0.004
599302	RSP02		146	Loose Fibres	Amosite	< 0.001	< 0.001
599303	RSP03		140	Insulation Lagging & Loose Fibres	Chrysotile & Crocidolite & Amosite	0.008	0.008
599304	RSP04		130	Insulation Lagging & Insulation Board/Tile	Chrysotile & Amosite	0.013	0.013

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



Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				602830	602831			
Sample Reference				RSP01	RSP04			
Sample Number				None Supplied	None Supplied			
Depth (m)				None Supplied	None Supplied			
Date Sampled				05/07/2016	05/07/2016			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Bulk Analysis)				Units	Limit of detection	Accreditation Status		
Asbestos Identification Name				Type	N/A	ISO 17025	Chrysotile-Hard/cement type material	Chrysotile-Hard/Cement Type Material



Analytical Report Number: 16-22251
Project / Site name: Green Park Village

Lab Sample Number				599305	599306	599307	599308	
Sample Reference				RTP704	RTP710	RTP716	RTP721	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.30	2.40	0.50	0.10	
Date Sampled				06/07/2016	06/07/2016	07/07/2016	07/07/2016	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

pH	pH Units	N/A	ISO 17025	7.9	8.0	7.6	7.4	
Free Cyanide	µg/l	10	NONE	< 10	< 10	< 10	< 10	
Sulphate as SO ₄	µg/l	100	ISO 17025	24200	3540	3650	105000	
Ammonium as NH ₄	µg/l	15	NONE	500	450	470	340	
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	7.02	4.57	5.40	5.09	
Hardness - Total	mgCaCO ₃ /l	1	NONE	42.5	2.7	25.2	136	

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	
----------------------	------	-----	------	-------	-------	-------	-------	--

Speciated PAHs

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

Total PAH

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



Analytical Report Number: 16-22251

Project / Site name: Green Park Village

Lab Sample Number				599305	599306	599307	599308	
Sample Reference				RTP704	RTP710	RTP716	RTP721	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.30	2.40	0.50	0.10	
Date Sampled				06/07/2016	06/07/2016	07/07/2016	07/07/2016	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	7.0	10	3.6	3.9	
Boron (dissolved)	µg/l	10	ISO 17025	56	< 10	< 10	60	
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.6	< 0.4	0.4	2.4	
Copper (dissolved)	µg/l	0.7	ISO 17025	19	2.1	5.0	13	
Lead (dissolved)	µg/l	1	ISO 17025	7.8	< 1.0	< 1.0	6.2	
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	
Nickel (dissolved)	µg/l	0.3	ISO 17025	3.1	1.5	2.1	3.2	
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	11	< 4.0	< 4.0	
Vanadium (dissolved)	µg/l	1.7	ISO 17025	29	9.5	5.7	4.7	
Zinc (dissolved)	µg/l	0.4	ISO 17025	6.1	3.4	5.0	14	

Calcium (dissolved)	mg/l	0.012	ISO 17025	16	1.2	9.7	49	
Magnesium (dissolved)	mg/l	0.005	ISO 17025	0.51	< 0.005	0.20	3.4	

Petroleum Hydrocarbons

TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10	< 10	< 10	
TPH2 (C6 - C10)	µg/l	10	NONE	< 10	< 10	< 10	< 10	
TPH C6 - C40	µg/l	10	NONE	< 10	< 10	< 10	< 10	

Analytical Report Number : 16-22251

Project / Site name: Green Park Village

* 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 *
599271	RTP701	None Supplied	1.40	Brown loam and clay with gravel.
599272	RTP702	None Supplied	0.00-0.10	-
599273	RTP703	None Supplied	1.70	-
599274	RTP704	None Supplied	0.30	Brown loam and sand with gravel and rubble.
599275	RTP704	None Supplied	0.60	-
599276	RTP705	None Supplied	1.00	-
599277	RTP706	None Supplied	0.10	-
599278	RTP706	None Supplied	0.40	-
599279	RTP707	None Supplied	0.10	-
599280	RTP707	None Supplied	0.90	Brown loam and clay with gravel.
599281	RTP708	None Supplied	0.10	-
599282	RTP709	None Supplied	0.10	-
599283	RTP710	None Supplied	0.60	-
599284	RTP710	None Supplied	1.20	-
599285	RTP710	None Supplied	2.40	Brown gravelly sand.
599286	RTP711	None Supplied	0.60	-
599287	RTP711	None Supplied	1.10	Brown gravelly sand.
599288	RTP712	None Supplied	0.10	-
599289	RTP713	None Supplied	0.20	Brown loam and sand with gravel and rubble.
599290	RTP714	None Supplied	0.10	-
599291	RTP715	None Supplied	0.60	Brown loam and sand with gravel and rubble.
599292	RTP716	None Supplied	0.20	-
599293	RTP716	None Supplied	0.50	Brown clay and sand.
599294	RTP717	None Supplied	0.10	-
599295	RTP718	None Supplied	0.10	-
599296	RTP720	None Supplied	0.20	-
599297	RTP721	None Supplied	0.10	Brown loam and sand with gravel.
599298	RTP722	None Supplied	0.60	-
599299	RTP716A	None Supplied	0.10	-
599300	RTP716A	None Supplied	0.70	-
599301	RSP01	None Supplied	None Supplied	Brown loam and sand with gravel.
599302	RSP02	None Supplied	None Supplied	-
599303	RSP03	None Supplied	None Supplied	-
599304	RSP04	None Supplied	None Supplied	Brown loam and sand with gravel.



4041



Environmental Science

Analytical Report Number : 16-22251

Project / Site name: Green Park Village

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammonium as NH ₄ in leachate	Determination of Ammonium/Ammonia/Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Asbestos identification in Bulks	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	W	ISO 17025
Asbestos Quantification - Gravimetric	The analysis was carried out using documented in-house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
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
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L023-PL	W	NONE
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	NONE
Free cyanide in soil	Determination of free 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
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
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
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 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Organic matter 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	L023-PL	D	MCERTS
pH 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

Iss No 16-22251-1 Green Park Village 1620000492

This certificate should not be reproduced, except in full, without the express permission of the laboratory.

The results included within the report are representative of the samples submitted for analysis.

Page 23 of 24



4041



Environmental Science

Analytical Report Number : 16-22251

Project / Site name: Green Park Village

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
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	L102B-PL	W	NONE
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 in leachates	Determination of sulphate 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
Total Hardness of leachates	Determination of hardness in leachates by calculation from calcium and magnesium.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	NONE
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding.	L076-PL	W	MCERTS
TPH C6 - C40 (leachate)	Determination of TPH in leachate by HS-GC-MS and GC-MS	In-house method	L070-PL	W	NONE
TPH C6 - C40 (soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method	L076-PL	W	NONE
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPH2 (Leachates)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L076-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.

**APPENDIX D - LEGISLATIVE CONTEXT AND GROUND
CONTAMINATION ASSESSMENT METHODOLOGIES, SCREENING
SHEET AND GAC**

1. LEGISLATIVE CONTEXT

1.1.1. England

The regime for contaminated land was set out in Part 2A (ss.78A-78YC) of the Environmental Protection Act 1990 (EPA), as inserted by S.57 of The Environment Act 1995 and came into effect in England on 1st April 2000 as The Contaminated Land (England) Regulations 2000 (SI 2000/227). These regulations were subsequently revoked with the provision of The Contaminated Land (England) Regulations 2006 (SI 2006/1380) (as amended), which came into force in August 2006, and consolidated the previous regulations and amendments. Revised statutory guidance ("the Guidance") for local authorities on how to implement the regime, including the decision-making process on whether land is contaminated land in the legal sense, has been published by Defra and entered into force in April 2012.

Under Part 2A of the EPA Section 78A(2), "contaminated land" is defined as "land which appears... to be in such a condition, by reason of substances in, on or under the land, that –

- a) significant harm is being caused or there is a significant possibility of such harm being caused; or
- b) significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused".

1.1.2. Wales

The regime for contaminated land was set out in Part 2A (ss.78A-78YC) of the Environmental Protection Act 1990 (EPA), as inserted by S.57 of The Environment Act 1995 and came into effect in Wales on 1st July 2001 as The Contaminated Land (Wales) Regulations 2001 (WSI 2001/2197, W.157). These regulations were subsequently revoked with the provision of The Contaminated Land (Wales) Regulations 2006 (SI 2006/2989 W.278), which consolidated the previous regulations and amendments and added in provisions regarding radioactive contaminated land. These regulations came into force on 10th December 2006 and were accompanied by statutory guidance published by the Welsh Assembly Government in December 2006 ('the Guidance') for local authorities on how to implement the regime. The 2006 statutory guidance was replaced by the Contaminated Land Statutory Guidance - 2012 (WG19243), issued by the Welsh Government.

Under Part 2A of the EPA Section 78A(2), "contaminated land" is defined as "land which appears... to be in such a condition, by reason of substances in, on or under the land, that –

- a) significant harm is being caused or there is a significant possibility of such harm being caused; or
- b) pollution of controlled waters is being, or is likely to be caused" (Section 86 of the Water Act 2003 remains only partially implemented in Wales).

1.1.3. Scotland

The regime for contaminated land was set out in Part 2A (ss.78A-78YC) of the Environmental Protection Act 1990 (EPA), as inserted by S.57 of The Environment Act 1995 and came into effect in Scotland on 14th July 2000 as The Contaminated Land (Scotland) Regulations 2000 (SSI 2000/ 178). These regulations were subsequently revoked with the provision of The Contaminated Land (Scotland) Regulations 2005 (SSI 2005 /658), which came into force in April 2006 and consolidated the previous regulations and amendments and were accompanied by statutory guidance published by

the Scottish Government in May 2006 ('the Guidance') for local authorities on how to implement the regime.

Under Part 2A of the Environmental Protection Act 1990, "contaminated land" is defined in the Contaminated Land (Scotland) Regulations 2005 (as amended) as land which appears to the local authority to be in such a condition, by reason of substances in, on or under the land, that:

- a) significant harm is being caused, or there is a significant possibility of such harm being caused; or
- b) significant pollution of the water environment is being caused or there is a significant possibility of such pollution being caused.

1.1.4. Northern Ireland

The regime for Contaminated Land in Northern Ireland was set out in the Waste and Contaminated Land (Northern Ireland) Order 1997 (as amended). Part 3 of the Waste and Contaminated Land (Northern Ireland) Order 1997 contains the main legal provisions for the introduction of a contaminated land regime in Northern Ireland, but the regime is not yet in operation. It is noted that the Contaminated Land (Northern Ireland) Regulations 2006 and associated statutory guidance were published in draft for consultation in 2006, but have yet to be finalised. Under Part 3 of the 1997 Order, contaminated land is defined as,

"any land which appears to a district council in whose district it is situated to be in such a condition, by reason of substances in, on or under the land, that -

- (a) significant harm is being caused or there is a significant possibility of such harm being caused; or
- (b) pollution of waterways or underground strata is being, or is likely to be, caused.

"Significant harm" is defined in the draft guidance on risk based criteria and must be the result of a "pollutant linkage", which may be assessed using qualitative risk assessment models. The presence of a pollutant linkage relies on the Source-Pathway-Receptor concept, where all three factors must be present and potentially or actually linked for a potential risk to exist.

1.1.5. The Channel Islands

There is no formal contaminated land regime in the Channel Islands, as they are not part of the UK, and as such they usually adopt either the English or French legislation or create their own.

1.1.6. Isle of Man

There is no formal contaminated land regime in the Isle of Man, and they usually adopt a best 'practice approach' from a European country of choice on this basis.

1.1.7. Risk assessment Framework

"Significant harm" or "significant pollution of controlled waters" is defined in the Guidance on risk based criteria and must be the result of one or more relevant 'contaminant linkages' relating to the land.

The presence of a contaminant linkage relies on the Source-Pathway-Receptor concept, where all three factors must be present and potentially or actually linked for a potential risk to exist. For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- A source - a substance that is capable of causing pollution or harm;
- A receptor - something which could be adversely affected by the contaminant;
- and

- A pathway - a route by which the contaminant can reach the receptor.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

The Environment Agency Contaminated Land Report CLR 11 Model Procedures for the Management of Land Contamination provides the technical framework for structured decision making about land contamination. CLR 11 advocates a phased approach to risk assessment comprising:

- Preliminary Risk Assessment (PRA) – desk study and qualitative assessment
- Generic Quantitative Risk Assessment (GQRA) – assessment of contaminant concentrations against generic assessment criteria.
- Detailed Quantitative Risk Assessment (DQRA) – detailed site specific risk assessment and development of site-specific assessment criteria.

Each of these phases follows the same basic steps but adds site specific details and further certainty into the assessment as the stages progress. The basic steps are:

- Hazard identification and hazard assessment – development or refinement of the source-pathway-receptor conceptual model, and identification of potential pollutant linkages.
- Risk Estimation – qualitative risk estimation predicting magnitude and probability of potential consequences that may arise as a result of a hazard.
- Risk Evaluation – deciding whether a risk is unacceptable.

2. RISK ESTIMATION

An assessment of environmental risks is made for each potential pollutant linkage identified.

Risk estimation has been completed in accordance with the guidance provided in:

- NHBC and Environment Agency 2008. Guidance for the Safe Development of Housing on Land Affected by Contamination. R&D Publication 66: 2008.

The following is taken directly from NHBC/EA 2008. The key to the classification is that the designation of risk is based upon the consideration of both:

- a) the magnitude of the potential consequence (*i.e.*, severity) [takes into account both the potential severity of the hazard and the sensitivity of the receptor];
- b) the magnitude of probability (*i.e.*, likelihood) [takes into account both the presence of the hazard and receptor and the integrity of the pathway].

Table 1: Classification of Consequence (after NHBC/EA 2008)

Category	Definition
Severe	Highly elevated concentrations likely to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. Catastrophic damage to crops, buildings or property.
Medium	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.
Mild	Exposure to human health unlikely to lead to "significant harm". Equivalent to EA Category 3 pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce. Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population. Minor damage to crops, buildings or property.
Minor	No measurable effect on humans. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structures and services.

* For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned.

The likelihood of an event (probability) takes into account both the presence of the hazard and target and the integrity of the pathway and has been assessed based on the categories given below.

Table 2: Classification of Probability (after NHBC/EA 2008)

Category	Definition
High Likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.
Likely	There is pollutant 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	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the following matrix in order to give a level of risk for each potential hazard.

Table 3: The Classification of Risk (after NHBC/EA 2008)

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very high	High	Moderate	Low
	Likely	High	Moderate	Moderate/ Low	Low
	Low Likelihood	Moderate	Moderate/ Low	Low	Very low
	Unlikely	Moderate/ Low	Low	Very low	Very low

Very high risk

There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without remediation action OR there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.

High risk

Harm is likely to arise to a designated receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.

Moderate risk

It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.

Low risk

It is possible that harm could arise to a designated receptor from identified hazard, but it is likely at worst, that this harm if realised would normally be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.

Very low risk

It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.

No potential risk

There is no potential risk if no pollution linkage has been established.

3. GQRA METHODOLOGIES

In order to assess the significance of the chemical concentrations recorded, generic assessment criteria (GAC) must be selected. The GAC are screening concentrations which are used initially for direct comparison to the measured site concentrations.

The GAC are defined based on the critical receptors identified at the site. Receptors are considered in relation to:

- Human health receptors (*e.g.*, site users);
- The water environment (*e.g.*, groundwater and surface water).

Potential risks to human health are considered primarily using measured concentrations of chemicals in soil. Potential risks to the water environment are considered primarily using soil leachate and groundwater concentrations as indicative of the potentially mobile fraction of any soil impact.

Additional receptors may be relevant dependent on the site *e.g.*, flora/fauna, water supply pipes, buried concrete.

3.1. Human Health Assessment

3.1.1. Initial Screening Assessment

In accordance with current UK guidance on legislation including Part 2A of the Environmental Protection Act 1990 and based on the principles of risk assessment, Ramboll Environ (REH) has derived generic assessment criteria (GAC) for interpretation of soil and groundwater chemical analysis. The Ramboll Environ GAC are considered to be threshold based screening concentrations, at which a significant risk is not considered to be present to the relevant receptors.

The Ramboll Environ REH GAC for soil assessment are based on the generic scenarios outlined in the Contaminated Land Exposure Assessment (CLEA) methodology and guidance documents (incorporating Science Reports SC050021/SR2 (January 2009), SR3 (January 2009), SR4 (September 2009) and the SGV reports (2009)). The generic scenarios include inhalation, ingestion, dermal contact of soil and dust as pathways for commercial and residential scenarios; as well as ingestion of homegrown produce for residential with gardens scenario. In addition, REH GAC have also been derived for the two Public Open Space land uses defined in C4SL guidance (outlined below).

The GAC have been calculated by use of two proprietary risk assessment models (CLEA Version 1.071 and the American Society for Testing Materials Risk Based Corrective Action RBCA Tool Kit Version 2.6 for Chemical Releases) which have been altered, where necessary, to reflect the current UK approach to human health risk assessment as set out in the Contaminated Land Report (CLR) 11 and the CLEA guidance documents. The physiochemical data has been taken from or derived using the methodology detailed in SR7 (November 2008) and SGV reports (2009), where feasible. The toxicology data has been taken from the current published EA toxicology documents. We have referred to all current publications and guidance issued up until 1st May 2016.

Reference has been made to the Defra-funded research project (SP1010), which developed a methodology to derive Category 4 Screening Levels (C4SLs) for six contaminants (benzo-a-pyrene, cadmium, arsenic, benzene, hexavalent chromium and lead). SP1010 provides technical tools and advice to be developed to help regulators and others to conform to the requirements of revised Part 2A Statutory Guidance. The C4SLs are therefore less conservative than GAC developed in accordance with published CLEA guidance as they describe a low risk as opposed to minimal risk scenario. However,

consistent with the developed GAC, sites below the C4SLs are within Category 4 (lowest risk category) and therefore considered suitable for use.

Defra's SP1010 Policy Companion document (DEFRA, Dec 2014) states that where a C4SL value has been derived for a contaminant where a Soil Guideline Value (as published by the EA 2009) exists, it is anticipated that risk assessors will use the C4SL value in line with Part 2A Statutory Guidance. In the absence of a suitable C4SL, risk assessors should identify and select appropriate GAC in accordance with established good practice. On this basis, Ramboll Environ has adopted the use of C4SLs however minimal risk assumptions have been applied in-house REH GAC for other contaminants of concern within our screening assessments.

The C4SLs for the six compounds published, are based on a sandy loam soil with 6% soil organic matter (SOM). The 6% SOM and sandy loam soil type is not considered by Ramboll Environ to be realistic of 'typical' UK soil conditions, and EA guidance ('Using Soil Guideline Values' EA, 2009) states that at 6% SOM, GAC may not be sufficiently protective (i.e. the values are too high to be sufficiently certain that they describe land where there is no risk to human health or the risk is negligible). For the Ramboll Environ GAC, all the C4SL inputs have been used apart from the SOM and soil type, which were amended to 1% and sand; thereby ensuring a suitably conservative Ramboll Environ GAC appropriate for most soils and Made Ground encountered in the UK. It is noted that none of the screening criteria used in the UK, including the C4SLs, have a statutory basis.

Ramboll Environ also attended the Land Quality Management and Chartered Institute of Environmental Health workshop for the collaborative development of 'Suitable 4 Use Levels' (S4ULs) and reference has been made to their publication 'The LQM/CIEH S4ULs for Human Health Risk Assessment, 2015'.

Review of additional UK organisation guidance including Contaminated Land: Applications in Real Environments (CL:AIRE) and partners GAC, including addendums up until 10 April 2012 has also been made. Soil Guideline Values (EA/DEFRA, 2009) may also be referred to if relevant. Finally, where necessary, other published sources of (non-UK) information, such as the RBCA V2.6 database has also been reviewed.

Contaminant concentrations below the adopted GAC are not considered to present a significant risk to identified receptors and therefore are not considered to warrant further study. Contaminants which are recorded at concentrations above their respective GAC are considered to present a potential risk to identified receptors and resultantly these determinants are subject to further assessment.

3.1.2. Contaminant Distribution Assessment

Concentrations above the GAC are considered further in relation to vertical and lateral distribution across the site and through statistical analysis, where appropriate. This analysis is used to define 'averaging areas' within which contamination concentrations and distribution are considered likely to be similar.

For each averaging area, where appropriate, statistical analysis is then used to calculate a 'representative' concentration for each contaminant within that area and identify possible outliers of the underlying distribution of contaminant concentrations. This analysis is completed in accordance with CIEH 2008 guidance.

The initial statistical tests are used to calculate the 95% probability that the true population mean falls below the critical concentration (GAC). In practice, this involves comparing the 95th Upper Confidence Limit of the true population mean with the GAC. The Maximum Value test is then used to identify whether the maximum concentration is likely to lie outside of the assumed distribution trend and as such would represent an outlier of the general population of data across the site. Outliers above the GAC may represent localised contaminant hotspots and require further consideration.

Constituent non-detects are conservatively assigned a value equal to the reported analytical laboratory limit of detection. Any identified true outliers are excluded from the datasets used in calculation of the 95%UCL value.

3.2. Assessment for the Water Environment

Assessment of risks to water resources is completed in general accordance with guidance provided in the Environment Agency 2013, Groundwater Protection Principles and Practice (GP3) for England and Wales and with reference to SEPA guidance WAT-PS-10-01 in Scotland.

Generic assessment criteria for waters must be selected to assess potential risks to the identified environmental receptors.

In the absence of relevant published water assessment criteria, the potential risk to human health from contaminated surface and groundwater and the potential risk to the aquatic environment from entry of pollutants (either directly or via a groundwater pathway) has been assessed using commonly accepted UK guidelines including the Water Supply (Water Quality) (England) Regulations 2000 (known as the Drinking Water Standards, or DWS) and the Environmental Quality Standards (EQS) defined in European legislation such as the Water Framework Directive (WFD) (2000/60/EC).

Minimum reporting values are also considered for hazardous substances for assessment of risks to groundwater resources in order to comply with the requirements of the guidance to 'prevent' input of hazardous substances to groundwater.

4. GROUND GAS RISK ASSESSMENT

Ground gas risk is characterised using guidance provided in the following:

- CIRIA C665, 2007. Assessing risks posed by hazardous ground gases to buildings. (Supersedes CIRIA 659).
- NHBC / RSK, 2007. Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present. Report Ed 4.
- BS8485: 2007 Code of practice for the characterization and remediation from ground gas in affected developments.
- BS8576:2013. Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)

The risk posed by a gas regime is assessed initially by calculating a Gas Screening Value using a combination of the gas flow rate and recorded concentrations of carbon dioxide and methane. This Gas Screening Value is then used in combination with the maximum recorded gas concentrations to determine the site's Characteristic Situation (CIRIA 665 – all site uses except low rise residential) or Traffic Light Classification (NHBC/RSK 2007 low rise residential sites only). Table A below outlines the method for defining the Characteristic Situation as detailed in CIRIA 665 and Table B outlines the method for defining the Traffic Light classification as detailed in NHBC/RSK 2007.

Table A: Proposed method for classifying gassing sites (after CIRIA C665 2007)

Characteristic Situation	Risk classification	Gas screening value of CH ₄ or CO ₂ (l/hr) ^a	Additional limiting factors	Typical source of generation
1	Very low risk	<0.07	Typically methane ≤ 1% and/or carbon dioxide ≤ 5%. Otherwise consider increase to Situation 2	Natural soils with low organic content. "Typical" Made Ground
2	Low risk	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to Characteristic Situation 3	Natural soil, high peat/organic content. "Typical" Made Ground
3	Moderate risk	<3.5	-	Old landfill, inert waste, mineworking flooded
4	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protective measures	Mineworking -susceptible to flooding, completed landfill, inert waste (WMP 26B criteria)
5	High risk	<70	-	Mineworking unflooded inactive with shallow workings near surface
6	Very high risk	>70	-	Recent landfill site

^a Gas screening value = gas concentration (%) x measured borehole flow rate (l/hr)

Table B: Proposed method for classifying gassing sites (after NHBC/RSK 2007)

Traffic Light	Methane ¹		Carbon Dioxide ¹	
	Typical Maximum Concentration ⁵ (%v/v)	Gas Screening Value (GSV) ^{2,4,6} litres per hour	Typical Maximum Concentration ⁵	Gas Screening Value (GSV) ^{2,3,4,5}

			(%v/v)	litres per hour
Green				
	1	0.16	5	0.78
Amber 1				
	5	0.63	10	1.56
Amber 2				
	20	1.56	30	3.13
Red				

The CIRIA, NHBC and BS8485 guidance documents are then used to determine requirements for gas protection measures based on the site classification.

5. WATER SUPPLY PIPES

The assessment has been completed in accordance with the current UK guidance:

- Water UK. Jan 2014. Contaminated Land Assessment Guidance.
- UKWIR UK Water Industry Research Ltd, 2010. Guidance for Selection of Water Supply Pipes to be used in Brownfield Sites.

This guidance provides threshold concentrations for different pipe material for various chemical groups.

The pipeline materials considered by the guidance are PE, PVC, wrapped steel, wrapped ductile iron or copper pipe and barrier pipe. PE and PVC are assessed using threshold concentrations for various chemical groups including volatile organic compounds (VOC) with tentatively identified compounds (TICs), semi-volatile organic compounds (SVOC) with TICs, and mineral oils. Wrapped steel, wrapped ductile iron and copper pipe are assessed using corrosive properties.

Regional water companies may have adopted additional more stringent thresholds which they apply locally, thus consultation with the water authority must always be completed prior to final determination of water supply pipe materials.

6. WASTE CLASSIFICATION

The main steps in classifying waste are:

1. Is it really a waste or can it be reused, recycled or recovered?
2. If the material is not to be utilised in some way and it is waste then classify to ascertain if hazardous or non-hazardous. In order to do this, guidance regarding the definition and classification of hazardous waste is utilised, the two main documents being EA, 2015 'Technical Guidance WM3: Waste Classification - Guidance on the classification and assessment of waste' and the European Waste Catalogue (EWC 2002).
3. Use the results of this initial waste classification to follow one of the following routes:

Hazardous			Non-Hazardous		
Pre-treat the waste.			Thought likely to be inert: (e.g. insoluble and inorganic in nature)	Thought unlikely to be inert: (e.g. may contain peat or other high organic content material)	
Complete WAC (Waste Acceptance Criteria) testing to determine class of landfill it can go to or any requirement for further pre-treatment if WAC fails.			Complete WAC test to determine class of landfill it can be disposed to		-
Pass stable non-reactive hazardous WAC: dispose of at SNRHW landfill.	Pass hazardous WAC: dispose of at hazardous landfill.	Fail: further remedial action required	Pass: dispose of at inert landfill	Fail: dispose of at non-hazardous landfill	Dispose to non-hazardous landfill (no WAC testing required by WM3).

The landfill regulations (Environment Agency, 2011 Treatment of Waste for Landfill) prescribe that hazardous waste requires pre-treatment prior to disposal to landfill. This may include physical sorting at the point of production on site, by sorting of waste soils into separate stockpiles of eg topsoil, made ground and natural gravels.

6.1. Methodology

In terms of the EWC, the soil to be excavated from this site for disposal is classed as 'Soil and Stones containing Dangerous Substances' (EWC Code 170503) or 'Soil and Stones other than those mentioned in EWC Code 170503' (EWC Code 170504). As such it is what is known as a 'Mirror Entry waste' and needs to be assessed against Threshold Levels for certain dangerous substances in order to confirm whether it needs to be classified as hazardous (170503) or non-hazardous (170504).

Data from site soil chemical testing have been assessed to classify the site soils. The assessment has been undertaken using HazWasteOnline TM, a web-based tool for classifying waste. The software utilises Environment Agency guidance and European regulations to classify samples in line with current requirements.

The assessment provided in this report fulfils the requirement of step 2 above, and allows classification of the site soils and hazardous or non-hazardous.

Asbestos: The Hazardous Waste (England and Wales) Regulations 2005 requires that any waste having an asbestos content greater than 0.1% weight/weight (w/w) be classified as Hazardous Waste. Any waste with an asbestos content of less than 0.1% w/w can be classified as non-hazardous waste, unless there are other contaminants present which would make the waste hazardous.

Where fibrous asbestos is present at concentrations greater than 0.001%, these can be considered to pose a risk to human health and must be dealt with as hazardous soils for disposal purposes.

Where the asbestos is deemed to be of a fibrous nature the Health and Safety Executive (HSE) require that the handling of the material is undertaken by a suitably licensed company. The Carriage of Dangerous Goods (etc.) Regulations 2009 (CDG2009) applies in this instance.

Shortlist for England, Wales and Scotland.

This shortlist is designed to be used as a quick screening tool to represent a worst case for common contaminants only.

Refer to detailed sheets for all other contaminants and specific receptor thresholds.

		Drinking water resource protection - Shortlist DWS (standard taken in accordance with heirarchy)	Shortlist Freshwater Surface Water Standards
		Hazardous substances (highlighted) For sites with gw resource potential - screen to Method detection limit	
Metals			
Aluminium	µg/l	150	
Antimony	µg/l	5	
Arsenic	µg/l	7.5	50
Barium	mg/l	0.7	
Beryllium	mg/l	0.004	
Boron	mg/l	0.75	
Cadmium and its compounds	µg/l	3.75	≤0.08 (Class1) ^[15] 0.08 (Class 2) 0.09 (Class3) 0.15 (Class 4) 0.25 (Class 5)
Chromium(III)	µg/l	37.5	4.7
Chromium(VI)	µg/l		3.4
Copper	µg/l	1500	1µg/l bioavailable***
Iron	µg/l	200	1000
Lead and its compounds (dissolved)	µg/l	7.5	1.2 bioavailable
Manganese	µg/l	50	123 µg/l bioavailable***
Mercury	µg/l	0.75	0.07
Nickel	µg/l	15	4 bioavailable***
Selenium	µg/l	7.5	
Zinc	µg/l	-	10.9 bioavailable plus Ambient Background Concentration (µg/l) dissolved***
PAH			
Polycyclic aromatic hydrocarbons (PAH) (sum of b(b)fl, b(k)fl, ind(123cd)p, b(ghi)p)	µg/l	0.1	not applicable
Anthracene	µg/l	-	0.1
Benzo(a)pyrene	µg/l	0.0075	1.7x10-4**
Benzo(b)fluoranthene	µg/l	0.075	
Benzo(k)fluoranthene			
Benzo(g,h,i)- perylene			**
Indeno(1,2,3- cd)-pyrene			
Fluoranthene	µg/l	0.075	0.0063
Naphthalene	µg/l	0.07	2
BTEX			
Benzene	µg/l	0.75	10
Ethylbenzene	µg/l	300	
Toluene	µg/l	700	74
Xylenes (total)	µg/l	500	
TPH	µg/l	10	
MISC			
Ammonia (as N)	µg/l	200	21
Ammonium (NH ₄)	µg/l	500	200
Cyanide (free)	µg/l	50	1
Electrical conductivity	µS/cm	1880	
Fluoride	mg/l	1.13	
Nitrate (NO ₃)[9]	mg/l	37.5	
Nitrite (NO ₂)	mg/l	0.5	
Phenol	µg/l	-	7.7
Phosphate (as P)	µg/l	-	
Sodium	mg/l	150	
Sulphate	mg/l	188	

Zn, Cu, Ni bioavailable concentration to be calculated in separate sheet (m-BAT tool 20150206 with test data)

[m-BAT tool 20150206 with test data.xlsm](#)

Pb - bioavailable concentration to be calculated in separate sheet (Final Pb Screening Tool)

[Final Pb Screening Tool.xlsm](#)

[15]

Class 1: <40 mg CaCO₃/l
 Class 2: 40 - <50 mg CaCO₃/l
 Class 3: 50 - <100 mg CaCO₃/l
 Class 4: 100 - <200 mg CaCO₃/l
 Class 5: ≥200 mg CaCO₃/l



Lab Sample Number				Asbestos SAC (1% SOM)	599271	599272	599273	599274	599275	599276	599277	599278	599279	599280	599281	599282	599283	599284	599285	599286	599287	599288	599289	599290	599291	599292	599293	599294	599295	599296	599297	599298	599299	599300	599301	599302	599303	599304			
Sample Reference					R17201	R17202	R17203	R17204	R17205	R17206	R17207	R17208	R17209	R17210	R17211	R17212	R17213	R17214	R17215	R17216	R17217	R17218	R17219	R17220	R17221	R17222	R17223	R17224	R17225	R17226	R17227	R17228	R17229	R17230	R17231	R17232	R17233	R17234			
Depth (m)					1.40	0.00-0.10	1.70	0.30	0.60	1.00	0.10	0.40	0.10	0.10	0.10	0.60	1.20	2.40	0.60	1.10	0.10	0.20	0.10	0.60	0.20	0.50	0.10	0.10	0.20	0.10	0.60	0.10	0.70	None Suspected	None Suspected	None Suspected	None Suspected				
Date Sampled					05/07/2016	05/07/2016	05/07/2016	06/07/2016	06/07/2016	05/07/2016	05/07/2016	05/07/2016	05/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016	06/07/2016		
Strata																																									
Analytical Parameter (Soil Analysis)																																									
					type	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level	unexposed pH level		
Stone Content				%	0.1	NONE		< 0.1	-	-	< 0.1	-	-	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1		
Moisture Content				%	N/A	NONE		14	-	-	9.4	-	-	-	11	-	-	-	-	9.4	-	14	-	15	-	16	-	7.9	-	-	-	11	-	-	-	2.1	-	-	4.5		
Total mass of sample received				kg	0.001	NONE		1.1	-	-	1.1	-	-	-	1.2	-	-	-	1.5	-	1.6	-	1.3	-	1.2	-	1.3	-	1.3	-	1.3	-	1.1	-	-	-	-	1.2			
Asbestos in Soil Screen / Identification Name				Type	N/A	ISO 17025		Chrysotile	Chrysotile & Amosite	Amosite	Chrysotile & Amosite	Chrysotile & Amosite	-	Chrysotile & Crocidolite	Amosite	Chrysotile	-	Chrysotile	Chrysotile	Chrysotile & Amosite	Amosite	-	Chrysotile & Amosite	Chrysotile & Amosite	Amosite	Chrysotile & Amosite	Chrysotile	Chrysotile & Amosite	Chrysotile	Chrysotile	Chrysotile & Amosite	Chrysotile & Amosite	-	Chrysotile & Amosite	Chrysotile	Chrysotile	Chrysotile & Amosite	Chrysotile & Amosite	Amosite	Chrysotile & Crocidolite & Amosite	Chrysotile & Amosite
Asbestos in Soil				Type	N/A	ISO 17025		Detected	Detected	Detected	Detected	Detected	Detected	Not detected	Detected	Detected	Detected	-	Detected	Detected	Detected	Detected	-	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected
Asbestos Quantification (Stage 2)				%	0.001	ISO 17025		0.001	0.019	0.006	0.003	0.001	-	0.001	0.001	0.557	-	0.001	0.001	0.050	0.001	-	0.001	0.001	0.001	0.016	0.174	0.001	0.001	0.017	0.004	-	0.001	0.001	0.001	0.001	0.004	0.001	0.008	0.013	
Asbestos Quantification Total				%	0.001	ISO 17025		0.001	0.019	0.006	0.003	0.001	-	0.001	0.001	0.557	-	0.001	0.001	0.050	0.001	-	0.001	0.001	0.001	0.016	0.174	0.001	0.001	0.017	0.004	-	0.001	0.001	0.001	0.001	0.004	0.001	0.008	0.013	
General Inorganics				ppm	N/A	MCERTS		7.7	-	-	9.7	-	-	-	8.2	-	-	-	-	8.1	-	8.7	-	8.5	-	7.8	-	8.4	-	-	-	7.9	-	-	-	10.1	-	-	10.0		
Free Cyanide				mg/kg	1	MCERTS	49	2.1	-	-	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Organic Matter				%	0.1	MCERTS		2.8	-	-	1.2	-	-	-	-	0.8	-	-	-	-	0.3	-	1.4	-	1.3	-	5.3	-	1.4	-	-	-	1.3	-	-	-	1.8	-	-	2.4	
Associated PAHs				mg/kg	0.05	MCERTS	0.99	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.49
Naphthalene				mg/kg	0.1	MCERTS	170	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	1.1
Acenaphthylene				mg/kg	0.1	MCERTS	280	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.63
Acenaphthene				mg/kg	0.1	MCERTS	280	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.63
Fluorene				mg/kg	0.1	MCERTS	170	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	1.1
Benzofluorene				mg/kg	0.1	MCERTS	95	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	1.3
Anthracene				mg/kg	0.1	MCERTS	2300	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	2.9
Fluoranthene				mg/kg	0.1	MCERTS	280	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	20
Pyrene				mg/kg	0.1	MCERTS	620	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	8.7
Benzo(a)anthracene				mg/kg	0.1	MCERTS	2.5	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	7.5
Benzo(b)fluoranthene				mg/kg	0.05	MCERTS	0.99	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	10.7
Benzo(k)fluoranthene				mg/kg	0.1	MCERTS	1.3	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	10		
Benzo(a)pyrene				mg/kg	0.1	MCERTS	0.91	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	4.9		
Benzo(b)pyrene				mg/kg	0.1	MCERTS	1.1	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	11		
Indeno(1,2,3-cd)pyrene				mg/kg	0.1	MCERTS	0.73	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	4.2		
Benzo(ghi)perylene				mg/kg	0.1	MCERTS	0.99	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.88
Benzo(ghi)perylene				mg/kg	0.05	MCERTS	0.63	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	4.9		
Total PAH				mg/kg	1.6	MCERTS		11.7	-	-	0.001	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	104	
Speciated Total EPA-16 PAHs				mg/kg	1.6	MCERTS		11.7	-	-	0.001	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	104	
Heavy Metals / Metalloids				ppm	N/A	MCERTS		37	15	-	17	-	-	0.5	-	-	-	5.4	-	7.8	-	22	-	12	-	8.7	-	-	-	16	-	-	-	11	-	-	-	14			
Arsenic (aqueous extractable)				mg/kg	0.3	MCERTS	75	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001		
Cadmium (aqueous extractable)				mg/kg	0.1	MCERTS	15	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001		
Chromium (hexavalent)				mg/kg	4	MCERTS	23	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001		
Chromium (III)				mg/kg	1	MCERTS	53	0.001	-	-	0.001	-	-	-	-	0.001	-	-	-	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001	-	0.001		
Chromium (total extractable)				mg/kg	1	MCERTS	910	0.001	-	-	0.001	-	-	-	-	0.																									

[illegible]

[illegible]

APPENDIX E - GENERAL SITE ENVIRONMENTAL CONTROLS

1. GENERAL SITE ENVIRONMENTAL CONTROLS

The following Section provides an outline of the expectations of the Contractor, in order to ensure environmental compliance throughout the enabling and remedial works. The Contractor should adhere to the general guidance provided as part of this strategy and should undertake works in an environmentally sound manner, in accordance with industry best practice.

1.1 Air Quality and Dust

The Contractor shall be responsible for obtaining any necessary authorisations required by the Local Authority, including liaison for any monitoring requirements to be adopted.

The Contractor shall be responsible for the implementation of any air quality and dust monitoring required by the Local Authority.

The Contractor shall ensure that emissions to air are minimised and that all necessary precautions to prevent the occurrence of smoke emissions, fumes or odours from site plant, stored fuel or other substances and prevent any emissions for fumes drifting into the nearby residences, workplaces or public open spaces.

A log of the activities being undertaken on the site should be given to the Employer's Representative each week together with a record of any complaints that have been received.

It will be necessary to ensure that mitigation measures are implemented to prevent off-site migration of contaminants, such as dust/vapours or run-off during excavations and soil stockpiling.

It will be necessary to ensure that all plant is in good repair and conforms to the manufacturers or legislative/British Standard emission standards. Plant shall not be left running for long periods when not directly in use. Where appropriate or practical, electrically powered plant shall be used instead of diesel.

While asbestos containing soils have not been identified as part of previous ground investigations there is the potential for it to be present in the building fabric. Adequate health and safety protocols (PPE/RPE) and dust suppression techniques are considered integral to pollution prevention should asbestos be encountered. Moreover, methodologies and procedures should be selected through consultations with a specialist asbestos contractor, in accordance with best practice and legislation current at the time of the works, plus any specific requirements of Local Authority and the Health and Safety Executive.

Dust suppression techniques and monitoring requirements should be outlined in consultation with a specialist asbestos Contractor. Suppression techniques and monitoring requirements are likely to include (but are not exclusive to) soil dampening with the use of a dedicate site water bowser, use of dust curtains and air quality monitoring stations along site boundaries.

The following measures shall be used to minimise the generation of dust where appropriate:

- Wheel washing and street sweeping (where appropriate);
- Loading/unloading within designated bays/areas;
- Hoarding around site and/or appropriate locations such as plant;
- Monaflex or similar sheeting around scaffolding;
- Sheeting of lorries leaving site;
- Maintenance of plant;
- Liaison with neighbours; and
- Highest standards of housekeeping.

No vehicles shall leave the site with earth, mud, etc. adhering to the wheels in a quantity which may result in its being deposited on the public highway or footpath, and creating a nuisance, or

hazard to vehicles or pedestrians. Suitable wheel washing equipment to avoid such problems shall be installed, operated and maintained on the site until the development is completed.

The written consent of the Environment Agency and Local Utility provider shall be obtained regarding the disposal of wheel wash water to surface water drains.

1.2 Noise and Vibration

The Contractor shall be responsible for obtaining any necessary authorisations required by the Local Authority, including liaison for any monitoring requirements to be adopted. Any 'Out of hours' work shall require prior agreement with Reading Borough Council.

The Contractor shall be responsible for the implementation of any noise and vibration monitoring required by the Local Authority.

The Contractor shall take all practical measures to minimise noise and vibration during the Works and where relevant, comply with BS 5228 Noise Control on Construction and Open Sites.

The following measures should be implemented to minimise the generation of noise and vibration:

- Use of acoustic silencers on equipment;
- Regular maintenance of plant;
- Unloading and loading of material within designated areas;
- Radio controlled lorry movements to avoid unnecessary vehicles on site; and
- Liaison with neighbours in conjunction with the employer's agent.

1.3 Oils Fuels and Chemicals

Oils, fuel and chemical storage facilities should be designed with regard to Environment Agency (EA) Pollution Prevention Guidelines (PPG). Best practices with regard to controlling pollution and spillages include (but are not limited to) the following:

- Designated facilities specially designed for the storage of fuels and oils in accordance with PPG2;
- An oil, chemical and product inventory for the site;
- Site drainage plans;
- Emergency procedures;
- Use of drip trays beneath stationary plant;
- Keeping plant well maintained;
- Site induction for all personnel on emergency procedures;
- Contact list of emergency services, water suppliers, EA, Local Authority (LA) and the Health and Safety Executive (HSE); and,
- Emergency response equipment (provision of adequate spill kits on-site and competent emergency response staff).

Bunded areas should comprise at least 110% of the total storage capacity. For smaller storage volumes, the volume of the largest container should be catered for.

The storage, itinerary, and use of hazardous materials on-site will be conducted in accordance with the Control of Substances Hazardous to Health (COSHH) regulations 2002. In accordance with COSHH, records held of all hazardous materials on-site will be maintained by the Contractor. The Contractor is responsible for the completeness and accuracy of all records held.

APPENDIX F – CONSULTATION WITH REGULATORS

Tom Smith

From: Jarvis, Ross <Ross.Jarvis@reading.gov.uk>
Sent: 03 August 2016 16:23
To: Tom Smith
Cc: Wilson, Jodie
Subject: RE: Green Park Village | Asbestos Impacts in Soils in Phase 5

Hi Tom,

I have taken an initial look at the measures that have been proposed to control contaminants of concern at the site. Prior to the submission of the full documentation I can agree in principle that the measures outlined should adequately protect the health and wellbeing of site workers and future users of the site.

Regards

Ross

Ross Jarvis
Senior Technical Officer
Environmental Protection & Nuisance | Department of Environment & Neighbourhood Services

Reading Borough Council
Civic Offices
Bridge Street
Reading
RG1 2LU

0118 937 2314 (72314)

[Website](#) | [Facebook](#) | [Twitter](#) | [YouTube](#)



From: Tom Smith [mailto:thomas.smith@ramboll.co.uk]
Sent: 03 August 2016 14:58
To: Jarvis, Ross
Cc: Wilson, Jodie
Subject: FW: Green Park Village | Asbestos Impacts in Soils in Phase 5

This is an EXTERNAL EMAIL. STOP. THINK before you CLICK links or OPEN attachments.

Ross,

Thanks for your time this morning.

As discussed we have recently undertaken ground investigation works in Phase 5 at Green Park Village (application ref 10/01461/OUT). As part of these works we encountered the following contaminants of concern:

- ☐ Visibly discrete fragments of asbestos containing materials were found in the majority of the site soils, typically comprising single to multiple cement-bound asbestos containing materials (sheet and pipe materials) and 3No. occurrences of asbestos insulation board materials.
- ☐ Asbestos fibres within the soil matrix across the majority of the phase. Typically comprising loose fibres, cement type/ bitumen ACMs, insulating and lagging materials (47% of samples containing asbestos). % w/w concentrations range from <0.001% to 0.557% w/w.
- ☐ Localised minor impacts of benzo(a)pyrene and lead within Made Ground soils. B(a)P and lead concentrations are typically within one order of magnitude of the GAC.
- ☐ Isolated impact of aromatic TPHs within drain effluent impacted Made Ground soil.

At this stage we are yet to complete an assessment of the ground gas regime or groundwater quality and this will follow in due course.

Based on the occurrence of these contaminants we are preparing a remediation strategy that is currently being finalised. This will be submitted shortly but as groundworks are due to start on the 10th August we wanted to send through the outline of this strategy for your comments to expedite the approvals process.

As part of the development in this area the main construction activities that will be undertaken will comprise:

- ☐ Turnover of the entirety of the Made Ground in Phase 5 (west of the ditch – see Figure 2) to clear obstructions/concrete ahead of foundations/ground improvement via Vibro-Stone Columns;
- ☐ Removal of oversize/concrete for crushing to be re-used onsite subject to chemical testing; and
- ☐ Re-use and compaction of asbestos impacted Made Ground within Phase 5; and

In the final developed state the risks to end users and maintenance workers will be mitigated through the following design measures:

- ☐ Levels within the phase are to be raised by approximately 1 to 1.5m as part of filling for flood alleviation. Filling is being undertaken under a bespoke environmental permit ref EPR/DB3206HL (re-use of inert waste in construction). This fill thickness will sufficiently act as the clean cover system and will be topped off with chemically suitable topsoil and subsoil. Due to thickness of fill above the impacted soils it is not anticipated that a no dig layer or demarcation layer will be required; and
- ☐ A series of clean service corridors will be created in the main spine roads with Phase 5 to ensure future maintenance workers do not come in contact with asbestos impacted soils at depth.

During the course of earthworks the following control measures will be adopted over and above that which would be “normally anticipated” for earthworks:

- ☐ Increased PPE/RPE including washable boots, Type 5/6 overalls, FFP3 respirators and face fit certification for all operatives entering the “dirty” work area.
- ☐ Personal and reassurance air monitoring during all instructive works with impacted soils;
- ☐ Dust suppression during all intrusive works;
- ☐ Establishment of clean/dirty working area's with use of decontamination units and decontamination of equipment / plant leaving the work area; and
- ☐ Watching brief role by appropriately competent persons to manage ‘day to day’ aspects of the site works e.g. reviewing site practise and air monitoring data, identify any unearthed asbestos materials etc.

Would you be able to review the above and provide comment please? As mentioned on the phone I appreciate that no formal approval can be granted until the final documentation is submitted but as earthworks are due to commence shortly we would seek an approval in principal at this stage.

If you need to discuss anything further I am available on the no. below.

Kind Regards
Tom Smith

BSc (Hons) FGS CGeol CSci EurGeol
Principal Consultant
Environment & Health

D +44(0)791 867 8240
tom.smith@ramboll.co.uk

Connect with us  

Ramboll Environ
Carlton House
Ringwood Road
Woodlands
Southampton
SO40 7HT
United Kingdom
www.ramboll-environ.com



Ramboll UK Limited Registered in England & Wales Company No: 03659970
Registered office: 240 Blackfriars Road, London SE1 8NW

Click [here](#) to report this email as spam.

The information in this e-mail is confidential to the intended recipient to whom it has been addressed and may be covered by legal professional privilege and protected by law. Reading Borough Council does not accept responsibility for any unauthorised amendment made to the contents of this e-mail following its dispatch.

If received in error, you must not retain the message or disclose its contents to anyone. Please contact the sender of the email or mailto: customer.services@reading.gov.uk, quoting the name of the sender and the addressee and then delete the e-mail.

Reading Borough Council has scanned for viruses. However, it is your responsibility to scan the e-mail and attachments (if any) for viruses.

Reading Borough Council also operates to the Protective Document Marking Standard as defined for the Public Sector. Recipients should ensure protectively marked emails and documents are handled in accordance with this standard (Re: Cabinet Office – Government Security Classifications).