LK CONSULT LIMITED

PART OF THE LK GROUP

LAND AT GATEACRE GARDEN CENTRE LIVERPOOL

GEO-ENVIRONMENTAL INVESTIGATION AND RISK ASSESSMENT

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EXECUTIVE SUMMARY

Site Details	This report was undertaken in support of a future planning application for the redevelopment of the site for a residential end use. The site is located at National Grid Reference 342520E 387560N, east of Acrefield Road in the Gateacre area of Liverpool.
Previous Work	A preliminary risk assessment has previously been undertaken on the study site. The site was historically a nursery and currently a garden centre. Contamination relates to potential pesticides and heavy metals from use as a nursery, made ground on-site relating to ash and clinker (metals, PAHs and sulphate) and asbestos from former building structures on site. The conceptual model identified four potential pollutant linkages.
Ground Investigation	The investigation comprised the drilling of 21no. window sample boreholes and the excavation of one hand dug trial pit. 29no. representative soil samples were taken during the site investigation and selected for chemical contamination analysis. In addition, 6no. samples were scheduled for leaching tests.
Ground Conditions	The ground conditions beneath the site comprised made ground underlain by natural gravelly sand and / or sandy gravelly clay. These natural strata are underlain by shallow sandstone bedrock.
Conceptual Site Model	Three pollutant linkages have been identified for the site, relating to risks from direct contact of arsenic and lead in soils, sulphate attack on concrete and risk to potable water supplies. A further linkage remains possible pending a watching brief in the former pond area.
Soil Risk Assessment & Recommendations (Human Health)	Elevated arsenic and lead have been identified in the soils (WS107 and WS204 – located on the central southern part of the site) which will require remediation. It is recommended that United Utilities are contacted as there is a potential requirement for Protectaline water pipes.
Controlled Waters Assessment & Recommendations	Four slightly elevated lead concentrations are not considered to pose a significant risk to controlled waters.
Gas Risk Assessment & Recommendations	Possible pond on site may pose localised risk of hazardous gas and a watching brief should be maintained in this area during development works.
Preliminary Geotechnical Assessment & Recommendations	Possible sulphate resistant concrete required in the northwestern part of the site if concrete is laid in contact with the made ground (WS103, TH201 and WS208). Foundation zoning plan to be provided on receipt of Atterberg limits data.
Further Work	Determination of option for remediating arsenic and lead hotspots. Validation of any imported material. Watching brief in area of former pond. Details of protective potable water supply pipe work should be documented if required. A Completion/Validation Report detailing all validation work should be provided to the Local Authority. Once this has been approved any contamination conditions can be discharged.

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1 INTRODUCTION

1.1 Background

LK Consult Ltd (LKC) has been commissioned by Macbryde Homes Ltd to carry out a geo-environmental investigation and risk assessment for land at Gateacre Garden Centre, Liverpool. The investigation was undertaken in support of a future planning application for the redevelopment of the site for residential dwellings. Information is therefore required on the properties of any potential contaminants that may be present in, on or under the site.

A Preliminary Risk Assessment (PRA) report (Ref: LKC 14 1086-0 R0, dated April 2014) and Geoenvironmental Investigation and Risk Assessment report (Ref. LKC 14 1086-02 R0, dated April 2014) have previously been undertaken by LKC. The PRA report is summarised in Section 2. This report should be read in conjunction with these previous reports.

The Geoenvironmental Investigation and Risk Assessment report recommended further work was undertaken on site once access was possible. The data from the previous investigation is provided and assessed alongside data from this phase of works, to provide an overarching assessment of site conditions.

Macbryde Homes Ltd has received permission to utilise the previous data in this assessment.

1.2 Site Details

A summary of site settings is presented in Table 1-1. Figures 1 and 2 indicate the site location and boundary and Figure 3 indicates the proposed layout.

Location	East of Acrefield Road in the Gateacre area of Liverpool. National Grid Reference 342520E 387560N.
Area	5500m^2.
Topography	57 metres above ordnance datum (AOD) in the west to 44m AOD in the east.
Land Use	Site Hardstood tarmac and concrete ground across the entire site, bounded by wooden fencing. Surrounding Area North, East, South and West: Residential Properties. Acrefield Road adjacent to the western site boundary.
Proposed Development	10 no. detached dwellings.

Table 1-1. Summary of site details for land at Gateacre Garden Centre, Liverpool.

2 PREVIOUS WORK

2.1 Summary of Existing Information

A PRA report (Ref: CL-602-LKC14 1086-01 R0, dated April 2014) has previously been undertaken by LKC.

The report comprised a review of factual information sources such as site history via historical mapping, geology, hydrogeology and an Envirocheck search. A preliminary contamination conceptual model was provided which identified several potential pollutant linkages. A summary of the available information is provided below along with the preliminary conceptual model.

2.2 Site History

The site history is summarised in Table 2-1.

Site Features	**Location**	**Map Dates Present**	**Comments**
Possible small pond	W	1893-1894	-No longer present by 1907 mapping.
Nursery	Whole site	1927-2014	-Building present in north-eastern corner. -Access track added to centre of site by 1937 mapping. -Glass houses present on site by 1952 mapping. -Annotated as Acrefield Nursery from 1961 mapping. -Annotated as Garden Centre from 1993 mapping. -Some glass houses have been removed by 1993 mapping.
Surrounding Area Features	**Distance/ Location**	**Map Dates Present**	**Comments**
Acrefield Road	Adj. W	1849-2014	
Garden of residential dwelling	Adj. N	1849-2014	
Possible mound	50m SW	1893-1956	-No longer present by 1961 mapping.
Cutting	130m SW	1893-1956	-No longer present by 1951 mapping.
Cutting	80m S	1893-1982	-No longer present by 1993 mapping.
Cutting	80m N	1893-1982	-No longer present by 1993 mapping although level difference remains indicated.
Cutting	160m E	1893-2014	
Cutting	60m WNW	1907-1938	No longer present by 1952 mapping.
The Brae	Adj. N	1927-2014	
Orchard	30m E	1927-1938	-No longer present by 1952 mapping.
Cutting	10m NW	1937-1938	-No longer present by 1952 mapping
Unreferenced building	Adj. S	1952-2014	-Annotated as Cherryvale from 1961 mapping.

Table 2-1: Summary of significant historical features; surrounding area features include significant potentially contaminative features within 100m of the site or 250m of the site if a potential landfill (i.e. a possible source of landfill gas) is identified.

Surrounding Area Features	Distance/ Location	Map Dates Present	Comments
Nursery	Adj. S	1952-1974	-No longer present by 1982 mapping.
Bowling Green	Adj. E	1952-1953	-No longer present by 1956 mapping.
Virgo Potens Hospital	70m N	1952-1974	-Annotated as Gateacre Grange by 1978 mapping.
Grange Nursery	70m N	1961-1965	-No longer present by 1968 mapping.
Warehouse	90m E	1968-2014	
Residential dwellings	Adj. E	1974-2014	
Residential dwellings	Adj. S	1974-2014	
Hunts Cross Avenue	Adj. S	1974-2014	

Table 2-1 (continued): Summary of significant historical features; surrounding area features include significant potentially contaminative features within 100m of the site or 250m of the site if a potential landfill (i.e. a possible source of landfill gas) is identified.

2.3 Environmental Setting

The environmental setting is summarised in Table 2-2.

Summary of Environmental Setting			
Geology	Superficial		-Till on eastern part of site. No drift recorded on western part.
	Bedrock		-Chester Pebble Beds -Wilmslow Sandstone Formation to the east.
	Faulting		-None within influencing distance.
	BGS logs		-2 within 250m located 203m and 220m NE. -Nearest SJ48NW14 203m NE. Soil to 0.8m, brown clay to 2.18m, brown sand with occasional pebbles to 4.57m, clay and sand to 8.53m, sandstone with bands of clay to 10.06m, red sandstone with soft bands to 76.2m).
Hydrogeology	Aquifer Designation	Superficial	-Unproductive.
		Bedrock	-Principal Aquifer.
	Groundwater abstractions		-1 within 250m. Located 172m NE for manufacturing. The licence has been revoked.
Hydrology	Nearest surface water		-Drain 710m E.
	Flooding		-No risk from rivers or the sea.
	Surface water abstractions		-None within 1km.
	Discharge consent		-None within 1km.
	Pollution Incidents		-None within 500m.
Mining	Coal Mining Referral Area		-Standing Advice.
	Coal Report		-Not within likely zone of influence from past underground coal workings. -No shafts present within 20m of the site.
	Ground Stability		-Very low to no hazard of ground instability.
	Mineral Abstraction		-None within 250m.
Landfill sites (within 250m)	Known/Registered		-None within 250m.
	Potential		-4 cuttings located 10m to 130m from site. Nearest potentially infilled by 1952 mapping.
Radon			-Probability of <1% of homes above Action Level. -No further action required.
Designated Sites			-Site within Nitrate Vulnerable Zone.
Contemporary Trade Directory			-4 within 250m, nearest 57m SW (tyre dealers listed as inactive).

Table 2-2: Summary of the environmental settings for land at Gateacre Garden Centre, Liverpool.

2.4 Site Reconnaissance

A site reconnaissance of the study site area was carried out by LKC on the 18th March 2014. The site was accessed off Acrefield Road via a gated driveway along the west site boundary. The site is currently used as a garden centre with associated car park. The site was observed to be sloping downwards towards the east.

The western and southern areas of the site were used as a car parking area, with the north and east comprising the garden centre building, planting and storage area.

The garden centre area comprised the following:

- Raised flower beds.
- Wooden out-houses / sheds storing garden supplies / materials.
- Storage areas for plant potting/flowering/construction materials.
- Trolley storage and garden furniture areas.
- Large metal storage containers and gas canisters.
- Pesticides / Herbicides.
- Domestic appliances, such as fridge-freezers, cooling trays.

The ground across the study site was observed to be hard surfaced with tarmac and concrete across the majority of the site. A small area of bare ground was present on the south-eastern part of the site. The site was bounded by wooden fencing and large conifer trees. Several manhole covers were observed across the site surface. No fuel stains or leakages were apparent within the car parking area.

2.5 Preliminary Contamination Conceptual Model

The preliminary contamination conceptual model using contaminant-pathway-receptor linkages based on guidance in CLR11[1] has been summarised in Table 2-3. This is based on the premise that if there is no pollutant linkage then there will be no risk to the receptor. The site will follow a Residential land use scenario.

A summary of contamination sources are as follows:

- Demolition of structures and land raising using ash and clinker – heavy metals, PAHs, asbestos (ACM).
- Nursery - Pesticides and heavy metals, such as arsenic and lead, which were historically used in pesticides.
- Former pond – hazardous gas (primarily carbon dioxide and methane).

[1] EA (2004). "Model Procedures for the Management of Land Contamination." R&D Publication CLR 11.

A summary of possible pathways are as follows:

- Human Health - ingestion (of soil, dust, home produce), inhalation (of dust, fibres, vapours), dermal contact (of soils and dust).
- Controlled Waters: Migration of mobile contaminants through permeable strata or through preferential pathways.
- Building and Services: Direct contact.
- Flora: Root uptake.

A summary of possible receptors are as follows:

- Human Health: Future site residents.
- Controlled Waters: Underlying Principal Aquifer. Surface water is not considered a potential receptor due to its distance from the site.
- Buildings and Services: Hazardous gas and organic/corrosive contaminants that could affect integrity of building materials and service pipes.
- Flora: Within future gardens.

It should be noted that there may be risk from short term exposure from contaminated soil to site workers. The Preliminary Contamination Conceptual Model deals with long term exposure to key receptors. Acute risks can be easily mitigated by good environmental management of the site during site works. Standard health and safety precautions (as per HSE guidance[2]) should be adopted by all workers involved with site enabling and construction works. Therefore, this receptor is not considered in the contamination conceptual model.

Seven generic potential pollutant linkages have been identified for the study site. Each linkage is described along with an assessment of the risk based upon guidance on probabilities and consequences outlined in CIRIA C552[3].

This conceptual model is based upon contaminant-pathway-receptor pollutant linkages, on the premise that if there is no pollutant linkage then there will be no risk to the receptor[4].

In order to assess the potential risk for each pollutant linkage, an assessment of the magnitude of the potential consequence (severity) of the risk occurring and the magnitude of the probability (likelihood) of the risk occurring has been considered and classified. This

[2] HSE (1991). "Protection of workers and the general public during development of contaminated land" London HMSO.
[3] CIRIA (2001). "Contaminated land risk assessment: A guide to good practice". C552.
[4] EA (2004). "Model Procedures for the Management of Land Contamination." R&D Publication CLR 11

is based on the guidance provided in CIRIA C552 and further details including a risk matrix is provided in Appendix A.

Where LKC identifies a moderate or higher risk intrusive work or precautionary remedial measures will be recommended. Where there is a moderate/low risk an assessment will be undertaken to establish what category the pollutant linkage will fall into.

Pollutant Linkage	Pathway	Receptor	Contaminant (source)	Probability	Consequence	Risk	Assessment
PL1	– Dermal contact. – Inhalation of soil and dust. – Ingestion of soil and dust.	– Future residents	-Heavy metals, PAHs and pesticides (whole site).	Likely	Medium	**Moderate**	– Probability: Considered a likely probability for heavy metals, PAHs and pesticides. Considered low for ACM as significant quantities not anticipated. – Recommendation: An intrusive investigation across the site.
			-Possible ACM (former buildings / structures).	Low	Severe	**Moderate**	
PL2	– Inhalation of vapours. – Migration through permeable strata and preferential pathways.	– Future residents	– Volatile Contaminants (made ground).	Unlikely	Medium	**Low**	– Probability: Considered low as a significant source has not been identified. – Recommendation: Watching brief during site investigation and development.
PL3	– Inhalation of gas. – Migration through permeable strata and preferential pathways. – Explosion in confined spaces.	– Future residents – Buildings – Offsite land users	– Methane, Carbon Dioxide & Trace Gases. (made ground)	Low	Severe	**Moderate**	– Probability: Low localised possibility in area of former pond. Recommendation: Further assessment once ground conditions are known.
PL4	– Surface run-off. – Migration through permeable strata and preferential pathways – Perched waters migration.	– Groundwater.	– Pesticides (whole site)	Likely	Mild	**Moderate / Low**	– Probability: Considered likely associated with nursery use. – Risk: Moderate. – Recommendation: Further assessment on risk of pesticides on completion of soil analysis.
PL5	– Sulphate attack on concrete.	– Building structure	– Sulphate (made ground on site).	Likely	Mild	**Moderate / Low**	– Probability: Considered likely associated with potential ash and clinker materials. – Risk: Considered low as significant quantities not anticipated. – Recommendation: Limited sampling.
PL6	– Ingestion of tainted water supply.	– Future residents	– PAHs (whole site) – Petroleum hydrocarbons.	Likely	Medium	**Moderate / low**	– Probability: Considered likely in for PAHs associated with nursery land use. – Risk: moderate. – Recommendation: Further assessment on completion of site investigation. Standard PE pipe can be placed in natural strata.
PL7	– Direct Contact (plant uptake).	– Flora	– Inorganic (whole site).	Low	Minor	**Very Low**	– Probability: Considered unlikely as no evidence of vegetation stress identified during the study area reconnaissance. – Recommendation: No investigation required at this stage.

Table 2-1: Preliminary Contamination Conceptual Model for land at Gateacre Garden Centre, Liverpool

3 GROUND INVESTIGATION

3.1 Site Investigation Design and Methodology

In order to assess the ground conditions at the site and to investigate the potential pollutant linkages identified in the preliminary contamination conceptual model intrusive investigation was undertaken in two phases.

The first phase of investigation was carried out on 18th and 19th March 2014 in the accessible areas around the current buildings and structures. The site investigation comprised the following:

- Drilling of 12no. window sample boreholes to depths of between 0.82mbgl and 2.45mbgl (referenced WS101 to WS112).
- Standard Penetration Tests (SPTs) approximately every 1m in natural strata.
- Installation of two boreholes (WS102 and WS105).
- Head space samples were collected for onsite testing using a Photoionisation Detector (PID) and further soil samples were collected for laboratory chemical analysis.

The second phase of works was undertaken on the 15th and 16th October 2014 and concentrated on those areas of the site which were previously inaccessible. The site investigation comprised the following:

- Drilling of 9no. window sample boreholes to depths of between 0.99mbgl and 2.43mbgl (referenced WS201 to WS209).
- Standard Penetration Tests (SPTs) approximately every 1m in natural strata.
- Installation of five boreholes (WS202, WS204, WS206, WS207 and WS209).
- Excavation of one hand dug trial hole to a depth of 0.85mbgl (referenced TH201).
- Head space samples were collected for onsite testing using a Photoionisation Detector (PID) and further soil samples were collected for laboratory chemical analysis.

All borehole locations are shown in Figure 4 (current layout) and Figure 5 (proposed layout).

The sampling points were undertaken to give good site coverage across open areas and within the footprint of former buildings and also to target the location of the former pond

(WS101, WS103 and WS207) in an approximate herringbone pattern. The investigation was undertaken in line with BS10175[5].

All profile logs are provided in Appendix B and are in line with BS14688-1[6].

3.2 Well Installations

Seven boreholes were installed with monitoring wells for groundwater monitoring and groundwater sampling. Monitoring wells were installed in accordance with BS10175 and CIRIA C665[7] and generally comprised approximately 0.5m plain pipe over a length of slotted pipe surrounded by pea gravel and sealed at the top with bentonite and concrete.

The response zones for the window sample boreholes were installed along the entire length of the borehole.

Well installation details are provided in the Profile Logs in Appendix B.

3.3 Sampling Protocol

3.3.1 Soil Sample Collection

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation[8].

Soil was collected for onsite testing. A plastic zip bag was half filled with soil allowing a suitably sized headspace. The bag was sealed and stored for at least 20 minutes before being tested for total volatile organic compounds using a TVA-1000 photoionisation detector (PID). Results of the PID readings are presented on the profile logs (Appendix B). The on-site monitoring was carried out in line CIRIA C665[9] and C682[10] to aid in screening samples for volatile analysis.

Soil samples of approximately 500g were recovered in amber jars, amber vials for volatile analysis and plastic tubs. All the samples were labelled and stored in cool boxes prior to being collected by courier at the end of the day for delivery to the Chemtest laboratory in Newmarket. If collection was not possible the same day then samples were stored in the

[5] British Standard (2011). "Investigation of Potentially Contaminated Sites – Code of Practice." BS10175:2011
[6] British Standards (2002) Geotechnical investigation and testing – Identification and Classification of Soil. Part 1: Identification and description. BS EN ISO 14688-1:2002
[7] CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665
[8] EA (2000). "Technical Aspects Of Site Investigation. Volumes 1 & 2 Text Supplements Research and Development Technical Report." P5-065/Tr.
[9] CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665
[10] CIRIA (2009). "Investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination" CIRIA C682.

sample storage fridge at the LK Group offices below 4˚C. Samples were tracked using appropriate Chain of Custody forms provided by Chemtest.

Representative soil samples taken during the site investigation and were selected for chemical and geotechnical testing. Six samples were also subjected to leaching tests. Table 3-2 shows the testing undertaken.

The majority of soil samples were taken from the made ground to represent likely worst case site conditions. Six samples of natural strata were also analysed (WS107, 0.7-0.9m, WS109, 0.3-0.8m, WS110 0.3m, WS111, 0.1-0.5m, WS205, 0.3-0.5m and WS207, 0.3-0.5m).

It should be noted that hexavalent chromium soil is analysed using the USEPA recommended method of alkaline leach. This method limits chromium (VI) reduction to chromium (III)[11].

Many of the tests are UKAS or MCERTS accredited and further details are given in the Certificate of Analysis presented in Appendix C. The soil risk assessment is presented in Section 6.2 and the controlled waters risk assessment is presented in Section 6.3.

3.3.2 Geotechnical Testing

In-situ geotechnical tests were performed in the boreholes to further characterise the sub-soil conditions. In total, twenty-nine Standard Penetration Tests were performed on the underlying sub-soils.

During the first phase of works two Atterberg Limits tests were undertaken on selected clay samples to ascertain the risk of shrinkability from trees. In addition, two sand samples were subjected to particle size distribution testing. These tests were undertaken at Murray Rix Laboratories in Stockport. Certificates of analysis are presented in Appendix D.

Three further clay samples have been collected from the second phase of works and have been submitted for Atterberg Limits and pH and water soluble sulphate testing. The results are pending and will be reported under separate cover.

[11] Palmer, CD and Roberts, WP (1994). “Natural Attenuation of Hexavalent Chromium in Groundwater and Soils.” EPA Issue EPA/540/5-94/505.

3.3.3 Summary of Analysis Suites

A summary of analysed soil and water samples are presented in Table 3-2.

Sampling Suites			No. Soil Samples	No. Leaching Samples
Heavy Metals / Metalloids	Arsenic	Lead	26	6
	Cadmium	Mercury		
	Chromium (total)	Nickel		
	Copper	Selenium		
	Zinc	Chromium (VI)		
	Vanadium			
Inorganic	Bulk Asbestos Analysis		26	-
	Free Cyanide		7	3
	Total Cyanide	Water Soluble Boron	7	3
	PAH 16 (speciated)		26	6
	Combined pesticide suite		7	-
	Phenols (total)		7	3
	TPHCWG		7	3
	BTEX & MTBE			
General	pH		29	6
	SOM		29	-
	Particle Size Distribution		2	-
	Atterberg Limits		5	-
	Hardness		-	6

Table 3-2: Contamination Sampling Suites for land at Gateacre Garden Centre, Liverpool.

4 GROUND CONDITIONS

4.1 Summary of Ground Conditions

The ground conditions beneath the site comprised tarmac over made ground underlain by natural strata comprising gravelly sand and sandy gravelly clay.

These natural strata are underlain by shallow sandstone bedrock. The upper part of this strata was weathered which allowed penetration by the window sample borehole and the SPT sampler and was recovered as sand and gravel. A summary of typical ground conditions are detailed below in Table 4-1.

Depth to Top of Strata (mbgl)	Depth to Base of Strata (mbgl)	Thickness of Strata (m)	Description
0.0 to 0.2	0.0 to 0.75	0.1 to 0.75	**MADE GROUND 1:** Dark brown, very gravelly sand with ash, clinker, coal and brick fragments, tarmacadam gravel and rare roots. Gravel is fine to medium, sub-rounded to angular. Construction sub-base between 0.10-0.75mbgl, only evident in WS101, WS105 and WS107, WS204, WS206, WS207, WS209.
0.0 to 0.5	0.3 to 0.9	0.3 to 0.6	**MADE GROUND 2:** Brown sandy gravelly clay with ash, clinker, brick, coal and pottery. Only evident in WS107, WS108, WS201, WS202, WS204, WS206, WS209. Frequent ash noted in WS107 and WS204.
0.3 to 0.75	1.0 to 2.20	0.4 to 1.6	**SAND:** Medium dense, brown, clayey gravelly SAND with occasional coal fragments and frequent sandy clay lenses. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular. Becomes more clayey with depth. Evident in WS101, WS102, WS103, WS104 and WS106.
0.3 to 1.0	0.5 to 2.0	0.3 to 1.4	**CLAY:** Firm to stiff consistency, high strength, brown, very sandy gravelly CLAY with occasional coal fragments and rare rootlets. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular. Evident in WS104, WS105, WS107, WS110, WS111, WS112, WS203, WS204, WS205, WS207, WS208, WS209 and TH201.
0.3 to 2.2	>2.45+	0.11 to >1.15	**SANDSTONE:** Strong red fine grained weathered sandstone. Recovered as sand and gravel until refusal. Evident in all boreholes.

Table 4-1: Summary of ground conditions for land at Gateacre Garden Centre, Liverpool.

4.2 Groundwater

No groundwater strikes were recorded during the drilling works.

4.3 Vapour Assessment

LKC undertook an assessment using the PID on selected soil strata (<1.0 to 2.45mbgl) to screen soils for analysis. The results are summarised in Table 4-2 (TVOC readings from soil samples). The soil PID results are also presented on all the LKC profile logs in Appendix B.

It should be noted that PID is at best a semi-quantitative screen for TVOCs. In soils heterogeneity can cause large variations in readings, where pockets of hydrocarbon impacted soils may not represent the whole strata. However, it is useful to confirm what olfactory and visual evidence has observed. The actual concentrations in parts per million (ppm) are only indicative of TVOCs and should only be used to state one soil sample has a higher reading of TVOCs than another sample, since actual concentration will differ depending upon the composition of volatiles measured.

BH	Depth (mbgl)	PID (ppm)	Depth (mbgl)	PID (ppm)	Depth (mbgl)	PID (ppm)
WS101	0.4	0	-	-	-	-
WS102	0.1-0.6	0	0.6-1.3	0.1	-	-
WS103	0.5	0	1.1	0.1	-	-
WS104	0.1-0.6	2.0	0.6-1.0	0	1.0-1.5	0.1
WS105	0.4	0.7	0.8	0	-	-
WS106	0.1-0.3	0	0.3-1	0	-	-
WS107	0.2	0	0.7-0.9	0	-	-
WS108	0.1-0.3	0.1	0.3-0.7	0	-	-
WS109	0.1-0.3	0.2	0.3-0.8	0.1	-	-
WS110	0.3	0	0.3-0.7	0	-	-
WS111	0.1-0.5	0	-	-	-	-
WS112	0.1-0.2	0	0.5-0.8	0	-	-
WS203	0.3	0.9				
TH201	0.5	0.1				

Table 4-2: Summary of soil vapour screening results for land at Gateacre Garden Centre, Liverpool.

The low concentrations of vapours encountered across all samples would appear to corroborate visual and olfactory evidence indicate an absence of significant volatile contamination in the soils on the study site.

5 GEOTECHNICAL APPRAISAL

5.1 Standard Penetration Tests

Twenty-nine in-situ standard penetration tests (SPTs) were undertaken, all of which were in the natural ground. The results are summarised in Table 5-1 below and provided within the profile logs in Appendix B.

Borehole	0.6-1.0 mbgl	1.5-2.0 mbgl
WS101	24 (S)	50 (SS)
WS102	1 (S)	42 (SS)
WS103	4 (S)	50 (SS)
WS104	29 (S)	50 (SS)
WS105	32 (C)	50 (SS)
WS106	50 (SS)	-
WS107	50 (SS)	-
WS108	50 (SS)	-
WS109	50 (SS)	-
WS110	50 (SS)	-
WS111	50 (SS)	-
WS112	50 (SS)	-
WS201	50 (SS)	-
WS202	14 (SS)	50 (SS)
WS203	50 (SS)	-
WS204	50 (SS)	-
WS205	50 (SS)	-
WS206	50 (SS)	-
WS207	21 (C)	50 (SS)
WS208	50	-
WS209	4 (C)	50 (SS)

Table 5-1: Summary of SPT (N) values recorded for land at Gateacre Garden Centre, Liverpool.
S=Sand; C=Clay; Sandstone (SS)

5.2 Concrete Specification

Water soluble sulphate and pH tests were carried out on soil and leaching test samples. Full results are presented in Appendix C.

The concentrations of soluble sulphate in the made ground when contrasted to BRE Digest 2005[12] categorise the concrete requirement as DS-2 AC-1s in the area of WS103, TH201 and WS208. These locations are in the northwestern part of the site.

[12] BRE (2005)."Concrete in Aggressive Ground." Special Digest 1.

5.3 Particle Size Distribution

Particle size distribution (PSDs) tests were carried out on two samples logged in the field as clayey sand / sand. Full results are presented in Appendix D and summarised below in Table 5-2.

Sample	Depth (mbgl)	Material	Percent passing through sieve		
			50mm	2mm	0.063mm
WS103	1.1	Clayey slightly gravelly sand.	100	93	43
WS109	0.3-0.8	Weathered sandstone.	87	57	25

Table 5-2: Summary of Particle Size Distribution results for land at Gateacre Garden Centre, Liverpool.

5.4 Atterberg Limits and Moisture Content

Five representative samples of natural clay (WS104 1.0-1.5m, WS107 0.7-0.9m, WS203 0.5-0.6m, WS204 0.5-0.7m and WS208 0.6-0.8m) were subjected to Atterberg Limits and Moisture Content testing. The results of two samples are provided in Appendix D and summarised in Table 5-3.

Chapter 4.2 of the NHBC standards gives guidance on building near trees and indicates a modified plasticity index should be calculated prior to consideration of the type of adjacent trees, height and water demand. The above factors can then be used to select an appropriate foundation depth.

The modified plasticity index (I'p) as stipulated in NHBC Chapter 4.2-D5 is given by the formula:

I'p = plasticity index (Ip) x % less than 425µm sieve / 100%

Sample Ref. and depth	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)	Modified Plasticity Index (%)
WS104 1.0-1.5m	11	31	13	18	98	17.64
WS107 0.7-0.9m	17	33	14	19	90	17.1

Table 5-5: Summary of moisture content and plasticity index testing for land at Gateacre Garden Centre, Liverpool.

The modified plasticity index is between 17.1% and 17.64%. This characterises the clay in these samples as having a low volume change potential.

Further samples results are due and will be provided under separate cover.

5.5 Foundation Solution Options

No foundation loads for the proposed new buildings on the site have been provided, however buildings are proposed across the site, therefore all profile logs are considered relevant.

Sandstone bedrock is relatively shallow across the site at between 2.2m in the west to 0.3 in the eastern part.

Generally LKC consider the underlying sandstone is the appropriate founding strata for the site and traditional strip footings or trench fill foundations can be utilised dependent upon depth to bedrock.

In the western part of the site where there is some overlying dense sand /stiff clay has been identified which is likely to provide an allowable bearing pressure of 150kN/m^2. Therefore strip footings may be possible in this area. However, areas of likely lower strength soils were noted, including loose sand in WS102 and WS103 and soft clay in WS208 and WS209. Therefore deeper foundations to the sandstone or an alternative solution such as vibro piles (subject to a feasibility assessment due to clay) are likely to be required in these areas. This may also minimise the risk of differential settlement.

Sulphate resistant concrete is required where it is to be laid in contact with the made ground in the areas of WS103, TH201 and WS208.

A foundation zoning plan will be provided on receipt of the outstanding Atterberg limits data. This may need to make recourse to possible heave precautions and an arboricultural assessment.

Further advice from a suitably qualified structural engineer should be sought.

6 GENERIC RISK ASSESSMENT

6.1 Introduction

Current good practice requires that the findings from a site investigation should be evaluated on a site specific basis, using a risk based approach. Risk assessment involves identification and evaluation of the hazards presented by the concentrations of contaminants measured followed by an evaluation of the risks which are associated with these hazards (CLR11[13]). Information gathered from the risk assessment has been collated in the revised contamination conceptual model in Section 6.6.

6.2 Soil Risk Assessment

LKC compared all available soil data to Soil Guideline Values (SGVs) or new Category 4 Screening Levels (C4SLs)[14,15]. The recent change to the contaminated land guidance has changed the evaluation of risk from 'minimal' (SGVs) to 'low' (referred to as Lowest Level of Toxicological Concern (LLTCs).

Unfortunately, there are only a select number of new SGVs and C4SLs currently available and therefore, where there are no SGVs or C4SLs, ATRISK Soil Screening Values (SSVs) have been used as screening values. These have been generated using the CLEA V1.06 model[16] based on 1% and 6% SOM and are considered scientifically robust and conservative. All these criteria now follow current UK methodology[17,18,19,20].

The site will follow a residential with home-grown produce land use scenario. A summary of the ATRISK SSVs (Revision 3 for 1 % SOM and Revision 5 for 6% SOM from 2011) and CSL4 criteria are provided in Appendix E.

For ATRISK SSVs where contaminants (such as PAHs) are above the lowest aqueous or vapour saturation limits by <10% the combined values have been used, as per the EA CLEA user manual where no free product has been observed.

[13] EA (2004). "Model Procedures for the Management of Land Contamination." R&D Publication CLR 11.
[14] Defra (2014). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Policy Companion Document."
[15] CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."
[16] EA (2008). "CLEA Software (Version 1.05) Handbook." Science Report – SC050021/SR4.
[17] EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.
[18] EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.
[19] EA (2008). "A Review of Body Weight and Height Data used within the Contaminated Land Exposure Assessment Model (CLEA)." Project SC050021/Technical Review 1.
[20] EA (2009). "Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values." Science report SC050021/SR7.

ATRISK derived values for volatile petroleum hydrocarbons take into account the conservative nature of the J&E model, as described in the /SR3 report (10 to 100 times overestimation for petroleum hydrocarbons[21]) by applying a 10x sub-surface soil to indoor air correction factor. A similar approach was undertaken when generating the BTEX SGVs. There is some additional conservatism in the SSV values, since ATRISK considers a generic 50% background exposure which may not necessarily be the case. Research commissioned by Canadian Ministry[22] noted the petroleum hydrocarbon fraction >EC10 were not prevalent in food and water due to their low solubility and volatility and recommended the background concentration should be treated as zero. This did not include PAHs however, where the risk assessment was treated separately.

LKC consider the main risk drivers for PAHs are benzo(a)pyrene (B(a)P) and naphthalene. This is due to B(a)P possibly being carcinogens and most toxic of the PAHs[23,24] and naphthalene the most volatile and soluble[25]. The new C4SLs indicate B(a)P as a surrogate marker for non-volatile PAHs. Naphthalene will be treated separately using the ATRISK SSV.

Elevated results are presented in Table 6-1 below and all analysis sheets are presented in Appendix C.

Contaminant		Units	No. of samples	Result Ranges	Exceedences	Assessment Criteria	Source of Criteria
Metals	Lead	mg/kg	26	23 to 740	290 (WS110, 0.3m) 280 (WS111, 0.1-0.5m) 740 (WS107, 0.2m) 360 (WS203, 0.1-0.3m) 920 (WS204, 0.2-0.4m) 280 (WS206, 0.2-0.4m) 260 (WS209, 0.6-0.8m)	200mg/kg	C4SL
	Arsenic	mg/kg	14	6.4 to 54	54 (WS107, 0.2m)	37mg/kg	C4SL
General	pH	pH	29	Range 6.9 to 10.7			
	SOM	%	26	Range 0.88 to 17			
	Bulk analysis	--	26	None detected.			

Table 6-1: Summary of elevated analytical results for land at Gateacre Garden Centre, Liverpool.

Notes:

Only results that exceeded generic assessment criteria have been shown and results from **all depths** are noted.

[21] EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.

[22] CCME (2008). "Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale Supporting Technical Document."

[23] EA (2002). "Contaminants in Soils: Collation of Toxicological Data and Intake Values for Humans. Benzo[a]pyrene." R&D Publication TOX2.

[24] USEPA (1984). "Health Effects Assessment of Polycyclic Aromatic Hydrocarbons (PAHs). EPA 540/1-86-013."

[25] EA (2003). "Review of the Fate and Transport of Selected Contaminants in the Soil Environment." Draft technical report P5-079/TR1.

Seven elevated lead and one elevated arsenic results were identified at the site and likely related to ash and brick present in the made ground. The highest lead and arsenic concentrations in WS107 and WS204 may relate in part to the presence of pottery and more frequent ash.

6.2.1 Statistical Analysis

Statistical analysis has been undertaken on the data generated from the made ground as the nature of the soil and the proposed land use is similar. The exception is for WS107 and WS204, which are located in the central southern part of the site and have significantly higher concentrations of lead (both locations) and arsenic (WS107 only) and may relate to more frequent ash. It was assumed that these would be outliers and would require some form of remediation.

Fourteen soil samples were used in the statistical analysis. Output sheets are provided in Appendix F.

Current UK guidance on the use of statistical testing (CL:AIRE[26]) for contaminated land has been revised from the original CLR7[27] methodology. The latest guidance separates the planning and Part 2A regimes and is based upon the Null Hypothesis and Alternate Hypothesis approach. LKC have used the ESI contaminated land statistics calculator[28] to undertake this work, which follows the new UK guidance.

For the planning scenario the question to be answered will be “can we confidently say that the level of contamination on this land is low relative to some appropriate measure of risk [e.g. SGV, C4SL, SSV or GAC values].” The statistical test should show which hypothesis is true within a defined level of confidence (normally 95%), using the upper confidence limit ($UCL_{0.95}$).

For the planning scenario, where the aim is demonstrate the land is suitable for use the Null Hypothesis is the level of concentration that “is the same as, or higher than, the critical concentration [e.g. SGV, SSV or GAC value]” and the Alternative Hypothesis will be where the level of concentration “is lower than the critical concentration (Cc) .”

If the Null Hypothesis is rejected then it can be concluded that the Alternative Hypothesis is true (true mean (μ)<Cc) and that the potentially the site may be ‘suitable for use.’ If the

[26] CL:AIRE (2008). “Guidance on Comparing Soil Contamination Data with a Critical Concentration.”
[27] EA (2002). “Assessment of Risks to Human Health from Land Contamination: An Overview of the Development of Soil Guideline Values and related Research (CLR7).”
[28] ESI (2011). “ESI Contaminated Land Statistics Calculator User Manual.” Version 2.

Null Hypothesis is accepted (μ>Cc) then further measures may be needed and land may not be 'suitable for use.'

Care must be used in selecting data for the statistical test. Where possible the site should be zoned (vertically and laterally). This is because these statistics cannot be undertaken on targeted (unbiased) samples. LKC did not undertake targeted sampling at the site, where the dataset was taken and therefore the use of the statistical analysis is considered applicable.

Soil concentrations that are considered outliers may show areas that deviate from the true mean concentration and need to be investigated separately (e.g. they may be hotspots that need to be remediated separately). These are calculated using the Grubb test originally described in CLR7, but only relates to normally distributed data. Log transformation may be used on data to also establish normal distribution for outliers, if required, following CL:AIRE guidance. The test for outliers was based on a 5% level of significance.

In addition, detection limits are dealt with by using half the limits of detection (LOD) as per the guidelines.

No outliers were present on the remaining data and therefore concentrations were considered applicable across the site except for the areas of WS107 and WS204.

Furthermore, the guidance takes into account if the data follows a normal distribution (parametric), where a one-sided t-test can be used or non-normal distribution (non-parametric), where the Chebychev theorem should be used. This is done by using the Shapiro-Wilk test and graphical use of q-q plots.

The test for normality was adjusted to follow CL:AIRE (2013) guidelines[29] in deriving the C4SLs. This also uses the ESI statistical programme and guidance set out in CL:AIRE (2008)[30]. The changes relate to the test for normality, where it was stated the use of Chebychev theorem was implemented unnecessarily when the T-test could still be appropriate. This was ascertained by examining the standard deviation and producing a Relative Standard Error (RSE) of 20% as a threshold for normality. Furthermore, The ESI statistical programme was still used to calculate the upper 95th% ($UCL_{0.95}$) and lower 5th%

[29] CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."
[30] CL:AIRE (2008). "Guidance on Comparing Soil Contamination Data with a Critical Concentration."

($LCL_{0.95}$) confidence limits. The findings are presented in Table 6-2 and the information using the Chebychev theorem has been calculated for completeness.

Value	T- Test (Normal Distribution)	Chebychev (Non-Normal Distribution)
Critical Concentration (Cc)	200mg/kg	
Mean Concentration (μ)	148mg/kg	
Standard Deviation (SD)	103mg/kg	
Sample Number (n)	14	
Confidence (1-tailed)	95%	
Relative Standard Deviation (RSD)	0.70	
Relative Standard Error (RSE) of the Mean	0.19	
Lower Interval ($LCL_{0.95}$)	99.3mg/kg	27.9mg/kg
Upper Interval ($UCL_{0.95}$)	197mg/kg	268mg/kg
Interval as Proportion of Cc at $LCL_{0.95}$	50%	14%
Interval as Proportion of Cc at $UCL_{0.95}$	98%	134%
μ<Cc (Normal Distribution used)	✓ RSE ≤20%	--

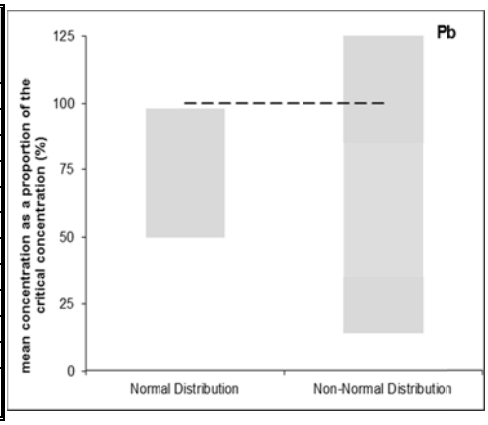


Table 6-2: Summary of statistical analysis ($UCL_{0.95}$ and $LCL_{0.95}$) for a residential end use using modified statistical methodology by CL:AIRE (2013). The graph illustrates the range for both distributions as % mean of the Cc.

Notes

RSE = RSD / √n. The RSE threshold is assumed to be 20% (0.2) for normality test; RSD = SD / μ.

Considering the above the upper confidence limit ($UCL_{0.95}$) on the true mean concentration for the made ground lead dataset is 197mg/kg compared with the C4SL of 200mg/kg.

The Null Hypothesis for lead can be rejected and is not statistically considered a significant risk.

6.2.2 Direct Contact Risk – Pollutant Linkage 1

Lead (7 samples) and arsenic (1 sample) were above the generic guideline values for a residential end use. Direct contact (ingestion, dermal and inhalation of dust) are the primary pathways to the receptor for these contaminants.

The highest concentration of lead and arsenic were present in WS107 and WS204 likely related to more frequent ash and possible pottery in the made ground. These are close to each other and were considered outliers.

One sample of natural clay in WS111 contained a concentration of lead at 280mg/kg. LKC consider that this may be associated with coal fragments identified within the clay as no evidence of cross-contamination was identified.. Given the level of exceedence and the natural source of this contaminant LKC does not consider that the natural strata pose a risk to human health.

Statistical analysis of the remaining made ground generated an $UCL_{0.95}$ of 197mg/kg for lead, which below the generic criteria value of 200mg/kg.

Based on the above Pollutant Linkage 1 has been identified for the plots associated with WS107 and WS 204 (Plots 'B1' and 'Buckingham'), where remedial measures will be required in garden areas.

6.2.3 Inhalation Risk – Pollutant Linkage 2

No elevated concentrations of potentially volatile contaminants have been identified in the soil sample results. There was no visual or olfactory evidence of such contaminants during the site investigation and no elevated headspace testing results were recorded. Therefore LKC consider Pollutant Linkage 2 to be incomplete in the locations tested.

6.3 Controlled Water Assessment

LKC considers the Principal Aquifer as the primary receptor.

LKC considers groundwater results should be compared to Environment Agency Values for UK Drinking Water Standard[31,32] (UKDWS), where available. This is considered a conservative measure as there are no potable water abstractions within 250m of the study site.

It should be noted that the leaching test is aggressive (de-ionised water) and is not in aqueous equilibrium (steady state) with the solid sample. This may cause rapid dissolution and overestimation of the aqueous phase concentrations compared to groundwater in contact with contaminated soils. Although dissolution may be reduced for highly hydrophobic contaminants[33], such as B(a)P it is likely that the initial leaching will remove the most readily available hydrocarbons and subsequent flushing would reduce the leachable concentrations[34]. Traditionally the leaching test was developed for inorganic constituents and the leaching of organics is poorly understood[35].

Elevated contaminants are presented in Table 6-2 below and all analysis sheets are presented in Appendix C.

[31] EA (2002). "Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the Environment Protection Act 1990.".
[32] HMSO (2009) "Water England: The private Water Supplies Regulations". Statutory Instruments No.3101.
[33] EA (1999)."Methodology for the Derivation of Remedial Targets for the Soil and Groundwater to Protect Water Resources." R&D Technical Report, P20
[34] EA (2006)."Remedial targets Methodology: Hydrological Risk Assessment for Land Contamination."
[35] EA (2009). "Petroleum Hydrocarbons in Groundwater: Supplementary Guidance for Hydrological Risk Assessment."

	Contaminant	Units	No. of samples	Result Ranges	No. Exceeded	Assessment Criteria	Source of Criteria
Metals	Lead	µg/l	3	<1 to 36 (WS108)	4	10	UKDWS
General	pH	pH	3	Range 8.5 to 11			
	Hardness	mg/l $CaCO_3$	3	Range 300 to 1400			

Table 6-2: Summary of elevated leaching test results for land at Gateacre Garden Centre, Liverpool.

Given the level of exceedence of the stringent UKDWS value and the absence of any water abstractions in the vicinity of the site, LKC does not consider that these exceedences poses a significant risk to controlled waters.

Based on the above LKC considers Pollutant Linkage 4 to be incomplete on the basis of the available information and no remediation is required to protect controlled waters.

6.4 Gas Risk Assessment

No landfill sites have been identified within 250m of the study site. Four areas of potential inflling have been identified within 250m, however given their age and size LKC does not consider them to pose a significant risk of hazardous gas.

The possible pond on site may have been infilled. WS101 and WS103 have been undertaken in this area of the site and have identified bedrock at between 1.2mbgl and 0.6mbgl respectively. Given the depth to bedrock LKC considers the risk of significant quantities of gas generating materials in the area of the former pond to be low. LKC recommend that a watching brief is undertaken in this area of the site during construction works.

LKC have not identified any significant quantities of putrescible or degradable material. Therefore the risk is considered low in these areas. Therefore pollutant linkage 3 remains possible subject to a watching brief during foundation service excavations in this area of the site.

6.5 Additional Risk Assessment

6.5.1 Concrete

Based upon the results of the soil sample analysis and groundwater results, sulphate resistant concrete is required at the site as a precaution in the area of WS103, TH201 and WS208 (located in the northwestern part of the site). The highest concentrations of soluble

sulphate in the made ground when contrasted to BRE Digest 2005[36] categorise the concrete requirement as DS-2 AC-1s.

6.5.2 Potable Water Supply

United Utilities (UU) guidelines have been recently replaced with new guidance[37], where sampling is required for contaminants that include speciated petroleum hydrocarbons, chlorinated compounds, BTEX compounds, phenols, cresols, ethers, nitrobenzene, ketones, aldehydes and amines. However, the guidelines do state a robust risk assessment can be undertaken on why specific pipework is not required.

The analytical data indicates a slight exceedance of naphthalene (0.51mg/kg vs 0.5mg/kg trigger level) in WS203 (0.1-0.3mbgl) and an exceedance of EC10-EC16 hydrocarbons (65.5mg/kg vs 10mg/kg trigger level) in WS104 (0.1-0.6mbgl). If the pipes were installed in the made ground in these areas then barrier pipe would be required.

However if the pipework is laid in the natural strata (usually at depths of at least 0.75mbgl) then standard PE pipe may be appropriate.

This is subject to completing a UU risk assessment form and consultation with UU. Therefore, based upon the above Pollutant Linkage 6 remains possible pending the completion of a UU risk assessment document.

6.5.3 Phytotoxicity

One analysed soil concentration of Zinc in WS204 is considered phytotoxic as outlined in BS3882[38]. Given the marginal exceedence of the assessment criteria LKC does not consider this concentration to pose a significant risk.

Based on the above the risk from pollutant linkage 7 is considered very low and no specific remediation to protect flora is required. Although consideration to the soil matrix should be assessed to establish if made ground is a suitable growing medium for flora.

6.6 Revised Conceptual Model

A revised conceptual model may be undertaken for the site using all available data and this is presented in Table 6-3.

[36] BRE (2005)."Concrete in Aggressive Ground." Special Digest 1.
[37] UU(2011). "United Utilities Water Supplementary Guidance for the Selection of Water Pipes in Land Potentially Affected by Contamination."
[38] BS (2007). "Specifications for Topsoil and Requirements for use." BS3882:2007

In order to assess the potential risk for each pollutant linkage, an assessment of the magnitude of the potential consequence (severity) of the risk occurring and the magnitude of the probability (likelihood) of the risk occurring has been considered and classified. This is based on the guidance provided in CIRIA C552[39] and further details including a risk matrix is provided in Appendix A.

Where LKC identifies a moderate or higher risk intrusive work or precautionary remedial measures will be recommended. Where there is a moderate/low risk an assessment will be undertaken to establish what category the pollutant linkage will fall into.

[39] CIRIA (2001). "Contaminated land risk assessment: A guide to good practice". C552.

Pollutant Linkage	Pathway	Receptor	Contaminant (source)	Probability	Consequence	Risk	Assessment
PL1	– Dermal contact. – Inhalation of soil and dust. – Ingestion of soil and dust.	– Future residents	-Arsenic and Lead (Area of WS107 and WS204 only)	High	Medium	**High**	– Probability: High risk in the locations of WS107 and WS204 since concentrations, particularly lead, exceeds generic assessment criteria by 3-4 times and are considered hotspots. – Recommendation: Remedial measures in garden areas of WS107 and WS204 (Plots 'B1' and 'Buckingham').
PL2	– Inhalation of vapours. – Migration through permeable strata and preferential pathways.	– Future residents	– Volatile Contaminants (made ground).	Unlikely	Medium	**Low**	– Probability: No elevated concentrations of volatile contaminants identified on site. Recommendation: No further action.
PL3	– Inhalation of gas. – Migration through permeable strata and preferential pathways. – Explosion in confined spaces.	– Future residents – Buildings – Offsite land users	– Methane, Carbon Dioxide & Trace Gases. (made ground)	Unlikely	Severe	Moderate / **Low**	– Probability: Low probability as no significant quantities of putrescible or degradable materials identified and shallow bedrock encountered on site. – Risk: Low. – Recommendation: Watching brief in area of former pond.
PL4	– Surface run-off. – Migration through permeable strata and preferential pathways – Perched waters migration.	– Groundwater.	– Pesticides (whole site)	Unlikely	Mild	**Very Low**	– Probability: No pesticides identified in soil samples. – Recommendation: No further action.
PL5	– Sulphate attack on concrete.	– Building structure	– Sulphate (made ground on site).	High	Mild	**Moderate**	– Probability: Three elevated sulphate results within soil samples. – Recommendation: Sulphate resistant concrete will be required in these locations where concrete is laid in contact with the made ground.
PL6	– Ingestion of tainted water supply.	– Future residents	– PAHs and hydrocarbons	likely	Medium	**Moderate**	– Probability: Elevated concentrations encountered in two locations in the made ground. However depending on the route and depth of the pipes they may be placed within natural strata and therefore remedial measures may not be necessary – Recommendation: Consultation with UU and completion of their RA.
PL7	– Direct Contact (plant uptake).	– Flora	– Inorganic (whole site).	Low	Minor	**Very Low**	– Probability: One marginal exceedence which is not considered a significant risk to flora. – Recommendation: No further action.as remediation of the one marginal exceedence at WS204 will be mitigated with PL1.

Table 6-3: Revised Contamination Conceptual Model for land at Gateacre Garden Centre, Liverpool.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

A ground investigation has been carried out to confirm the ground conditions below the site. This investigation included 21no. window sample boreholes and one hand dug trial pit.

Ground Conditions

The ground conditions beneath the site comprised tarmac over made ground underlain by natural gravelly sand and / or sandy gravelly clay. These natural strata are underlain by shallow sandstone.

No groundwater was encountered during the drilling of the boreholes on site.

Geotechnical Assessment

Traditional shallow foundations are considered possible across the majority of the site on to the underlying sandstone bedrock. Shallow foundations may also be possible on to the drift deposits in the western part of the site however consideration should be given to areas of loose sand and soft clay identified.

A foundation zoning plan will be provided upon receipt of the Atterberg Limits testing data.

The concrete requirement has been classified as DS-2 AC-1s in the area of WS103, TH201 and WS208. These are located in the northwestern part of the site.

Contamination Assessment

When compared to residential with plant uptake assessment criteria, one elevated arsenic and seven lead concentrations were identified in the made ground. One slightly elevated level of lead was identified in the natural ground.

An outlier was assumed for WS107 and WS204 for lead and arsenic and remediation will be required in those areas (Plots ‘B1’ and ‘Buckingham’). These contaminants may pose a risk to future residents in garden and soft landscaped areas and require remediation.

Statistically the remaining soil was not elevated for lead ($UCL_{0.95}$ of 197mg/kg) compared to the generic value of 200mg/kg. LKC consider no specific remediation is required in gardens for the rest of the site.

No volatile contamination was identified at the site.

No significant source of hazardous gas has been identified therefore no protection measures are required in future buildings.

An elevated level of EC10-16 hydrocarbons and one elevated level of naphthalene were encountered in the made ground when compared to very stringent UU pipework criteria. The analytical data indicates a slight exceedance of naphthalene (0.51mg/kg vs 0.5mg/kg trigger level) in WS203 (0.1-0.3mbgl) and an exceedance of EC10-EC16 hydrocarbons (65.5mg/kg vs 10mg/kg trigger level) in WS104 (0.1-0.6mbgl). If the pipes were installed in the made ground in these areas then barrier pipe would be required.

However if the pipework is laid in the natural strata (usually at depths of at least 0.75mbgl) then standard PE pipe may be appropriate. This is subject to the completion of a UU risk assessment document.

One elevated phytotoxic contaminant was identified however this is not considered to pose a significant risk to flora and the elevated concentration will be remediated as part of pollutant linkage 1.

A revised contamination conceptual model has been produced by LKC which is summarised in Table 7-1 below (more detailed model provided in Section 6). Where a moderate / low risk was identified, the assumed risk at this stage has been shown.

	Pollutant Linkage	Risk	Further Action Required
1	Non-volatile contaminants (lead and arsenic) posing a risk to site users via dermal contact, ingestion and inhalation (of soil, dust, fibres and vegetables).	**High**	- Contamination around WS107 and WS204 - **Recommendations:** Capping layer or source removal required in garden areas around WS107 (Plot 'B1)' and WS204 (Plot 'Buckingham').
2	Volatile contaminants posing a risk to site users via the inhalation of vapours.	**Low**	- No volatile source encountered. - **Recommendations:** No specific remediation required.
3	Gas posing a risk to buildings and site users via the migration of gas into building causing explosion and asphyxiation.	**Low**	- No significant gas risk identified. - **Recommendations:** Watching brief maintained during excavations in and around the former pond. No specific remediation required for other areas of the site.
4	Mobile contamination posing a risk to controlled waters via the migration through permeable strata.	**Low**	- No significant risk posed to principal Aquifer. - **Recommendations:** No remediation required.
5	Sulphate posing a risk to building via direct contact (sulphate attack).	**Moderate**	- Elevated sulphate identified in parts of the site. - **Recommendations:** Sulphate resistant concrete (DS-2 AC-1) in localised areas of site.
6	Organic contaminants posing a risk to water pipes.	**Moderate**	- Potential organic contaminants at pipeline depth. - **Recommendations:** UU risk assessment to be completed. The site will likely comprise protective piping. If placed in made ground.
7	Phytotoxic metals posing a risk to flora via root uptake.	**Low**	- One marginal exceedence (WS204) of phytotoxic metals above generic criteria. - **Likely Remediation:** This area will be remediated as part of PL1.

Table 7-1: Summary Risk Table for land at Gateacre Garden Centre, Liverpool.

7.2 Recommendations

The recommendations provided below are considered appropriate for the site based on the site investigation. LKC should stress that no remediation, enabling works or designing works should take place until Regulatory approval has been obtained.

7.2.1 Soil Contamination – Direct Contact (Pollutant Linkage 1)

Remediation is required for gardens associated with WS107 and WS204 (Plots 'B1' and 'Buckingham'). Two options are presented.

Option 1

Given the shallow depth of made ground on site, LKC recommend made ground is removed to natural within the two plots.

The material should be appropriately removed off site or placed under handstanding (e.g. roads or buildings) if it is geotechnically suitable.

Validation for the removal of the made ground should be undertaken from sides and base of the excavation to ensure remaining material is suitable for use.

Any imported topsoil should be chemically validated to ensure it is suitable for use.

Option 2

An environmental capping layer could be placed in garden areas of the impacted plots and should comprise a total of 600mm cover. This would comprise the following:

- 100mm physical break layer (MOT type 1 material, 20-30mm, minimal fines) and at least 500mm comprising clean inert fill and sufficient topsoil for a growing medium.

Any imported subsoil and topsoil should be chemically validated to ensure it is suitable for use.

7.2.2 Gas Risk (Pollutant Linkage 3)

A watching brief for any unusual ground conditions such as organic material should be maintained during foundation and service excavations around the former pond area. Any suspect material should be reported to LKC and the local authority for further assessment.

This may require removal or installation of precautionary gas protection measures in the adjacent plots.

7.2.3 Site Buildings (Pollutant Linkage 5)

The concentrations of soluble sulphate in the soil when contrasted to BRE Digest 2005 categorise the concrete requirement as DS-2 AC-1s in the area of WS103, TH201 and WS208. This information should be presented to the structural engineer for inclusion in the foundation design for the site.

7.2.4 Potable Water Supply (Pollutant Linkage 6)

LKC recommend that consultation with United Utilities is undertaken once the proposed pipe route and depths are known to determine the specification of potable water supplies.

It is likely that pipes will be installed in natural strata and that standard PE pipe will be suitable, however this is subject to consultation and completion of the UU Risk Assessment form.

7.3 Additional Considerations

7.3.1 Unexpected Contamination

The relevant contractors should be briefed that during development works at the site should any unusual ground conditions and / or visual or olfactory evidence of contamination be encountered at the site, LKC and the Local Authority should be informed and further assessment of the material may be required.

7.3.2 Health and Safety Considerations

In working with, removing or treating any contaminating material it is important that any potential risks associated with the actual site works are mitigated by good environmental management of the site during the remedial phases. Standard health and safety precautions (as per HSE guidance[40]) should be adopted by all workers involved with site enabling and construction works.

7.4 Remediation, Verification and Site Completion Report

Once planning approval is obtained it is strongly recommended that the proposals detailed within this report are approved in writing by the Local Authority PRIOR to works starting on site.

[40] HSE (1991). "Protection of workers and the general public during development of contaminated land" London HMSO.

It is also recommended that any remediation carried out on the site is validated by a third party and suitable documentary evidence provided in a Site Completion Report, such as photographs, consignment documents and analytical results. This should include as a minimum:

- Information on the watching brief maintained around the former pond area and information on any further assessment and remedial works undertaken.
- Verification of all imported soil if required. The sampling suite and regime should follow Local Authority guidance. A typical sampling regime would be 1 per 250m^3 for subsoil and 1 per 50m^3 for topsoil (or a minimum of 3 samples per source). Typical composite samples would be tested for a comprehensive suite comprising as a minimum heavy metals, speciated PAHs, petroleum hydrocarbons and asbestos screen.
- Validation of removal of made ground in the area of WS107 and WS204 if Option 1 chosen.
- Validation of environmental capping depth if Option 2 taken.
- Confirmation from the structural engineer on the requirement for and use of any sulphate resistant concrete.
- Information on the installation of protective pipes if required.

The Site Completion Report will assist the Local Authority in the discharge of any future relevant planning condition and will also be of use to solicitors acting on behalf of any prospective conveyancer who may have concerns over the former use of the site.

FIGURES

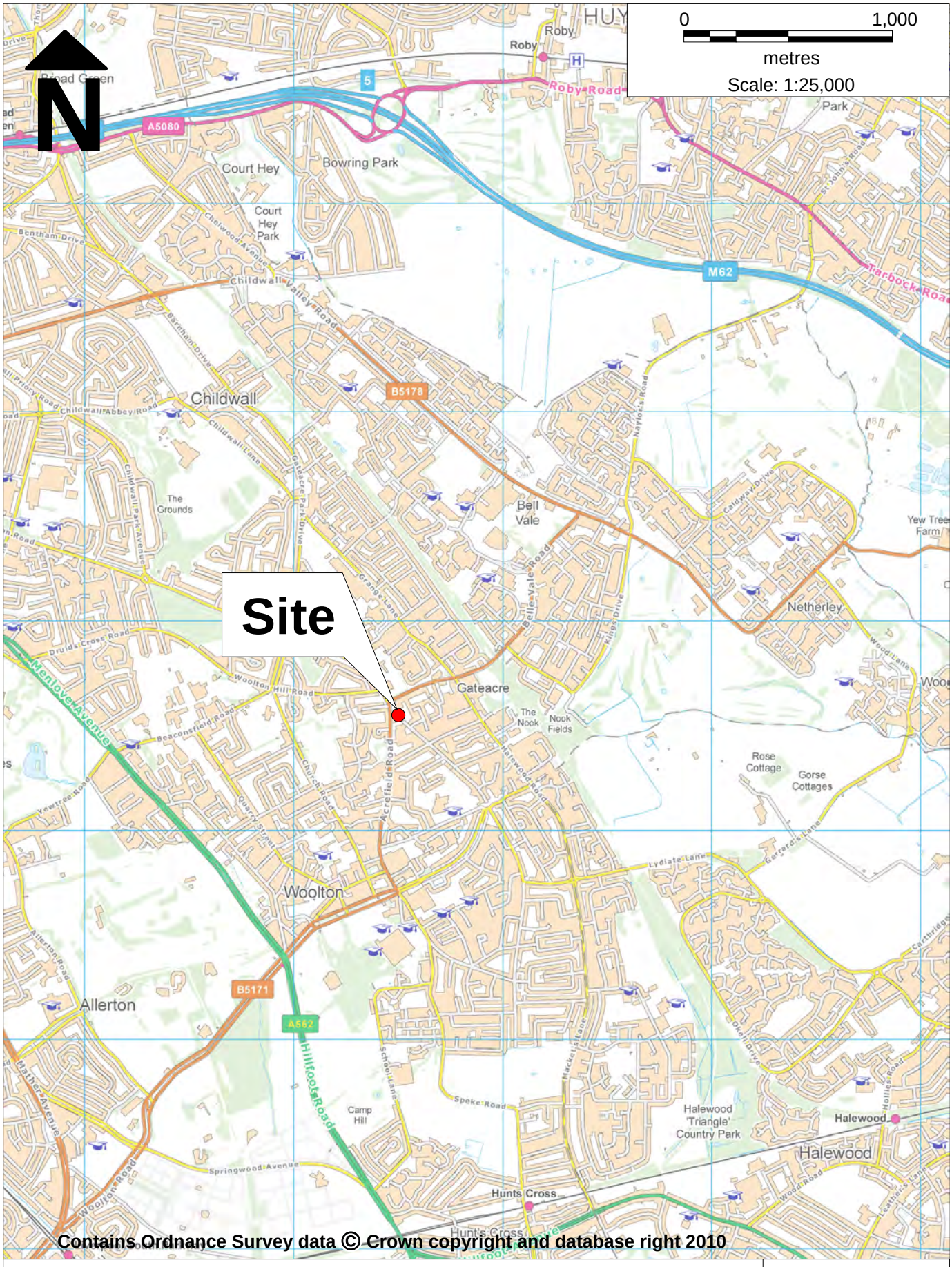
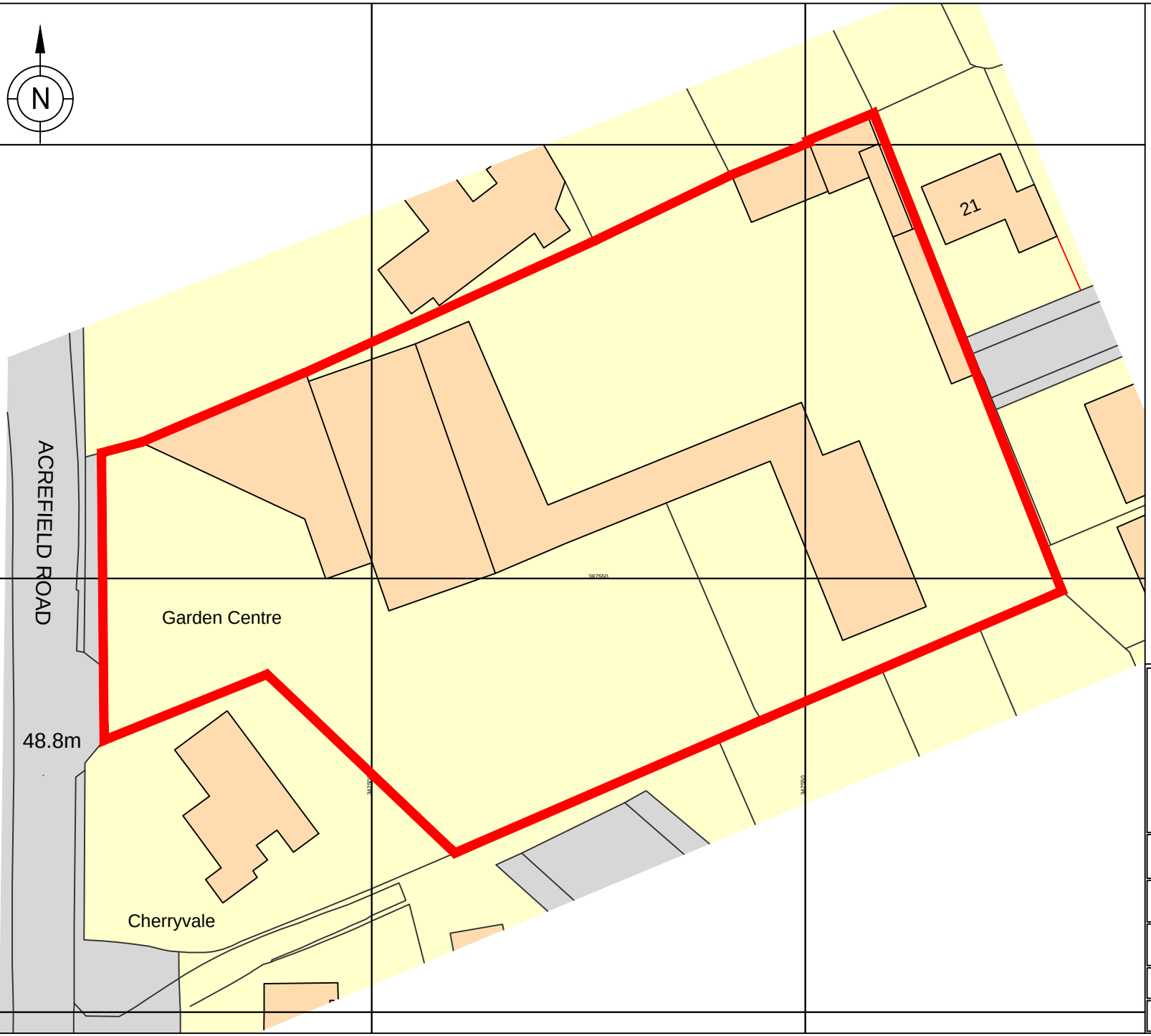


Figure 1: Location Plan, Land at Gateacre Garden Centre, Liverpool

Drawn: March 2014 Scale: 1:25,000 @ A4 (see scale bar)

LK CONSULT LIMITED



KEY

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.

LK CONSULT LIMITED

Client:	Macbryde Homes Ltd
Site:	Gateacre Garden Centre
Title:	Site Boundary Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 14 1086	1:625 @ A4	2	

Drawn By:	Checked By:	Drawn:
CC	MP	Oct 2014

Extract from Macbryde Homes Ltd Drawing Ref. GL-SL01, dated 26.08.14

KEY

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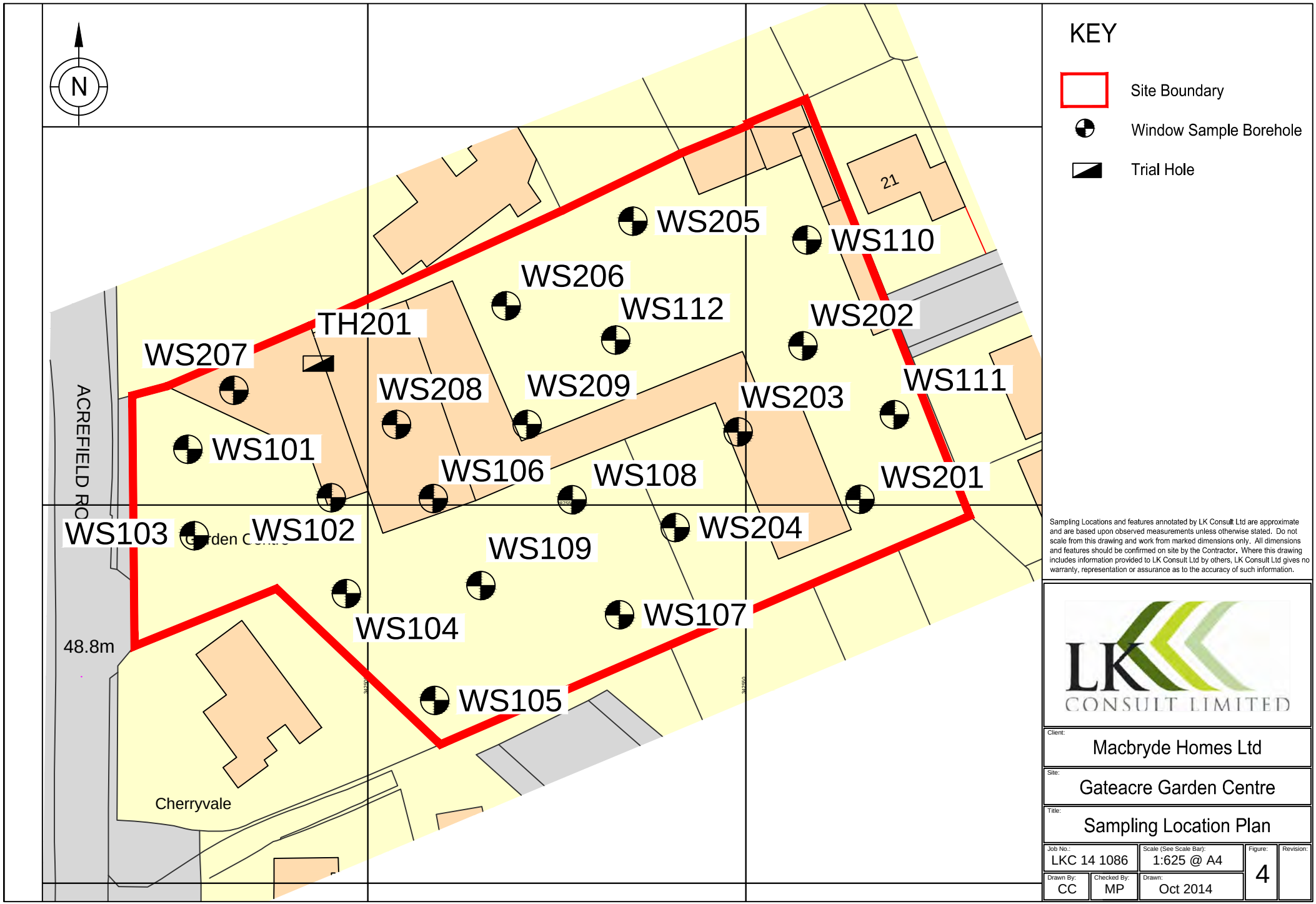
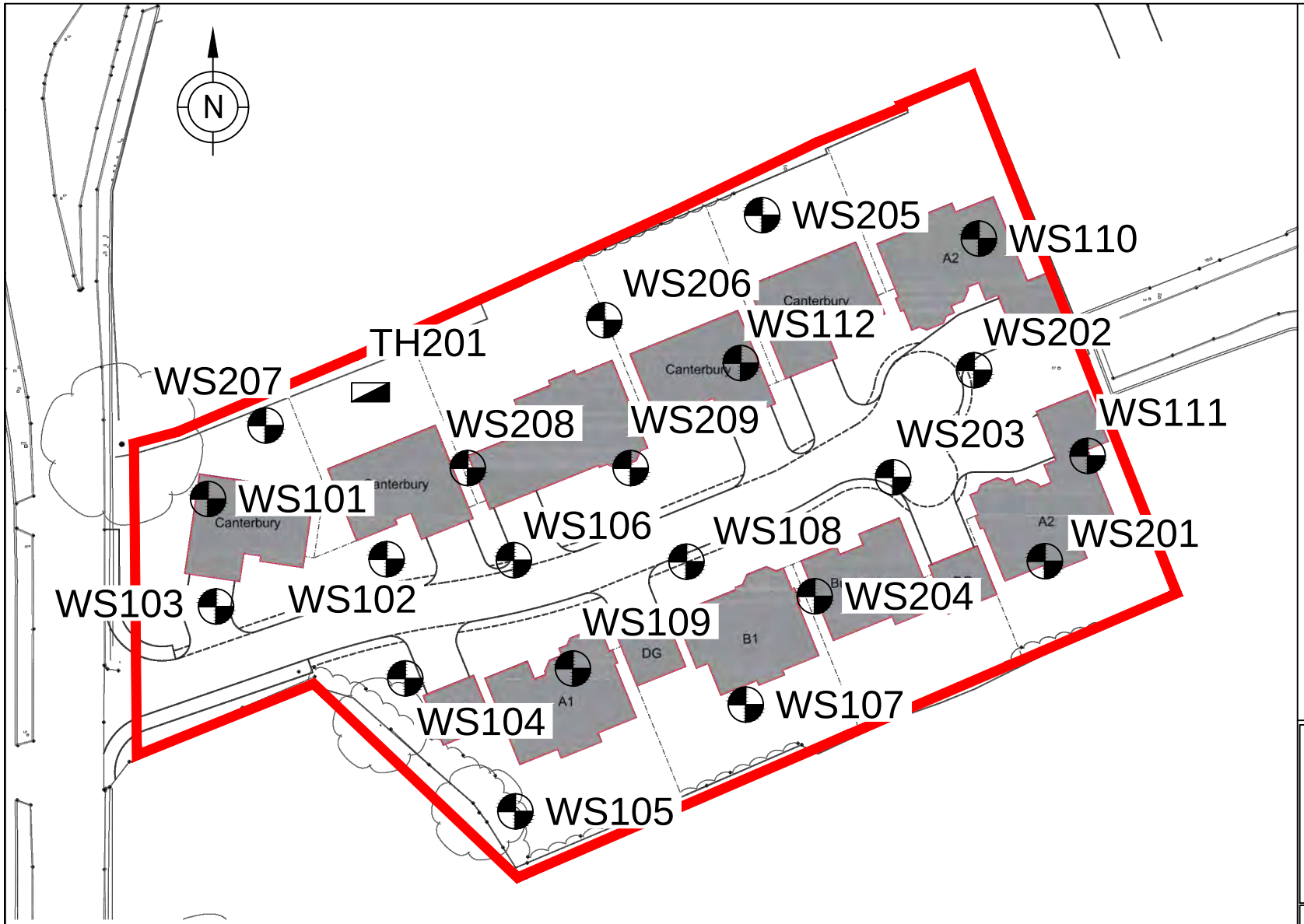
LK CONSULT LIMITED

Client:	Macbryde Homes Ltd
Site:	Gateacre Garden Centre
Title:	Proposed Layout Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 14 1086	1:625 @ A4	3	

Drawn By:	Checked By:	Drawn:
CC	MP	Oct 2014


N
KEY
Site Boundary
Window Sample Borehole
Trial Hole
WS205
WS110
WS206
WS112
WS202
TH201
WS207
WS208
WS209
WS203
WS111
WS101
WS106
WS108
WS201
WS103
WS102
WS204
WS109
WS107
WS104
WS105
21
ACREFIELD RO
48.8m
Cherryvale
Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.
LK CONSULT LIMITED
Client: Macbryde Homes Ltd
Site: Gateacre Garden Centre
Title: Sampling Location Plan
Job No.: LKC 14 1086
Scale (See Scale Bar): 1:625 @ A4
Figure: 4
Revision:
Drawn By: CC
Checked By: MP
Drawn: Oct 2014



KEY

- Site Boundary
- Window Sample Borehole
- Trial Hole

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.

LK CONSULT LIMITED

Client:	Macbryde Homes Ltd
Site:	Gateacre Garden Centre
Title:	Sampling Location Plan

Job No.:	Scale (See Scale Bar):	Figure:	Revision:
LKC 14 1086	1:625 @ A4	5	

Drawn By:	Checked By:	Drawn:
CC	MP	Oct 2014

Extract from Macbryde Homes Ltd Drawing Ref. GL-SL01, dated 26.08.14

APPENDIX A

RISK MATRIX

Risk Assessment

The method for risk evaluation is a qualitative method of interpreting the output from the risk estimation stage of the assessment, based on CIRIA C552[1]. It involves the classification of the:

- Magnitude of the potential consequence (severity) of the risk occurring (Table E-1).
- Magnitude if the probability (likelihood) of the risk occurring (Table E-2).

Consequence (Severity)	
Classification	**Definition**
Severe	- Short term (acute) risk to human health likely to results in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. - Short term risk of pollution (note: water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. - Catastrophic damage to buildings/properties. - A short term risk to a particular ecosystem, or organism forming part of such ecosystem (note: the definition of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).
Medium	- Chronic damage to Human Health ('significant harm' as defined in DETR, 2000). - Pollution of sensitive water resources (note Water Resources Act contains no scope for considering significance of pollution). - A significant change in a particular ecosystem, or organism forming part of such ecosystem (note: the definition of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).
Mild	- Pollution of non-sensitive water resources. - Significant damage to crops, buildings, structures and services ('significant harm' as defined in DETR, 2000). - Damage to sensitive buildings/structures/services or the environment.
Minor	- Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. - Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). - Easily repairable damage to buildings, structures and services.

Table E-1. Classification of Consequence

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

Table E-2. Classification of Probability.

[1] CIRIA C552 (2001) Contaminated Land Risk Assessment - A guide to good practice.

These classifications are then compared to indicate the risk presented by each pollutant linkage (Table E-3). It is important that this classification is only applied where there is a possibility (which can range from high likelihood to unlikely) of a pollutant linkage existing.

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High Likelihood**	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

Table E-3. Comparison of Consequence against Probability

Once the risk has been determined the corresponding action can be assessed (Table E-4).

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

Table E-4. Description of the Classification and Likely Action Required.

APPENDIX B

PROFILE LOGS

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS101**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 18/03/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.08) 0.08	MADE GROUND: Tarmac.		
						MADE GROUND: Construction sub base gravel and sand.		
0.40-0.40 0.40-0.40	C1 PID1 0ppm				(0.67)			
					0.75	MADE GROUND: Brown clayey gravelly sand with brick and coal fragments and rootlets. Becomes more clayey with deph. Gravel is fine to medium and angular.		
1.00-1.45	SPT N=24		1,7/5,5,6,8		(0.45)			
					1.20	Medium dense orange brown gravelly clayey SAND with occasional coal fragments. Gravel is fine to medium, angular to sub-rounded.		
					(1.00)			
2.00-2.38	SPT 50/230		7,8/16,16,18		2.20	Strong red with white lenses fine grained weathered SANDSTONE.		
					(0.18) 2.38	Complete at 2.38m		

Remarks
No groundwater strike encountered.
SPT refusal in sandstone at 2.38m.

Scale (approx)	**Logged By**
1:25	MP

Figure No.
LKC 14 1086.WS101

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS102**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 18/03/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.10) 0.10	MADE GROUND: Tarmac.			
0.10-0.60 0.10-0.60	C1 PID1 0ppm				(0.50)	MADE GROUND: Dark brown, very gravelly sand with ash, clinker, coal and brick fragments, and rare rootles. Gravel is fine to medium, sub-rounded to angular.			
0.60-1.30 0.60-1.30	C2 PID2 0.1ppm				0.60 (0.70)	Very loose, orange brown gravelly clayey SAND with occasional coal fragments and frequent sandy clay lenses. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular.			
1.00-1.45	SPT N=1		0,0/0,1,0,0		1.30	Loose to medium dense, orange brown gravelly clayey SAND. Sand is fine to medium. Gravel is sub-rounded to sub-angular (Likely weathered sandstone).			
2.00-2.45	SPT N=42		3,6/8,9,11,14		(0.90) 2.20 (0.25) 2.45	Strong red with white lenses fine grained weathered SANDSTONE. Complete at 2.45m			

Remarks
No groundwater strike encountered.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS102

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS103**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 18/03/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.08) 0.08	MADE GROUND: Tarmac.		
					(0.52)	MADE GROUND: Brown very gravelly sand with ash, clinker, coal and brick fragments. Gravel is fine to medium and angular. Increased ash and clinker content with depth.		
0.50-0.50 0.50-0.50	C1 PID1 0ppm				0.60	Loose orange brown, slightly gravelly clayey SAND. Sand is fine to medium. Gravel is medium, angular to sub-rounded of sandstone.		
1.00-1.45	SPT N=4		1,1/1,1,1,1					
1.10-1.10 1.10-1.10	C2 PID2 0.1ppm				(1.60)			
2.00-2.38	SPT 57/225		1,3/7,18,32		2.20 (0.18) 2.38	Strong red fine grained SANDSTONE. Complete at 2.38m		

Remarks
No groundwater strike encountered.
SPT refusal in sandstone at 2.38mbgl.

Scale (approx)	Logged By
1:25	MP

Figure No.
LKC 14 1086.WS103

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS104**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 18/03/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	MADE GROUND: Tarmac.		
0.10-0.60 0.10-0.60	C1 PID1 2.0ppm				(0.50) 0.60	MADE GROUND: Dark brown, very gravelly sand with ash, clinker, coal and brick fragments, and rare rootlets. Gravel is fine to medium, sub-rounded to angular.		
0.60-1.00 0.60-1.00	C2 PID2 0ppm				(0.40) 1.00	Brown, clayey silty gravelly SAND with occasional coal fragments and rare rootlets. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular.		
1.00-1.45 1.00-1.50 1.00-1.50	SPT N=29 B1 PID3 0.1ppm		3,5/7,7,7,8		(1.00) 2.00	Firm to stiff consistency, high strength, brown, very sandy gravelly CLAY with occasional coal fragments and rare rootles. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular.		
1.80-2.11	SPT 50/160		4,9/14,28,8		(0.11) 2.11	Strong red fine grained weathered SANDSTONE.		
						Complete at 2.11m		

Remarks
SPT refusal in sandstone at 2.11mbgl.
No groundwater stike encountered.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS104

LK CONSULT LTD

Bury Business Centre, Kay Street, Bury, BL9 6BU
Tel: 0161 763 7200 web: www.thelkgroup.com

Site	Number
Gateacre Garden Centre, Huyton	WS105

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Macbryde Homes Ltd	LKC 14 1086

Location	Dates	Engineer	Sheet
	18/03/2014		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.08) 0.08	MADE GROUND: Tarmac.			
					(0.10) 0.18	MADE GROUND: Construction sub base sand and gravel.			
0.40-0.40 0.40-0.40	C1 PID1 0.7ppm				(0.42) 0.60	MADE GROUND: Dark brown, very gravelly sand with clinker, coal and brick fragments and occasional rootlets. Gravel is fine to medium, angular. Sand is fine grained.			
0.80-0.80 0.80-0.80	B1 PID2 0ppm					Very stiff friable consistency, very high strength, orange brown, slightly gravelly sandy CLAY with occasional coal fragments. Gravel is fine to medium, sub-rounded to sub-angular.			
1.00-1.45	SPT N=32		4,7/7,8,8,9		(1.40)				
2.00-2.16	SPT 25*/120 50/35		8,17/50		2.00 (0.16) 2.16	Strong red fine grained weathered SANDSTONE.			
						Complete at 2.16m			

Remarks
No groundwater strike encountered.
SPT refusal in sandstone at 2.16mbgl.

Scale (approx)	Logged By
1:25	MP

Figure No.
LKC 14 1086.WS105

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS106**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 18/03/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	MADE GROUND: Tarmac.		
0.10-0.30 0.10-0.30	C1 PID1 0ppm				(0.20) 0.30	MADE GROUND: Dark brown, very gravelly sand with ash, clinker, coal and brick fragments and rare rootlets. Gravel is fine to medium, sub-rounded to angular.		
0.30-1.00 0.30-1.00	C2 PID2 0ppm					Orange brown, gravelly clayey SAND with occasional coal fragments and rare rootlets. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular.		
					(0.70)			
1.00-1.33	SPT 50/180		10,15/19,16,15		1.00 (0.20) 1.20	Very dense, orange brown gravelly SAND. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular (Likely weathered sandstone).		
					(0.13) 1.33	Strong red fine grained weathered SANDSTONE.		
						Complete at 1.33m		

Remarks
SPT refusal in sandstone at 1.33mbgl.
No groundwater strike encountered.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS106

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	Site Gateacre Garden Centre, Huyton	Number WS107

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Macbryde Homes Ltd	LKC 14 1086
	Location	**Dates** 18/03/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	MADE GROUND: Tarmac underlain by sub-base gravel.		
0.20-0.20 0.20-0.20	C1 PID1 0ppm				(0.30) 0.40	MADE GROUND: Brown, reworked gravelly very sandy clay with frequent ash and clinker, coal and brick fragments. Gravel is fine to medium, angular.		
0.70-0.90 0.70-0.90	C2 PID2 0ppm				(0.50) 0.90	Firm to stiff consistency, orange brown, sandy gravelly CLAY with rare coal fragments. Gravel is fine to medium, sub-rounded.		
1.00-1.31	SPT 50/158		5,11/14,31,5		(0.41) 1.31	Strong red fine grained weathered SANDSTONE.		
						Complete at 1.31m		

Remarks
SPT refusal in sandstone at 1.31mbgl.
No groundwater strike encountered.

Scale (approx)	Logged By
1:25	MP

Figure No.
LKC 14 1086.WS107

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS108**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 18/03/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	MADE GROUND: Tarmac.		
0.10-0.30 0.10-0.30	C1 PID1 0.1ppm				(0.20) 0.30	MADE GROUND: Dark brown, reworked gravelly sandy clay with ash, clinker, coal and brick fragments with rare roots. Gravel is fine to medium, sub-rounded to angular.		
0.30-0.70 0.30-0.70	C2 PID2 0ppm				(0.60)	Orange brown, gravelly SAND. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular (Likely weathered sandstone).		
0.80-1.06	SPT 50/110		3,11/29,21		0.90 (0.16) 1.06	Strong red fine grained weathered SANDSTONE.		
						Complete at 1.06m		

Remarks
SPT refusal in sandstone at 1.06mbgl.
No groundwater strike encountered.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS108

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS109**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 18/03/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10)	MADE GROUND: Tarmac.		
					0.10			
0.10-0.30	C1				(0.20)	Medium dense, orange brown, clayey gravelly SAND with occasional coal fragments and rare rootlets. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular.		
0.10-0.30	PID1 0.2ppm							
					0.30			
0.30-0.80	C2							
0.30-0.80	PID2 0.1ppm							
					(0.50)	Firm to stiff consistency, brown, very sandy gravelly CLAY with occasional coal fragments and rare rootlets. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular.		
					0.80			
0.80-1.04	SPT 50/85		9,16/34,16		(0.24)	Strong red fine grained weathered SANDSTONE.		
					1.04			
						Complete at 1.04m		

Remarks
SPT refusal in sandstone at 1.04mbgl.
No groundwater strike encountered.

Scale (approx)	**Logged By**
1:25	AF

Figure No.
LKC 14 1086.WS109

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS110**	
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 19/03/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	MADE GROUND: Tarmac.		
0.20-0.30 0.30-0.30 0.30-0.70 0.30-0.70	C1 PID1 0ppm B1 PID2 0ppm				(0.20) 0.30	MADE GROUND: Dark brown, gravelly sand with ash, clinker, coal and brick fragments. Gravel is fine to medium, sub-rounded to angular.		
					(0.70)	Firm to stiff consistency, brown, very sandy gravelly CLAY with occasional coal fragments and rare rootles. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular.		
1.00-1.27	SPT 25*/120 50/146		14,11/21,29		1.00 (0.27) 1.27	Strong red fine grained weathered SANDSTONE. Complete at 1.27m		

Remarks
No groundwater strike encountered.
SPT refusal in sandstone at 1.27mbgl.

Scale (approx)	**Logged By**
1:25	AF

Figure No.
LKC 14 1086.WS110

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS111**	
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 19/03/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	MADE GROUND: Tarmac.		
0.10-0.50 0.10-0.50	C1 PID1 0ppm				(0.50)	Firm to stiff consistency, brown, sandy gravelly CLAY with occasional coal fragments and rare rootlets. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular.		
0.60-0.82	SPT 50/74		15,10/50		0.60 (0.22) 0.82	Strong red fine grained weathered SANDSTONE.		
						Complete at 0.82m		

Remarks
SPT refusal in sandstone at 0.82mbgl.
No groundwater strike encountered.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS111

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS112**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 19/03/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	MADE GROUND: Tarmac.		
0.10-0.20 0.10-0.20	C1 PID1 0ppm				(0.40)	MADE GROUND: Dark brown gravelly sand with ash, clinker, coal and brick fragments. Gravel is fine to medium, sub-rounded to angular.		
0.50-0.80 0.50-0.80	B1 PID2 0ppm				0.50 (0.30)	Firm to stiff consistency, brown, very sandy gravelly CLAY with occasional coal fragments and rare rootlets. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular.		
					0.80 (0.30)	Orange brown gravelly SAND. Sand is fine to medium. Gravel is fine to medium, sub-rounded to sub-angular (Likely weathered sandstone).		
1.00-1.37	SPT 50/217		4,5/10,18,22		1.10 (0.27)	Strong red fine grained weathered SANDSTONE.		
					1.37	Complete at 1.37m		

Remarks
No groundwater strike encountered.
SPT refusal in sandstone at 1.37mbgl.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS112

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS201**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 15/10/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.30	C1				(0.30) 0.30	MADE GROUND: Brown gravelly very sandy clay with occasional brick fragments, rare glass and rootlets. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular of sandstone.		
0.70-0.99	SPT 25*/120 50/173		16,9/14,19,17		(0.69) 0.99	Strong red fine grained weathered SANDSTONE. (recovered as sand and gravel). Complete at 0.99m		

Remarks
SPT refusal in sandstone at 0.99mbgl.
Borehole dry.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS201

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton		**Number** **WS202**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 15/10/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.20) 0.20	MADE GROUND: Stone gravel and compost.			
					(0.10) 0.30	MADE GROUND: Tarmacadam and concrete.			
0.40-0.60	C1				(0.60) 0.90	MADE GROUND: Brown gravelly very sandy clay with occasional coal fragments, rare brick fragments and rootlets. Sand is fine to medium, gravel is fine to medium, subangular to angular of sandstone.			
1.00-1.45	SPT N=14		1,1/1,2,3,8		(1.15) 2.05	Strong red with white lenses fine grained weathered SANDSTONE. (recovered as sand and gravel).			
1.70-2.05	SPT 50/198		9,14/14,19,17			Complete at 2.05m			

Remarks
SPT refusal in sandstone at 2.05mbgl.
Borehole dry.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS202

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	Site Gateacre Garden Centre, Huyton	Number WS203

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Macbryde Homes Ltd	LKC 14 1086
	Location	**Dates** 15/10/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	MADE GROUND: Tarmacadam.		
0.10-0.30	C1				(0.20) 0.30	MADE GROUND: Brown very gravelly sand with frequent brick, ash, clinker and coal fragments. Rare rootlets. Sand is fine to medium. Gravel is fine to medium, subangular to angular.		
0.30-0.30	PID 0.9ppm							
0.50-0.60	B1				(0.60)	Soft consistency, brown gravelly very sandy CLAY with occasional coal fragments. Sand is fine to medium. Gravel is fine to medium, subangular to angular of sandstone.		
					0.90			
1.00-1.43	SPT 57/277		2,5/7,15,20,15		(0.53)	Strong red fine grained weathered SANDSTONE. (recovered as sand and gravel).		
					1.43	Complete at 1.43m		

Remarks
SPT refusal in sandstone at 1.43mbgl.
Borehole dry.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS203

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	Site Gateacre Garden Centre, Huyton	Number WS204

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Macbryde Homes Ltd	LKC 14 1086
	Location	**Dates** 15/10/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					0.05	MADE GROUND: Flagstone.			
					0.10	MADE GROUND: Construction sub base sand and cement.			
0.20-0.40	C1				(0.40)	MADE GROUND: Brown gravelly very sandy clay with frequent brick, ash, clinker, pottery and coal fragments. Rare rootlets. Sand is fine to medium. Gravel is fine to medium, subrounded to angular.			
0.50-0.70	B1				0.50				
					(0.20)	Soft consistency, brown gravelly very sandy CLAY with occasional coal fragments. Sand is fine to medium. Gravel is fine to medium, subrounded to angular.			
					0.70				
1.00-1.37	SPT 50/218		8,5/15,17,18		(0.67)	Strong red fine grained weathered SANDSTONE. (recovered as sand and gravel).			
					1.37	Complete at 1.37m			

Remarks
Borehole dry.
SPT refusal in sandstone at 1.37mbgl.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS204

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	Site Gateacre Garden Centre, Huyton	Number WS205

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Macbryde Homes Ltd	LKC 14 1086
	Location	**Dates** 15/10/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	MADE GROUND: Stone gravel.		
					0.20			
					(0.10)	MADE GROUND: Grey very gravelly sand with rare brick fragments. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular.		
0.30-0.50	C1				0.30			
					(0.20)	Brown gravelly very sandy CLAY with occasional coal fragments. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular of sandstone.		
					0.50			
						Strong red fine grained weathered SANDSTONE. (recovered as sand and gravel).		
					(0.89)			
1.00-1.39	SPT 50/243		5,12/14,12,17,7					
					1.39	Complete at 1.39m		

Remarks
Borehole Dry.
SPT refusal in sandstone at 1.39mbgl.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS205

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS206**	
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 15/10/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					0.05	MADE GROUND: Tarmacadam.			
					0.10	MADE GROUND: Construction sub base sand and gravel.			
0.20-0.40	C1				(0.30)				
					0.40	MADE GROUND: Brown gravelly very sandy CLAY with frequent brick and pottery fragments, occasional ash, clinker and rare rootlets. Sand is fine to medium. Gravel is fine to coarse, subangular to angular.			
0.80-1.20	SPT 50/247		5,9/13,15,14,8		(0.80)	Strong red fine grained weathered SANDSTONE. (recovered as sand and gravel).			
					1.20	Complete at 1.20m			

Remarks
SPT refusal in sandstone at 1.20mbgl.
Borehole dry.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS206

LK CONSULT LTD
Bury Business Centre, Kay Street, Bury, BL9 6BU
Tel: 0161 763 7200 web: www.thelkgroup.com

Site	Number
Gateacre Garden Centre, Huyton	**WS207**

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Macbryde Homes Ltd	LKC 14 1086

Location	Dates	Engineer	Sheet
	15/10/2014		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					0.05	MADE GROUND: Tarmacadam.			
0.10-0.20	C1				(0.15) 0.20	MADE GROUND: Construction sub base sand and gravel.			
0.30-0.50	C2				(0.30) 0.50	Soft consistency, brown gravelly very sandy CLAY with occasional coal fragments. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular.			
1.00-1.45	SPT N=21		2,3/3,3,5,10		(1.00)	Firm to stiff consistency, high strength, brown gravelly very sandy CLAY with occasional coal fragments. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular.			
1.50-1.89	SPT 50/237		14,10/15,15,17,3		1.50 (0.39) 1.89	Strong red fine grained weathered SANDSTONE. (recovered as sand and gravel).			
						Complete at 1.89m			

Remarks
SPT refused in sandstone at 1.89mbgl.
Borehole dry.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS207

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS208**
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 16/10/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.05	MADE GROUND: Carpet over tarmacadam over concrete.		
0.20-0.40	C1				(0.35)	MADE GROUND: Brown very gravelly sand with frequent brick fragments, occasional ash, clinker and coal fragments. Sand is fine to medium. Gravel is fine to coarse, subrounded to angular.		
					0.40			
0.60-0.80	B1				(0.40)	Soft consistency, brown gravelly very sandy CLAY with occasional coal fragments. Sand is fine to medium. Gravel is fine to coarse, subangular to angular of sandstone.		
					0.80			
1.00-1.33	SPT 50/180		6,11/12,18,20		(0.53)	Strong red with white lenses fine grained weathered SANDSTONE. (recovered as sand and gravel).		
					1.33	Complete at 1.33m		

Remarks
SPT refused in sandstone at 1.33mbgl.
Borehole dry.

Scale (approx)	**Logged By**
1:25	AF

Figure No.
LKC 14 1086.WS208

LK CONSULT LTD Bury Business Centre, Kay Street, Bury, BL9 6BU Tel: 0161 763 7200 web: www.thelkgroup.com	**Site** Gateacre Garden Centre, Huyton	**Number** **WS209**	
Excavation Method Drive-in Window Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** Macbryde Homes Ltd	**Job Number** LKC 14 1086
	Location	**Dates** 16/10/2014	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					0.05 (0.15) 0.20	MADE GROUND: Flagstone. MADE GROUND: Construction sub base sand and gravel mixed with cement.			
0.30-0.50	C1				(0.30) 0.50	MADE GROUND: Brown slightly clayey very gravelly sand with frequent brick fragments, rare pottery, concrete, ash and clinker fragments. Sand is fine to medium. Gravel is fine to medium, subangular to rounded. Becoming clayey with depth.			
0.60-0.80	C2				(0.30) 0.80	MADE GROUND: Brown to dark brown gravelly very sandy organic clay with occasional brick, coal and ash fragments. Sand is fine to medium. Gravel is fine to medium, subangular to angular. (STRONG ORGANIC ODOUR NOTED).			
1.00-1.45	SPT N=4		1,1/1,1,1,1		(1.00) 1.80	Soft consistency, brown gravelly very sandy CLAY with occasional coal fragments. Sand is fine to medium. Gravel is fine to medium, subrounded to angular of sandstone.			
2.00-2.43	SPT 50/282		3,8/15,9,10,16		(0.63) 2.43	Strong red fine grained weathered SANDSTONE. (recovered as sand and gravel). Complete at 2.43m			

Remarks
Borehole dry.
SPT refused in sandstone at 2.43mbgl.

Scale (approx)	Logged By
1:25	AF

Figure No.
LKC 14 1086.WS209

LK CONSULT LTD

Bury Business Centre, Kay Street, Bury, BL9 6BU
Tel: 0161 763 7200 web: www.thelkgroup.com

Site	Trial Pit Number
Gateacre Garden Centre, Huyton	TH201

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand excavated trial hole.			Macbryde Homes Ltd	LKC 14 1086

Location	Dates	Engineer	Sheet
	15/10/2014		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.05	MADE GROUND: Carpet over tiles over concrete.		
0.20-0.50	C1				(0.65)	MADE GROUND: Brown very gravelly sand with frequent brick, coal, concrete, tile, ash and clinker fragments. Sand is fine to medium. Gravel is fine to coarse, subangular to angular.		
0.50-0.50	PID 0.1ppm				0.70			
					(0.10)	Soft consistency, brown gravelly very sandy CLAY with occasional coal fragments. Sand is fine to medium. Gravel is fine to medium, subrounded to angular.		
					0.80			
					0.85	Strong red fine grained weathered SANDSTONE.		
						Complete at 0.85m		

Plan

Remarks

Trial hole obstructed in sandstone at 0.85mbgl.
Trial hole dry.

Scale (approx)	Logged By	Figure No.
1:25	AF	LKC 14 1086.TH201

APPENDIX C

CERTIFICATES OF ANALYSIS - CONTAMINATION

Leyden Kirby
Unit 25 Bury Business Centre
Kay Street
Bury, Lancashire
BL9 6BU

FAO M Pickford

LABORATORY TEST REPORT
Asbestos in Soils

Results of analysis of 14 samples
received 21 March 2014
LKC 14 1086 - Gateacre Garden Centre, Liverpool

Chemtest

Report Date
27 March 2014

Login Batch No: 254076

Qualitative Results

				SOP 2192	
				ACM Type	Asbestos Identification
Chemtest ID	Sample ID	Sample Desc	Depth (m)		
AJ98715	WS101		0.40	-	No Asbestos Detected
AJ98716	WS102		0.00 - 0.60	-	No Asbestos Detected
AJ98718	WS103		0.50	-	No Asbestos Detected
AJ98719	WS104		0.00 - 0.60	-	No Asbestos Detected
AJ98720	WS105		0.40	-	No Asbestos Detected
AJ98721	WS106		0.00 - 0.30	-	No Asbestos Detected
AJ98724	WS107		0.20	-	No Asbestos Detected
AJ98725	WS107		0.70 - 0.90	-	No Asbestos Detected
AJ98727	WS108		0.00 - 0.30	-	No Asbestos Detected
AJ98728	WS109		0.00	-	No Asbestos Detected
AJ98729	WS109		0.30 - 0.80	-	No Asbestos Detected
AJ98730	WS110		0.30	-	No Asbestos Detected
AJ98731	WS111		0.10 - 0.50	-	No Asbestos Detected
AJ98732	WS112		0.00 - 0.20	-	No Asbestos Detected

The detection limit for this method is 0.001%

Signed

Lauren Quinn
Asbestos Analyst

All tests undertaken between 27-Mar-2014 and 27-Mar-2014 at our asbestos testing facility in Coventry

Leyden Kirby
Unit 25 Bury Business Centre
Kay Street
Bury, Lancashire
BL9 6BU

FAO M Pickford

LABORATORY TEST REPORT

Results of analysis of 3 samples
received 21 March 2014

LKC 14 1086 - Gateacre Garden Centre, Liverpool

Chemtest
The right chemistry to deliver results

Report Date
27 March 2014

Login Batch No					**254076**		
Chemtest LIMS ID					AJ98733	AJ98734	AJ98735
Sample ID					WS103	WS104	WS108
Sample No							
Sampling Date					18/3/2014	18/3/2014	18/3/2014
Depth					0.50m	0.00m - 0.60m	0.00m
Matrix					*LEACHATE*	*LEACHATE*	*LEACHATE*
SOP↓	Determinand↓	CAS No↓	Units↓	*			
1010	pH	PH		U	11.0	10.0	9.5
1300	Cyanide (total)	57125	mg l-¹	U		<0.050	
	Cyanide (free)	57125	mg l-¹	U		<0.050	
1610	Total Organic Carbon	TOC	mg l-¹	N	11	17	100
1270	Hardness	HARD_TOT	mg CaCO3 l-¹	U	940	1400	300
1220	Sulfate	14808798	mg l-¹	U	27	7.7	1.3
1450	Arsenic	7440382	µg l-¹	U	2.3	4.9	33
	Boron	7440428	µg l-¹	U		<20	
	Cadmium	7440439	µg l-¹	U	<0.08	<0.08	0.08
	Chromium	7440473	µg l-¹	U	<1.0	<1.0	<1.0
	Copper	7440508	µg l-¹	U	2.7	1.3	12
	Mercury	7439976	µg l-¹	U	<0.5	<0.5	<0.5
	Nickel	7440020	µg l-¹	U	<1.0	<1.0	<1.0
	Lead	7439921	µg l-¹	U	3.3	<1.0	24
	Selenium	7782492	µg l-¹	U	<1.0	<1.0	1.0
	Vanadium	7440622	µg l-¹	U	16	7.7	19
	Zinc	7440666	µg l-¹	U	2.4	<1.0	5.2
1490	Chromium (hexavalent)	18540299	µg l-¹	U	<20	<20	<20
1675	TPH aliphatic >C5-C6		µg l-¹	N		< 0.1	
	TPH aliphatic >C6-C8		µg l-¹	N		< 0.1	
	TPH aliphatic >C8-C10		µg l-¹	N		< 0.1	
	TPH aliphatic >C10-C12		µg l-¹	N		< 0.1	
	TPH aliphatic >C12-C16		µg l-¹	N		< 0.1	
	TPH aliphatic >C16-C21		µg l-¹	N		< 0.1	

All tests undertaken between 21/03/2014 and 27/03/2014

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page.

Leyden Kirby
Unit 25 Bury Business Centre
Kay Street
Bury, Lancashire
BL9 6BU

FAO M Pickford

LABORATORY TEST REPORT

Results of analysis of 3 samples
received 21 March 2014

LKC 14 1086 - Gateacre Garden Centre, Liverpool

Chemtest
The right chemistry to deliver results

Report Date
27 March 2014

					254076		
					AJ98733	AJ98734	AJ98735
					WS103	WS104	WS108
					18/3/2014	18/3/2014	18/3/2014
					0.50m	0.00m - 0.60m	0.00m
					LEACHATE	*LEACHATE*	*LEACHATE*
1675	TPH aliphatic >C21-C35		µg l⁻¹	N		< 0.1	
	TPH aliphatic >C35-C44		µg l⁻¹	N		< 0.1	
	TPH aromatic >C5-C7		µg l⁻¹	N		< 0.1	
	TPH aromatic >C7-C8		µg l⁻¹	N		< 0.1	
	TPH aromatic >C8-C10		µg l⁻¹	N		< 0.1	
	TPH aromatic >C10-C12		µg l⁻¹	N		< 0.1	
	TPH aromatic >C12-C16		µg l⁻¹	N		< 0.1	
	TPH aromatic >C16-C21		µg l⁻¹	N		< 0.1	
	TPH aromatic >C21-C35		µg l⁻¹	N		< 0.1	
	TPH aromatic >C35-C44		µg l⁻¹	N		< 0.1	
	Total Petroleum Hydrocarbons		µg l⁻¹	N		< 10	
	Total Aliphatic Hydrocarbons		µg l⁻¹	N		< 5	
	Total Aromatic Hydrocarbons		µg l⁻¹	N		< 5	
1700	Naphthalene	91203	µg l⁻¹	N	<0.01	<0.01	<0.01
	Acenaphthylene	208968	µg l⁻¹	N	<0.01	<0.01	<0.01
	Acenaphthene	83329	µg l⁻¹	N	<0.01	<0.01	<0.01
	Fluorene	86737	µg l⁻¹	N	<0.01	<0.01	<0.01
	Phenanthrene	85018	µg l⁻¹	N	<0.01	<0.01	<0.01
	Anthracene	120127	µg l⁻¹	N	<0.01	<0.01	<0.01
	Fluoranthene	206440	µg l⁻¹	N	0.7	<0.01	<0.01
	Pyrene	129000	µg l⁻¹	N	0.7	<0.01	<0.01
	Benzo[a]anthracene	56553	µg l⁻¹	N	<0.01	<0.01	<0.01
	Chrysene	218019	µg l⁻¹	N	<0.01	<0.01	<0.01
	Benzo[b]fluoranthene	205992	µg l⁻¹	N	<0.01	<0.01	<0.01
	Benzo[k]fluoranthene	207089	µg l⁻¹	N	<0.01	<0.01	<0.01

All tests undertaken between 21/03/2014 and 27/03/2014

* Accreditation status

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Leyden Kirby
Unit 25 Bury Business Centre
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FAO M Pickford

LABORATORY TEST REPORT

Results of analysis of 3 samples
received 21 March 2014

LKC 14 1086 - Gateacre Garden Centre, Liverpool

Chemtest
The right chemistry to deliver results

Report Date
27 March 2014

					254076		
					AJ98733	AJ98734	AJ98735
					WS103	WS104	WS108
					18/3/2014	18/3/2014	18/3/2014
					0.50m	0.00m - 0.60m	0.00m
					LEACHATE	*LEACHATE*	*LEACHATE*
1700	Benzo[a]pyrene	50328	µg l-¹	N	<0.01	<0.01	<0.01
	Dibenzo[a,h]anthracene	53703	µg l-¹	N	<0.01	<0.01	<0.01
	Indeno[1,2,3-cd]pyrene	193395	µg l-¹	N	<0.01	<0.01	<0.01
	Benzo[g,h,i]perylene	191242	µg l-¹	N	<0.01	<0.01	<0.01
	Total (of 16) PAHs		µg l-¹	N	1.3	<0.2	<0.2
1750	Fuel Type (waters)			n/a		n/a	
1760	Methyl tert-butylether	1634044	µg l-¹	N		<1.0	
	Benzene	71432	µg l-¹	U		<1.0	
	Toluene	108883	µg l-¹	U		<1.0	
	Ethylbenzene	100414	µg l-¹	U		<1.0	
	m- & p-Xylene	1330207	µg l-¹	U		<1.0	
	o-Xylene	95476	µg l-¹	U		<1.0	
1920	Phenols (total)		mg l-¹	N		< 0.03	

All tests undertaken between 21/03/2014 and 27/03/2014

* Accreditation status

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Leyden Kirby
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LABORATORY TEST REPORT

Results of analysis of 17 samples
received 21 March 2014

LKC 14 1086 - Gateacre Garden Centre, Liverpool

Chemtest
The right chemistry to deliver results

Report Date
27 March 2014

Login Batch No						**254076**					
Chemtest LIMS ID						AJ98715	AJ98716	AJ98718	AJ98719	AJ98720	AJ98721
Sample ID						WS101	WS102	WS103	WS104	WS105	WS106
Sample No											
Sampling Date						18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014
Depth						0.40m	0.00m - 0.60m	0.50m	0.00m - 0.60m	0.40m	0.00m - 0.30m
Matrix						*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*							
2030	Moisture		%	M		13	8.08	15.5	6.34	7.02	14.5
	Stones content (>50mm)		%	M		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2040	Soil colour			M		brown	brown	brown	brown	brown	brown
	Soil texture			M		clay	sand	loam	loam	sand	loam
	Other material			M		stones	stones	stones	stones	stones, roots	stones
2010	pH			M		7.8	9.3	10.7	9.7	7.8	8.8
2300	Cyanide (free)	57125	mg kg-¹	M					<0.50	<0.50	
	Cyanide (total)	57125	mg kg-¹	M					1.3	<0.50	
2625	Organic matter		%	M		2.9	11	11	16	13	17
2120	Boron (hot water soluble)	7440428	mg kg-¹	M					0.6	1.0	
	Sulfate (2:1 water soluble) as SO4	14808798	g l-¹	M		<0.01	0.15	0.82	0.17	0.09	0.20
2490	Chromium (hexavalent)	18540299	mg kg-¹	N		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2450	Arsenic	7440382	mg kg-¹	M		20	12	23	23	21	33
	Cadmium	7440439	mg kg-¹	M		0.90	0.29	0.17	0.26	0.29	0.26
	Chromium	7440473	mg kg-¹	M		20	16	21	17	44	24
	Copper	7440508	mg kg-¹	M		55	43	59	59	46	78
	Mercury	7439976	mg kg-¹	M		0.29	<0.10	<0.10	0.22	0.26	0.22
	Nickel	7440020	mg kg-¹	M		22	27	32	35	40	50
	Lead	7439921	mg kg-¹	M		180	56	74	50	130	64
	Selenium	7782492	mg kg-¹	M		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	Vanadium	7440622	mg kg-¹	M		18	35	35	33	37	62
	Zinc	7440666	mg kg-¹	M		260	52	76	53	100	69
2675	TPH aliphatic >C5-C6		mg kg-¹	N					< 0.1	< 0.1	
	TPH aliphatic >C6-C8		mg kg-¹	N					< 0.1	< 0.1	

All tests undertaken between 21/03/2014 and 27/03/2014

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LABORATORY TEST REPORT

Results of analysis of 17 samples
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LKC 14 1086 - Gateacre Garden Centre, Liverpool

Chemtest
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Report Date
27 March 2014

Login Batch No					**254076**						
Chemtest LIMS ID					AJ98724	AJ98725	AJ98727	AJ98728	AJ98729	AJ98730
Sample ID					WS107	WS107	WS108	WS109	WS109	WS110
Sample No										
Sampling Date					18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014	19/3/2014
Depth					0.20m	0.70m - 0.90m	0.00m - 0.30m	0.00m	0.30m - 0.80m	0.30m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*						
2030	Moisture		%	M	20.5	16	16.3	10.2	12.1	11.2
	Stones content (>50mm)		%	M	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2040	Soil colour			M	brown	brown	brown	brown	brown	brown
	Soil texture			M	clay	clay	clay	clay	clay	sand
	Other material			M	none	none	stones	stones	stones	stones
2010	pH			M	7.7	8.1	8.1	8.0	7.5	8.3
2300	Cyanide (free)	57125	mg kg^{-1}	M						
	Cyanide (total)	57125	mg kg^{-1}	M						
2625	Organic matter		%	M	9.5	0.88	3.4	9.5	1.1	7.1
2120	Boron (hot water soluble)	7440428	mg kg^{-1}	M						
	Sulfate (2:1 water soluble) as SO4	14808798	g l^{-1}	M	0.05	<0.01	0.04	0.05	<0.01	<0.01
2490	Chromium (hexavalent)	18540299	mg kg^{-1}	N	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2450	Arsenic	7440382	mg kg^{-1}	M	54	10	17	21	6.4	20
	Cadmium	7440439	mg kg^{-1}	M	1.8	<0.10	0.30	0.36	<0.10	0.30
	Chromium	7440473	mg kg^{-1}	M	50	43	28	14	20	18
	Copper	7440508	mg kg^{-1}	M	120	21	43	39	13	27
	Mercury	7439976	mg kg^{-1}	M	0.44	<0.10	0.19	0.27	<0.10	0.11
	Nickel	7440020	mg kg^{-1}	M	32	37	22	19	19	20
	Lead	7439921	mg kg^{-1}	M	740	35	140	110	43	290
	Selenium	7782492	mg kg^{-1}	M	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	Vanadium	7440622	mg kg^{-1}	M	43	37	27	21	21	29
	Zinc	7440666	mg kg^{-1}	M	300	51	100	63	35	78
2675	TPH aliphatic >C5-C6		mg kg^{-1}	N						
	TPH aliphatic >C6-C8		mg kg^{-1}	N						

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LABORATORY TEST REPORT

Results of analysis of 17 samples
received 21 March 2014

LKC 14 1086 - Gateacre Garden Centre, Liverpool

Chemtest
The right chemistry to deliver results

Report Date
27 March 2014

Login Batch No						**254076**	
Chemtest LIMS ID						AJ98731	AJ98732
Sample ID						WS111	WS112
Sample No							
Sampling Date						19/3/2014	19/3/2014
Depth						0.10m - 0.50m	0.00m - 0.20m
Matrix						*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*			
2030	Moisture		%	M		15	9.91
	Stones content (>50mm)		%	M		<0.02	<0.02
2040	Soil colour			M		brown	brown
	Soil texture			M		clay	loam
	Other material			M		none	stones
2010	pH			M		7.8	8.1
2300	Cyanide (free)	57125	mg kg-1	M			
	Cyanide (total)	57125	mg kg-1	M			
2625	Organic matter		%	M		2.9	11
2120	Boron (hot water soluble)	7440428	mg kg-1	M			
	Sulfate (2:1 water soluble) as SO4	14808798	g l-1	M		0.06	<0.01
2490	Chromium (hexavalent)	18540299	mg kg-1	N		<0.5	<0.5
2450	Arsenic	7440382	mg kg-1	M		19	27
	Cadmium	7440439	mg kg-1	M		0.28	0.28
	Chromium	7440473	mg kg-1	M		24	23
	Copper	7440508	mg kg-1	M		48	84
	Mercury	7439976	mg kg-1	M		0.30	0.13
	Nickel	7440020	mg kg-1	M		26	39
	Lead	7439921	mg kg-1	M		280	94
	Selenium	7782492	mg kg-1	M		<0.20	<0.20
	Vanadium	7440622	mg kg-1	M		29	37
	Zinc	7440666	mg kg-1	M		140	150
2675	TPH aliphatic >C5-C6		mg kg-1	N			
	TPH aliphatic >C6-C8		mg kg-1	N			

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LABORATORY TEST REPORT

Results of analysis of 17 samples
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Chemtest
The right chemistry to deliver results

Report Date
27 March 2014

					254076					
					AJ98715	AJ98716	AJ98718	AJ98719	AJ98720	AJ98721
					WS101	WS102	WS103	WS104	WS105	WS106
					18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014
					0.40m	0.00m - 0.60m	0.50m	0.00m - 0.60m	0.40m	0.00m - 0.30m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2675	TPH aliphatic >C8-C10		mg kg-1	N				< 0.1	< 0.1	
	TPH aliphatic >C10-C12		mg kg-1	M				6.0	< 1	
	TPH aliphatic >C12-C16		mg kg-1	M				49	< 1	
	TPH aliphatic >C16-C21		mg kg-1	M				1.7	< 1	
	TPH aliphatic >C21-C35		mg kg-1	M				< 1	< 1	
	TPH aliphatic >C35-C44		mg kg-1	N				< 1	< 1	
	TPH aromatic >C5-C7		mg kg-1	N				< 0.1	< 0.1	
	TPH aromatic >C7-C8		mg kg-1	N				< 0.1	< 0.1	
	TPH aromatic >C8-C10		mg kg-1	N				< 0.1	< 0.1	
	TPH aromatic >C10-C12		mg kg-1	N				3.0	< 1	
	TPH aromatic >C12-C16		mg kg-1	M				7.5	< 1	
	TPH aromatic >C16-C21		mg kg-1	M				3.7	< 1	
	TPH aromatic >C21-C35		mg kg-1	N				14	< 1	
	TPH aromatic >C35-C44		mg kg-1	N				< 1	< 1	
	Total Petroleum Hydrocarbons		mg kg-1	N				85	< 10	
2700	Naphthalene	91203	mg kg-1	M	0.32	< 0.1	0.5	< 0.1	< 0.1	< 0.1
	Acenaphthylene	208968	mg kg-1	M	0.77	< 0.1	0.59	< 0.1	< 0.1	< 0.1
	Acenaphthene	83329	mg kg-1	M	0.34	< 0.1	0.28	< 0.1	< 0.1	< 0.1
	Fluorene	86737	mg kg-1	M	0.51	< 0.1	0.17	< 0.1	< 0.1	< 0.1
	Phenanthrene	85018	mg kg-1	M	3.1	< 0.1	1.8	1.6	0.53	< 0.1
	Anthracene	120127	mg kg-1	M	0.96	< 0.1	0.32	0.25	0.13	< 0.1
	Fluoranthene	206440	mg kg-1	M	6.7	< 0.1	2	2.7	0.87	< 0.1
	Pyrene	129000	mg kg-1	M	7.6	< 0.1	2.1	3.9	1.1	< 0.1
	Benzo[a]anthracene	56553	mg kg-1	M	4	< 0.1	0.77	1.4	0.33	< 0.1
	Chrysene	218019	mg kg-1	M	4.7	< 0.1	0.63	2.1	0.55	< 0.1

All tests undertaken between 21/03/2014 and 27/03/2014

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27 March 2014

					254076					
					AJ98724	AJ98725	AJ98727	AJ98728	AJ98729	AJ98730
					WS107	WS107	WS108	WS109	WS109	WS110
					18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014	19/3/2014
					0.20m	0.70m - 0.90m	0.00m - 0.30m	0.00m	0.30m - 0.80m	0.30m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2675	TPH aliphatic >C8-C10		mg kg-1	N						
	TPH aliphatic >C10-C12		mg kg-1	M						
	TPH aliphatic >C12-C16		mg kg-1	M						
	TPH aliphatic >C16-C21		mg kg-1	M						
	TPH aliphatic >C21-C35		mg kg-1	M						
	TPH aliphatic >C35-C44		mg kg-1	N						
	TPH aromatic >C5-C7		mg kg-1	N						
	TPH aromatic >C7-C8		mg kg-1	N						
	TPH aromatic >C8-C10		mg kg-1	N						
	TPH aromatic >C10-C12		mg kg-1	N						
	TPH aromatic >C12-C16		mg kg-1	M						
	TPH aromatic >C16-C21		mg kg-1	M						
	TPH aromatic >C21-C35		mg kg-1	N						
	TPH aromatic >C35-C44		mg kg-1	N						
	Total Petroleum Hydrocarbons		mg kg-1	N						
2700	Naphthalene	91203	mg kg-1	M	0.13	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Acenaphthylene	208968	mg kg-1	M	0.33	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Acenaphthene	83329	mg kg-1	M	0.17	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Fluorene	86737	mg kg-1	M	0.21	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Phenanthrene	85018	mg kg-1	M	1.1	< 0.1	0.63	< 0.1	< 0.1	0.45
	Anthracene	120127	mg kg-1	M	0.17	< 0.1	< 0.1	< 0.1	< 0.1	0.13
	Fluoranthene	206440	mg kg-1	M	1.6	< 0.1	0.71	< 0.1	< 0.1	0.49
	Pyrene	129000	mg kg-1	M	1.8	< 0.1	0.82	< 0.1	< 0.1	0.6
	Benzo[a]anthracene	56553	mg kg-1	M	0.59	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Chrysene	218019	mg kg-1	M	0.79	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

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LABORATORY TEST REPORT

Results of analysis of 17 samples
received 21 March 2014

LKC 14 1086 - Gateacre Garden Centre, Liverpool

Chemtest
The right chemistry to deliver results

Report Date
27 March 2014

					254076	
					AJ98731	AJ98732
					WS111	WS112
					19/3/2014	19/3/2014
					0.10m - 0.50m	0.00m - 0.20m
					SOIL	*SOIL*
2675	TPH aliphatic >C8-C10		mg kg-1	N		
	TPH aliphatic >C10-C12		mg kg-1	M		
	TPH aliphatic >C12-C16		mg kg-1	M		
	TPH aliphatic >C16-C21		mg kg-1	M		
	TPH aliphatic >C21-C35		mg kg-1	M		
	TPH aliphatic >C35-C44		mg kg-1	N		
	TPH aromatic >C5-C7		mg kg-1	N		
	TPH aromatic >C7-C8		mg kg-1	N		
	TPH aromatic >C8-C10		mg kg-1	N		
	TPH aromatic >C10-C12		mg kg-1	N		
	TPH aromatic >C12-C16		mg kg-1	M		
	TPH aromatic >C16-C21		mg kg-1	M		
	TPH aromatic >C21-C35		mg kg-1	N		
	TPH aromatic >C35-C44		mg kg-1	N		
	Total Petroleum Hydrocarbons		mg kg-1	N		
2700	Naphthalene	91203	mg kg-1	M	< 0.1	< 0.1
	Acenaphthylene	208968	mg kg-1	M	< 0.1	< 0.1
	Acenaphthene	83329	mg kg-1	M	< 0.1	< 0.1
	Fluorene	86737	mg kg-1	M	< 0.1	< 0.1
	Phenanthrene	85018	mg kg-1	M	0.64	0.86
	Anthracene	120127	mg kg-1	M	0.14	0.22
	Fluoranthene	206440	mg kg-1	M	1	0.91
	Pyrene	129000	mg kg-1	M	1.3	1
	Benzo[a]anthracene	56553	mg kg-1	M	0.79	0.34
	Chrysene	218019	mg kg-1	M	1.3	0.67

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Results of analysis of 17 samples
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Chemtest
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					254076					
					AJ98715	AJ98716	AJ98718	AJ98719	AJ98720	AJ98721
					WS101	WS102	WS103	WS104	WS105	WS106
					18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014
					0.40m	0.00m - 0.60m	0.50m	0.00m - 0.60m	0.40m	0.00m - 0.30m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2700	Benzo[b]fluoranthene	205992	mg kg-¹	N	5	< 0.1	1.4	3	0.9	< 0.1
	Benzo[k]fluoranthene	207089	mg kg-¹	N	2.1	< 0.1	0.8	0.85	0.54	< 0.1
	Benzo[a]pyrene	50328	mg kg-¹	M	4.3	< 0.1	0.99	3.4	1	< 0.1
	Dibenzo[a,h]anthracene	53703	mg kg-¹	M	1.1	< 0.1	< 0.1	0.69	< 0.1	< 0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg-¹	M	2.7	< 0.1	< 0.1	3.2	< 0.1	< 0.1
	Benzo[g,h,i]perylene	191242	mg kg-¹	M	2.7	< 0.1	< 0.1	4.3	< 0.1	< 0.1
	Total (of 16) PAHs		mg kg-¹	M	47	< 2	12	27	6	< 2
2750	Fuel Type (soils)			N				w/diesel PAH	n/a	
2760	Methyl tert-butylether	1634044	µg kg-¹	M				< 1.0	< 1.0	
	Benzene	71432	µg kg-¹	M				< 1.0	< 1.0	
	Toluene	108883	µg kg-¹	M				< 1.0	< 1.0	
	Ethylbenzene	100414	µg kg-¹	M				< 1.0	< 1.0	
	m- & p-Xylene	1330207	µg kg-¹	M				< 1.0	< 1.0	
	o-Xylene	95476	µg kg-¹	M				< 1.0	< 1.0	
2820	Azinphos methyl	86500	mg kg-¹	N						
	Coumaphos	56724	mg kg-¹	N						
	Demeton (O+S)	8065483	mg kg-¹	N						
	Disulfoton	298044	mg kg-¹	N						
	Fensulfothion	115902	mg kg-¹	N						
	Fenthion	55389	mg kg-¹	N						
	Phorate	298022	mg kg-¹	N						
	Prothiophos	34643464	mg kg-¹	N						
	Sulprofos	35400432	mg kg-¹	N						
	Trichloronate	327980	mg kg-¹	N						
2830	Ametryn	834128	mg kg-¹	N						

All tests undertaken between 21/03/2014 and 27/03/2014

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page.

Leyden Kirby
Unit 25 Bury Business Centre
Kay Street
Bury, Lancashire
BL9 6BU

FAO M Pickford

LABORATORY TEST REPORT

Results of analysis of 17 samples
received 21 March 2014

LKC 14 1086 - Gateacre Garden Centre, Liverpool

Chemtest
The right chemistry to deliver results

Report Date
27 March 2014

					254076					
					AJ98724	AJ98725	AJ98727	AJ98728	AJ98729	AJ98730
					WS107	WS107	WS108	WS109	WS109	WS110
					18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014	19/3/2014
					0.20m	0.70m - 0.90m	0.00m - 0.30m	0.00m	0.30m - 0.80m	0.30m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2700	Benzo[b]fluoranthene	205992	mg kg-¹	N	1.4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Benzo[k]fluoranthene	207089	mg kg-¹	N	0.83	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Benzo[a]pyrene	50328	mg kg-¹	M	1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Dibenzo[a,h]anthracene	53703	mg kg-¹	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg-¹	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Benzo[g,h,i]perylene	191242	mg kg-¹	M	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Total (of 16) PAHs		mg kg-¹	M	10	< 2	2.2	< 2	< 2	< 2
2750	Fuel Type (soils)			N						
2760	Methyl tert-butylether	1634044	µg kg-¹	M						
	Benzene	71432	µg kg-¹	M						
	Toluene	108883	µg kg-¹	M						
	Ethylbenzene	100414	µg kg-¹	M						
	m- & p-Xylene	1330207	µg kg-¹	M						
	o-Xylene	95476	µg kg-¹	M						
2820	Azinphos methyl	86500	mg kg-¹	N	< 0.2					< 0.2
	Coumaphos	56724	mg kg-¹	N	< 0.2					< 0.2
	Demeton (O+S)	8065483	mg kg-¹	N	< 0.2					< 0.2
	Disulfoton	298044	mg kg-¹	N	< 0.2					< 0.2
	Fensulfothion	115902	mg kg-¹	N	< 0.2					< 0.2
	Fenthion	55389	mg kg-¹	N	< 0.2					< 0.2
	Phorate	298022	mg kg-¹	N	< 0.2					< 0.2
	Prothiophos	34643464	mg kg-¹	N	< 0.2					< 0.2
	Sulprofos	35400432	mg kg-¹	N	< 0.2					< 0.2
	Trichloronate	327980	mg kg-¹	N	< 0.2					< 0.2
2830	Ametryn	834128	mg kg-¹	N	< 0.2					< 0.2

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					254076	
					AJ98731	AJ98732
					WS111	WS112
					19/3/2014	19/3/2014
					0.10m - 0.50m	0.00m - 0.20m
					SOIL	*SOIL*
2700	Benzo[b]fluoranthene	205992	mg kg-¹	N	0.74	0.69
	Benzo[k]fluoranthene	207089	mg kg-¹	N	0.38	0.33
	Benzo[a]pyrene	50328	mg kg-¹	M	0.83	0.63
	Dibenzo[a,h]anthracene	53703	mg kg-¹	M	0.29	< 0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg-¹	M	0.69	< 0.1
	Benzo[g,h,i]perylene	191242	mg kg-¹	M	0.62	< 0.1
	Total (of 16) PAHs		mg kg-¹	M	8.7	5.7
2750	Fuel Type (soils)			N		
2760	Methyl tert-butylether	1634044	µg kg-¹	M		
	Benzene	71432	µg kg-¹	M		
	Toluene	108883	µg kg-¹	M		
	Ethylbenzene	100414	µg kg-¹	M		
	m- & p-Xylene	1330207	µg kg-¹	M		
	o-Xylene	95476	µg kg-¹	M		
2820	Azinphos methyl	86500	mg kg-¹	N		< 0.2
	Coumaphos	56724	mg kg-¹	N		< 0.2
	Demeton (O+S)	8065483	mg kg-¹	N		< 0.2
	Disulfoton	298044	mg kg-¹	N		< 0.2
	Fensulfothion	115902	mg kg-¹	N		< 0.2
	Fenthion	55389	mg kg-¹	N		< 0.2
	Phorate	298022	mg kg-¹	N		< 0.2
	Prothiophos	34643464	mg kg-¹	N		< 0.2
	Sulprofos	35400432	mg kg-¹	N		< 0.2
	Trichloronate	327980	mg kg-¹	N		< 0.2
2830	Ametryn	834128	mg kg-¹	N		< 0.2

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					254076					
					AJ98715	AJ98716	AJ98718	AJ98719	AJ98720	AJ98721
					WS101	WS102	WS103	WS104	WS105	WS106
					18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014
					0.40m	0.00m - 0.60m	0.50m	0.00m - 0.60m	0.40m	0.00m - 0.30m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2830	Atraton	1610179	mg kg-¹	N						
	Atrazine	1912249	mg kg-¹	N						
	Prometon	1610180	mg kg-¹	N						
	Prometryn	7287196	mg kg-¹	N						
	Propazine	139402	mg kg-¹	N						
	Secbumeton	26259450	mg kg-¹	N						
	Simazine	122349	mg kg-¹	N						
	Simetryn	1014706	mg kg-¹	N						
	Terbuthylazine	5915413	mg kg-¹	N						
	Terbutryn	886500	mg kg-¹	N						
2840	alpha-HCH	319846	mg kg-¹	N						
	gamma-HCH	58899	mg kg-¹	N						
	beta-HCH	319857	mg kg-¹	N						
	Heptachlor	76448	mg kg-¹	N						
	delta-HCH	319868	mg kg-¹	N						
	Aldrin	309002	mg kg-¹	N						
	Heptachlor epoxide	1024573	mg kg-¹	N						
	gamma-Chlordane	5103742	mg kg-¹	N						
	alpha-Chlordane	5103719	mg kg-¹	N						
	Endosulfan I	959988	mg kg-¹	N						
	4,4'-DDE	72559	mg kg-¹	N						
	Dieldrin	60571	mg kg-¹	N						
	Endrin	72208	mg kg-¹	N						
	4,4'-DDD	72548	mg kg-¹	N						
	Endosulfan II	33213659	mg kg-¹	N						

All tests undertaken between 21/03/2014 and 27/03/2014

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					254076					
					AJ98724	AJ98725	AJ98727	AJ98728	AJ98729	AJ98730
					WS107	WS107	WS108	WS109	WS109	WS110
					18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014	19/3/2014
					0.20m	0.70m - 0.90m	0.00m - 0.30m	0.00m	0.30m - 0.80m	0.30m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2830	Atraton	1610179	mg kg-¹	N	< 0.2					< 0.2
	Atrazine	1912249	mg kg-¹	N	< 0.2					< 0.2
	Prometon	1610180	mg kg-¹	N	< 0.2					< 0.2
	Prometryn	7287196	mg kg-¹	N	< 0.2					< 0.2
	Propazine	139402	mg kg-¹	N	< 0.2					< 0.2
	Secbumeton	26259450	mg kg-¹	N	< 0.2					< 0.2
	Simazine	122349	mg kg-¹	N	< 0.2					< 0.2
	Simetryn	1014706	mg kg-¹	N	< 0.2					< 0.2
	Terbuthylazine	5915413	mg kg-¹	N	< 0.2					< 0.2
	Terbutryn	886500	mg kg-¹	N	< 0.2					< 0.2
2840	alpha-HCH	319846	mg kg-¹	N	< 0.2					< 0.2
	gamma-HCH	58899	mg kg-¹	N	< 0.2					< 0.2
	beta-HCH	319857	mg kg-¹	N	< 0.2					< 0.2
	Heptachlor	76448	mg kg-¹	N	< 0.2					< 0.2
	delta-HCH	319868	mg kg-¹	N	< 0.2					< 0.2
	Aldrin	309002	mg kg-¹	N	< 0.2					< 0.2
	Heptachlor epoxide	1024573	mg kg-¹	N	< 0.2					< 0.2
	gamma-Chlordane	5103742	mg kg-¹	N	< 0.2					< 0.2
	alpha-Chlordane	5103719	mg kg-¹	N	< 0.2					< 0.2
	Endosulfan I	959988	mg kg-¹	N	< 0.2					< 0.2
	4,4'-DDE	72559	mg kg-¹	N	< 0.2					< 0.2
	Dieldrin	60571	mg kg-¹	N	< 0.2					< 0.2
	Endrin	72208	mg kg-¹	N	< 0.2					< 0.2
	4,4'-DDD	72548	mg kg-¹	N	< 0.2					< 0.2
	Endosulfan II	33213659	mg kg-¹	N	< 0.2					< 0.2

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					AJ98731	AJ98732
					WS111	WS112
					19/3/2014	19/3/2014
					0.10m - 0.50m	0.00m - 0.20m
					SOIL	*SOIL*
2830	Atraton	1610179	mg kg-¹	N		< 0.2
	Atrazine	1912249	mg kg-¹	N		< 0.2
	Prometon	1610180	mg kg-¹	N		< 0.2
	Prometryn	7287196	mg kg-¹	N		< 0.2
	Propazine	139402	mg kg-¹	N		< 0.2
	Secbumeton	26259450	mg kg-¹	N		< 0.2
	Simazine	122349	mg kg-¹	N		< 0.2
	Simetryn	1014706	mg kg-¹	N		< 0.2
	Terbuthylazine	5915413	mg kg-¹	N		< 0.2
	Terbutryn	886500	mg kg-¹	N		< 0.2
2840	alpha-HCH	319846	mg kg-¹	N		< 0.2
	gamma-HCH	58899	mg kg-¹	N		< 0.2
	beta-HCH	319857	mg kg-¹	N		< 0.2
	Heptachlor	76448	mg kg-¹	N		< 0.2
	delta-HCH	319868	mg kg-¹	N		< 0.2
	Aldrin	309002	mg kg-¹	N		< 0.2
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	gamma-Chlordane	5103742	mg kg-¹	N		< 0.2
	alpha-Chlordane	5103719	mg kg-¹	N		< 0.2
	Endosulfan I	959988	mg kg-¹	N		< 0.2
	4,4'-DDE	72559	mg kg-¹	N		< 0.2
	Dieldrin	60571	mg kg-¹	N		< 0.2
	Endrin	72208	mg kg-¹	N		< 0.2
	4,4'-DDD	72548	mg kg-¹	N		< 0.2
	Endosulfan II	33213659	mg kg-¹	N		< 0.2

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					WS101	WS102	WS103	WS104	WS105	WS106
					18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014
					0.40m	0.00m - 0.60m	0.50m	0.00m - 0.60m	0.40m	0.00m - 0.30m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2840	4,4'-DDT	50293	mg kg-¹	N						
	Endrin aldehyde	7421934	mg kg-¹	N						
	Endosulfan sulfate	1031078	mg kg-¹	N						
	Methoxychlor	72435	mg kg-¹	N						
	Endrin ketone	53494705	mg kg-¹	N						
	Hexachlorobutadiene	87683	mg kg-¹	N						
2920	Phenols (total)		mg kg-¹	M				<0.3	<0.3	

All tests undertaken between 21/03/2014 and 27/03/2014

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					AJ98724	AJ98725	AJ98727	AJ98728	AJ98729	AJ98730
					WS107	WS107	WS108	WS109	WS109	WS110
					18/3/2014	18/3/2014	18/3/2014	18/3/2014	18/3/2014	19/3/2014
					0.20m	0.70m - 0.90m	0.00m - 0.30m	0.00m	0.30m - 0.80m	0.30m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2840	4,4'-DDT	50293	mg kg-¹	N	< 0.2					< 0.2
	Endrin aldehyde	7421934	mg kg-¹	N	< 0.2					< 0.2
	Endosulfan sulfate	1031078	mg kg-¹	N	< 0.2					< 0.2
	Methoxychlor	72435	mg kg-¹	N	< 0.2					< 0.2
	Endrin ketone	53494705	mg kg-¹	N	< 0.2					< 0.2
	Hexachlorobutadiene	87683	mg kg-¹	N	< 0.2					< 0.2
2920	Phenols (total)		mg kg-¹	M						

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					AJ98731	AJ98732
					WS111	WS112
					19/3/2014	19/3/2014
					0.10m - 0.50m	0.00m - 0.20m
					SOIL	*SOIL*
2840	4,4'-DDT	50293	mg kg-¹	N		< 0.2
	Endrin aldehyde	7421934	mg kg-¹	N		< 0.2
	Endosulfan sulfate	1031078	mg kg-¹	N		< 0.2
	Methoxychlor	72435	mg kg-¹	N		< 0.2
	Endrin ketone	53494705	mg kg-¹	N		< 0.2
	Hexachlorobutadiene	87683	mg kg-¹	N		< 0.2
2920	Phenols (total)		mg kg-¹	M		

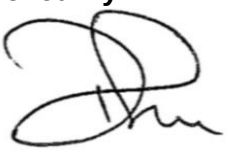
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report Number:	14-12449 Issue-1
Initial Date of Issue:	24-Oct-14
Client:	Leyden Kirby
Client Address:	Unit 25 Bury Business Centre Kay Street Bury Lancashire BL9 6BU
Contact(s):	Michelle Pickford
Project:	LKC 14 1086 - Gateacre Garden, Centre. Liverpool

Quotation No.:		**Date Received:**	20-Oct-14
Order No.:	731030	**Date Instructed:**	20-Oct-14
No. of Samples:	15	**Results Due:**	22-Oct-14
Turnaround: (Weekdays)	3		
Date Approved:	24-Oct-14		

Approved By:



Details: Darrell Hall, Laboratory Director

Chemtest
The right chemistry to deliver results

Results Summary - Soil

Project: LKC 14 1086 - Gateacre Garden, Centre. Liverpool

Client: Leyden Kirby													
Quotation No.:				**Chemtest Job No.:**	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449
Order No.: 731030				**Chemtest Sample ID.:**	60605	60606	60607	60608	60609	60610	60611	60612	60613
				Client Sample Ref.:									
				Client Sample ID.:	WS201	WS202	WS203	WS204	WS205	WS206	WS207	WS207	TH201
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0	0.4	0.1	0.2	0.3	0.2	0.1	0.3	0.2
				Bottom Depth(m):	0.3	0.6	0.3	0.4	0.5	0.4	0.2	0.5	0.5
				Date Sampled:	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192			-	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.02	14	15	8.0	19	9.5	20	2.8	12	10
Soil Colour	N				brown	brown	brown	brown	brown	brown	brown	brown	brown
Other Material	N				stones	stones	stones	stones	stones	stones	stones	stones	stones
Soil Texture	N				clay	clay	sand	clay	sand	clay	sand	clay	sand
pH	M	2010			8.9	7.4	8.0	7.5	7.9	7.6	8.4	7.8	9.3
Boron (Hot Water Soluble)	M	2120	mg/kg	0.4		0.68	0.66			0.54			
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/L	0.01	0.30	0.037	0.12	0.043	0.020	0.054	0.084	0.020	1.3
Cyanide (Total)	M	2300	mg/kg	0.5		< 0.50	< 0.50			< 0.50			
Cyanide (Free)	M	2300	mg/kg	0.5		< 0.50	< 0.50			< 0.50			
Arsenic	M	2450	mg/kg	1	8.9	6.7	19	14	10	15	7.4	< 1.0	31
Cadmium	M	2450	mg/kg	0.1	0.18	0.17	0.43	0.53	0.11	0.33	0.19	< 0.10	0.24
Chromium	M	2450	mg/kg	1	35	17	23	26	21	22	5.2	23	28
Copper	M	2450	mg/kg	1	24	42	49	62	31	47	6.2	13	59
Mercury	M	2450	mg/kg	0.1	< 0.10	0.12	0.27	0.30	< 0.10	0.41	< 0.10	< 0.10	0.14
Nickel	M	2450	mg/kg	1	32	20	28	28	23	19	5.0	23	36
Lead	M	2450	mg/kg	1	48	160	360	920	47	280	23	30	100
Selenium	M	2450	mg/kg	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5	36	14	16	22	7.9	73	< 5.0	< 5.0	38
Zinc	M	2450	mg/kg	1	75	85	160	380	79	66	11	27	78
Chromium (Hexavalent)	N	2490	mg/kg	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.4	1.9	1.7	4.7	6.2	3.1	7.2	1.1	0.93	4.7
Fuel Type	N	2670				N/A	Lube Oil			N/A			
Aliphatic TPH >C5-C6	N	2675	mg/kg	0.1		< 0.10	< 0.10			< 0.10			
Aliphatic TPH >C6-C8	N	2675	mg/kg	0.1		< 0.10	< 0.10			< 0.10			
Aliphatic TPH >C8-C10	M	2675	mg/kg	0.1		< 0.10	< 0.10			< 0.10			
Aliphatic TPH >C10-C12	M	2675	mg/kg	1		< 1.0	< 1.0			< 1.0			
Aliphatic TPH >C12-C16	M	2675	mg/kg	1		< 1.0	< 1.0			< 1.0			
Aliphatic TPH >C16-C21	M	2675	mg/kg	1		< 1.0	< 1.0			< 1.0			
Aliphatic TPH >C21-C35	M	2675	mg/kg	1		< 1.0	190			< 1.0			
Aliphatic TPH >C35-C44	M	2675	mg/kg	1		< 1.0	36			< 1.0			

Chemtest
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Results Summary - Soil

Project: LKC 14 1086 - Gateacre Garden, Centre. Liverpool

Client: Leyden Kirby				Chemtest Job No.:	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449
Quotation No.:				Chemtest Sample ID.:	60605	60606	60607	60608	60609	60610	60611	60612	60613
Order No.: 731030				Client Sample Ref.:									
				Client Sample ID.:	WS201	WS202	WS203	WS204	WS205	WS206	WS207	WS207	TH201
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0	0.4	0.1	0.2	0.3	0.2	0.1	0.3	0.2
				Bottom Depth(m):	0.3	0.6	0.3	0.4	0.5	0.4	0.2	0.5	0.5
				Date Sampled:	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Total Aliphatic Hydrocarbons	M	2675	mg/kg	5		< 5.0	220			< 5.0			
Aromatic TPH >C5-C7	N	2675	mg/kg	0.1		< 0.10	< 0.10			< 0.10			
Aromatic TPH >C7-C8	N	2675	mg/kg	0.1		< 0.10	< 0.10			< 0.10			
Aromatic TPH >C8-C10	M	2675	mg/kg	0.1		< 0.10	< 0.10			< 0.10			
Aromatic TPH >C10-C12	M	2675	mg/kg	1		< 1.0	< 1.0			< 1.0			
Aromatic TPH >C12-C16	M	2675	mg/kg	1		< 1.0	< 1.0			< 1.0			
Aromatic TPH >C16-C21	M	2675	mg/kg	1		3.2	< 1.0			< 1.0			
Aromatic TPH >C21-C35	M	2675	mg/kg	1		4.4	130			< 1.0			
Aromatic TPH >C35-C44	N	2675	mg/kg	1		< 1.0	< 1.0			< 1.0			
Total Aromatic Hydrocarbons	M	2675	mg/kg	5		7.6	130			< 5.0			
Total Petroleum Hydrocarbons	M	2675	mg/kg	10		< 10	350			< 10			
Naphthalene	M	2700	mg/kg	0.1	< 0.10	< 0.10	0.51	0.30	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.1	< 0.10	< 0.10	0.25	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.1	< 0.10	< 0.10	0.19	0.12	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.1	< 0.10	< 0.10	0.11	0.18	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.1	< 0.10	< 0.10	0.55	0.80	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.1	< 0.10	< 0.10	0.14	0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.1	1.3	1.6	1.4	1.2	0.40	0.77	< 0.10	< 0.10	0.36
Pyrene	M	2700	mg/kg	0.1	1.0	1.6	1.4	1.2	0.31	0.72	< 0.10	< 0.10	0.29
Benzo[a]anthracene	M	2700	mg/kg	0.1	0.51	0.57	0.31	0.46	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.1	0.35	0.51	0.23	0.45	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.1	< 0.10	0.66	1.4	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.1	< 0.10	< 0.10	0.37	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.1	< 0.10	0.61	0.55	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2	3.2	5.6	7.4	4.8	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Benzene	M	2760	µg/kg	1		< 1.0	< 1.0			< 1.0			
Toluene	M	2760	µg/kg	1		< 1.0	< 1.0			< 1.0			
Ethylbenzene	M	2760	µg/kg	1		< 1.0	< 1.0			< 1.0			
m & p-Xylene	M	2760	µg/kg	1		< 1.0	< 1.0			< 1.0			
o-Xylene	M	2760	µg/kg	1		< 1.0	< 1.0			< 1.0			

Chemtest
The right chemistry to deliver results

Results Summary - Soil

Project: LKC 14 1086 - Gateacre Garden, Centre. Liverpool

Client: Leyden Kirby					Chemtest Job No.:	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449
Quotation No.:					Chemtest Sample ID.:	60605	60606	60607	60608	60609	60610	60611	60612	60613
Order No.: 731030					Client Sample Ref.:									
					Client Sample ID.:	WS201	WS202	WS203	WS204	WS205	WS206	WS207	WS207	TH201
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0	0.4	0.1	0.2	0.3	0.2	0.1	0.3	0.2
					Bottom Depth(m):	0.3	0.6	0.3	0.4	0.5	0.4	0.2	0.5	0.5
					Date Sampled:	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14	15-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Methyl Tert-Butyl Ether	M	2760	µg/kg	1		< 1.0	< 1.0				< 1.0			
Demeton-O	N	2820	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Phorate	N	2820	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Demeton-S	N	2820	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Disulphoton	N	2820	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Fenthion	N	2820	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Trichloronate	N	2820	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Prothiophos	N	2820	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Fensulphothion	N	2820	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Sulprofos	N	2820	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Azinphos-Methyl	N	2820	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Coumaphos	N	2820	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Alpha-Lindane	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Gamma-Lindane	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Beta-Lindane	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Delta-Lindane	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Heptachlor	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Aldrin	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Heptachlor Epoxide	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Gamma-Chlordane	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Alpha-Chlordane	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Endosulphan I	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
4,4-DDE	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Dieldrin	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Endrin	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
4,4-DDD	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Endosulphan II	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Endrin Aldehyde	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
4,4-DDT	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Endosulphan Sulphate	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Methoxychlor	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Endrin Ketone	N	2840	mg/kg	0.2		< 0.20		< 0.20					< 0.20	
Total Phenols	M	2920	mg/kg	0.3		< 0.30	< 0.30				< 0.30			

Chemtest
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Results Summary - Soil

Project: LKC 14 1086 - Gateacre Garden, Centre. Liverpool

Client: Leyden Kirby										
				Chemtest Job No.:	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449
Quotation No.:				**Chemtest Sample ID.:**	60614	60615	60616	60617	60618	60619
Order No.: 731030				Client Sample Ref.:						
				Client Sample ID.:	WS208	WS209	WS209	WS203	WS204	WS208
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.2	0.3	0.6	0.5	0.5	0.6
				Bottom Depth(m):	0.4	0.5	0.8	0.6	0.7	0.8
				Date Sampled:	16-Oct-14	16-Oct-14	16-Oct-14	15-Oct-14	15-Oct-14	16-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
ACM Type	U	2192			-	-	-			
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected			
Moisture	N	2030	%	0.02	6.7	7.9	17	14	16	16
Soil Colour	N				brown	brown	brown	brown	brown	brown
Other Material	N				stones	stones	stones	stones	stones	stones
Soil Texture	N				sand	sand	clay	sands	clay	clay
pH	M	2010			8.8	8.4	7.6	7.0	6.9	7.2
Boron (Hot Water Soluble)	M	2120	mg/kg	0.4	1.1		0.92			
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/L	0.01	1.2	0.16	0.18	0.065	0.048	0.063
Cyanide (Total)	M	2300	mg/kg	0.5	< 0.50		< 0.50			
Cyanide (Free)	M	2300	mg/kg	0.5	< 0.50		< 0.50			
Arsenic	M	2450	mg/kg	1	6.6	10	17			
Cadmium	M	2450	mg/kg	0.1	0.22	0.24	0.41			
Chromium	M	2450	mg/kg	1	17	82	20			
Copper	M	2450	mg/kg	1	25	27	51			
Mercury	M	2450	mg/kg	0.1	< 0.10	0.22	0.49			
Nickel	M	2450	mg/kg	1	17	15	21			
Lead	M	2450	mg/kg	1	77	100	260			
Selenium	M	2450	mg/kg	0.2	< 0.20	< 0.20	< 0.20			
Vanadium	U	2450	mg/kg	5	15	24	15			
Zinc	M	2450	mg/kg	1	73	64	95			
Chromium (Hexavalent)	N	2490	mg/kg	0.5	< 0.50	< 0.50	< 0.50			
Organic Matter	M	2625	%	0.4	2.4	2.8	5.0			
Fuel Type	N	2670			Lube Oil		N/A			
Aliphatic TPH >C5-C6	N	2675	mg/kg	0.1	< 0.10		< 0.10			
Aliphatic TPH >C6-C8	N	2675	mg/kg	0.1	< 0.10		< 0.10			
Aliphatic TPH >C8-C10	M	2675	mg/kg	0.1	< 0.10		< 0.10			
Aliphatic TPH >C10-C12	M	2675	mg/kg	1	< 1.0		< 1.0			
Aliphatic TPH >C12-C16	M	2675	mg/kg	1	< 1.0		< 1.0			
Aliphatic TPH >C16-C21	M	2675	mg/kg	1	2.2		< 1.0			
Aliphatic TPH >C21-C35	M	2675	mg/kg	1	270		< 1.0			
Aliphatic TPH >C35-C44	M	2675	mg/kg	1	22		< 1.0			

Results Summary - Soil

Project: LKC 14 1086 - Gateacre Garden, Centre. Liverpool

Client: Leyden Kirby					Chemtest Job No.:	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449
Quotation No.:					Chemtest Sample ID.:	60614	60615	60616	60617	60618	60619
Order No.: 731030					Client Sample Ref.:						
					Client Sample ID.:	WS208	WS209	WS209	WS203	WS204	WS208
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.2	0.3	0.6	0.5	0.5	0.6
					Bottom Depth(m):	0.4	0.5	0.8	0.6	0.7	0.8
					Date Sampled:	16-Oct-14	16-Oct-14	16-Oct-14	15-Oct-14	15-Oct-14	16-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
Total Aliphatic Hydrocarbons	M	2675	mg/kg	5		300		< 5.0			
Aromatic TPH >C5-C7	N	2675	mg/kg	0.1		< 0.10		< 0.10			
Aromatic TPH >C7-C8	N	2675	mg/kg	0.1		< 0.10		< 0.10			
Aromatic TPH >C8-C10	M	2675	mg/kg	0.1		< 0.10		< 0.10			
Aromatic TPH >C10-C12	M	2675	mg/kg	1		< 1.0		< 1.0			
Aromatic TPH >C12-C16	M	2675	mg/kg	1		< 1.0		< 1.0			
Aromatic TPH >C16-C21	M	2675	mg/kg	1		< 1.0		3.7			
Aromatic TPH >C21-C35	M	2675	mg/kg	1		160		3.4			
Aromatic TPH >C35-C44	N	2675	mg/kg	1		< 1.0		< 1.0			
Total Aromatic Hydrocarbons	M	2675	mg/kg	5		160		7.1			
Total Petroleum Hydrocarbons	M	2675	mg/kg	10		460		< 10			
Naphthalene	M	2700	mg/kg	0.1		< 0.10	< 0.10	< 0.10			
Acenaphthylene	M	2700	mg/kg	0.1		< 0.10	< 0.10	< 0.10			
Acenaphthene	M	2700	mg/kg	0.1		< 0.10	< 0.10	< 0.10			
Fluorene	M	2700	mg/kg	0.1		< 0.10	< 0.10	< 0.10			
Phenanthrene	M	2700	mg/kg	0.1		1.1	< 0.10	0.53			
Anthracene	M	2700	mg/kg	0.1		0.33	< 0.10	0.18			
Fluoranthene	M	2700	mg/kg	0.1		2.5	0.95	1.3			
Pyrene	M	2700	mg/kg	0.1		2.5	1.0	1.2			
Benzo[a]anthracene	M	2700	mg/kg	0.1		1.4	0.56	0.24			
Chrysene	M	2700	mg/kg	0.1		1.1	0.85	0.21			
Benzo[b]fluoranthene	M	2700	mg/kg	0.1		1.5	0.58	0.63			
Benzo[k]fluoranthene	M	2700	mg/kg	0.1		0.80	0.10	< 0.10			
Benzo[a]pyrene	M	2700	mg/kg	0.1		1.5	0.88	0.55			
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.1		0.57	0.44	0.41			
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.1		0.24	< 0.10	< 0.10			
Benzo[g,h,i]perylene	M	2700	mg/kg	0.1		0.52	0.50	0.59			
Total Of 16 PAH's	M	2700	mg/kg	2		14	5.9	5.8			
Benzene	M	2760	µg/kg	1		< 1.0		< 1.0			
Toluene	M	2760	µg/kg	1		< 1.0		< 1.0			
Ethylbenzene	M	2760	µg/kg	1		< 1.0		< 1.0			
m & p-Xylene	M	2760	µg/kg	1		< 1.0		< 1.0			
o-Xylene	M	2760	µg/kg	1		< 1.0		< 1.0			

Chemtest
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Results Summary - Soil

Project: LKC 14 1086 - Gateacre Garden, Centre. Liverpool

Client: Leyden Kirby											
				Chemtest Job No.:	14-12449	14-12449	14-12449	14-12449	14-12449	14-12449
Quotation No.:				**Chemtest Sample ID.:**	60614	60615	60616	60617	60618	60619
Order No.: 731030				Client Sample Ref.:						
				Client Sample ID.:	WS208	WS209	WS209	WS203	WS204	WS208
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.2	0.3	0.6	0.5	0.5	0.6
				Bottom Depth(m):	0.4	0.5	0.8	0.6	0.7	0.8
				Date Sampled:	16-Oct-14	16-Oct-14	16-Oct-14	15-Oct-14	15-Oct-14	16-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Methyl Tert-Butyl Ether	M	2760	µg/kg	1	< 1.0		< 1.0			
Demeton-O	N	2820	mg/kg	0.2		< 0.20				
Phorate	N	2820	mg/kg	0.2		< 0.20				
Demeton-S	N	2820	mg/kg	0.2		< 0.20				
Disulphoton	N	2820	mg/kg	0.2		< 0.20				
Fenthion	N	2820	mg/kg	0.2		< 0.20				
Trichloronate	N	2820	mg/kg	0.2		< 0.20				
Prothiophos	N	2820	mg/kg	0.2		< 0.20				
Fensulphothion	N	2820	mg/kg	0.2		< 0.20				
Sulprofos	N	2820	mg/kg	0.2		< 0.20				
Azinphos-Methyl	N	2820	mg/kg	0.2		< 0.20				
Coumaphos	N	2820	mg/kg	0.2		< 0.20				
Alpha-Lindane	N	2840	mg/kg	0.2		< 0.20				
Gamma-Lindane	N	2840	mg/kg	0.2		< 0.20				
Beta-Lindane	N	2840	mg/kg	0.2		< 0.20				
Delta-Lindane	N	2840	mg/kg	0.2		< 0.20				
Heptachlor	N	2840	mg/kg	0.2		< 0.20				
Aldrin	N	2840	mg/kg	0.2		< 0.20				
Heptachlor Epoxide	N	2840	mg/kg	0.2		< 0.20				
Gamma-Chlordane	N	2840	mg/kg	0.2		< 0.20				
Alpha-Chlordane	N	2840	mg/kg	0.2		< 0.20				
Endosulphan I	N	2840	mg/kg	0.2		< 0.20				
4,4-DDE	N	2840	mg/kg	0.2		< 0.20				
Dieldrin	N	2840	mg/kg	0.2		< 0.20				
Endrin	N	2840	mg/kg	0.2		< 0.20				
4,4-DDD	N	2840	mg/kg	0.2		< 0.20				
Endosulphan II	N	2840	mg/kg	0.2		< 0.20				
Endrin Aldehyde	N	2840	mg/kg	0.2		< 0.20				
4,4-DDT	N	2840	mg/kg	0.2		< 0.20				
Endosulphan Sulphate	N	2840	mg/kg	0.2		< 0.20				
Methoxychlor	N	2840	mg/kg	0.2		< 0.20				
Endrin Ketone	N	2840	mg/kg	0.2		< 0.20				
Total Phenols	M	2920	mg/kg	0.3	< 0.30		< 0.30			

Results Summary - Leachate

Project: LKC 14 1086 - Gateacre Garden, Centre. Liverpool

Client: Leyden Kirby					Chemtest Job No.:	14-12449	14-12449	14-12449
Quotation No.:					Chemtest Sample ID.:	60606	60608	60616
Order No.: 731030					Client Sample Ref.:			
					Client Sample ID.:	WS202	WS204	WS209
					Sample Type:	SOIL	SOIL	SOIL
					Top Depth (m):	0.4	0.2	0.6
					Bottom Depth(m):	0.6	0.4	0.8
					Date Sampled:	15-Oct-14	15-Oct-14	16-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
pH	U	1010				8.7	8.6	8.5
Sulphate	U	1220	mg/l	1		< 1.0	< 1.0	24
Cyanide (Total)	U	1300	mg/l	0.05		< 0.050		< 0.050
Cyanide (Free)	U	1300	mg/l	0.05		< 0.050		< 0.050
Hardness	U	1415	mg/l	15		550	600	620
Arsenic (Dissolved)	U	1450	µg/l	1		7.0	5.3	7.9
Boron (Dissolved)	U	1450	µg/l	20		< 20		< 20
Cadmium (Dissolved)	U	1450	µg/l	0.08		0.13	0.10	0.080
Chromium (Dissolved)	U	1450	µg/l	1		< 1.0	< 1.0	< 1.0
Copper (Dissolved)	U	1450	µg/l	1		14	4.6	7.5
Mercury (Dissolved)	U	1450	µg/l	0.5		< 0.50	< 0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1		< 1.0	< 1.0	< 1.0
Lead (Dissolved)	U	1450	µg/l	1		36	26	28
Selenium (Dissolved)	U	1450	µg/l	1		< 1.0	< 1.0	< 1.0
Vanadium (Dissolved)	U	1450	µg/l	1		8.0	< 1.0	1.3
Zinc (Dissolved)	U	1450	µg/l	1		3.2	7.5	1.6
Chromium (Hexavalent)	U	1490	µg/l	20		< 20	< 20	< 20
Total Organic Carbon	N	1610	mg/l	1		220	240	340
Fuel Type	N	1670				N/A		N/A
Aliphatic TPH >C5-C6	N	1675	µg/l	0.1		< 0.10		< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.1		< 0.10		< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.1		< 0.10		< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.1		< 0.10		< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.1		< 0.10		< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.1		< 0.10		< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.1		< 0.10		< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.1		< 0.10		< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5		< 5.0		< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.1		< 0.10		< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.1		< 0.10		< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.1		< 0.10		< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.1		< 0.10		< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.1		< 0.10		< 0.10

Results Summary - Leachate

Project: LKC 14 1086 - Gateacre Garden, Centre. Liverpool

Client: Leyden Kirby					Chemtest Job No.:	14-12449	14-12449	14-12449
Quotation No.:					Chemtest Sample ID.:	60606	60608	60616
Order No.: 731030					Client Sample Ref.:			
					Client Sample ID.:	WS202	WS204	WS209
					Sample Type:	SOIL	SOIL	SOIL
					Top Depth (m):	0.4	0.2	0.6
					Bottom Depth(m):	0.6	0.4	0.8
					Date Sampled:	15-Oct-14	15-Oct-14	16-Oct-14
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Aromatic TPH >C16-C21	N	1675	µg/l	0.1	< 0.10		< 0.10	
Aromatic TPH >C21-C35	N	1675	µg/l	0.1	< 0.10		< 0.10	
Aromatic TPH >C35-C44	N	1675	µg/l	0.1	< 0.10		< 0.10	
Total Aromatic Hydrocarbons	N	1675	µg/l	5	< 5.0		< 5.0	
Total Petroleum Hydrocarbons	U	1675	µg/l	10	< 10		< 10	
Naphthalene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Acenaphthylene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Acenaphthene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Fluorene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Phenanthrene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Anthracene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Fluoranthene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Pyrene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Benzo[a]anthracene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Chrysene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Benzo[b]fluoranthene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Benzo[k]fluoranthene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Benzo[a]pyrene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Indeno(1,2,3-c,d)Pyrene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Dibenz(a,h)Anthracene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Benzo[g,h,i]perylene	N	1700	µg/l	0.01	< 0.010	< 0.010	< 0.010	
Total Of 16 PAH's	N	1700	µg/l	0.2	< 0.20	< 0.20	< 0.20	
Benzene	U	1760	µg/l	1	< 1.0		< 1.0	
Toluene	U	1760	µg/l	1	< 1.0		< 1.0	
Ethylbenzene	U	1760	µg/l	1	< 1.0		< 1.0	
m & p-Xylene	U	1760	µg/l	1	< 1.0		< 1.0	
o-Xylene	U	1760	µg/l	1	< 1.0		< 1.0	
Methyl Tert-Butyl Ether	N	1760	µg/l	1	< 1.0		< 1.0	
Total Phenols	U	1920	mg/l	0.03	< 0.030		< 0.030	

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers

Sample Retention and Disposal

All soil samples will be retained for a period of 1 month following the date of the test report
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

APPENDIX D

CERTIFICATES OF ANALYSIS - GEOTECHNICAL

MURRAY RIX

CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client LK Consult Ltd

Address Kay Street
Bury
BL9 6BU

Contract Gateacre, Liverpool

Job Number MRN 2347/58
Date of Issue 11 April 2014
Page 1 **of** 5

Approved Signatory

S J Hutchings, A W Hutchings, A Richardson

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

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

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted. This does not, however, guarantee the balance of the materials from which the tested samples have been taken to be of equal quality.

MURRAY RIX

33C Vauxhall Ind. Estate, Greg Street
Reddish, Stockport SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871

UKAS TESTING
1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.2: 1990

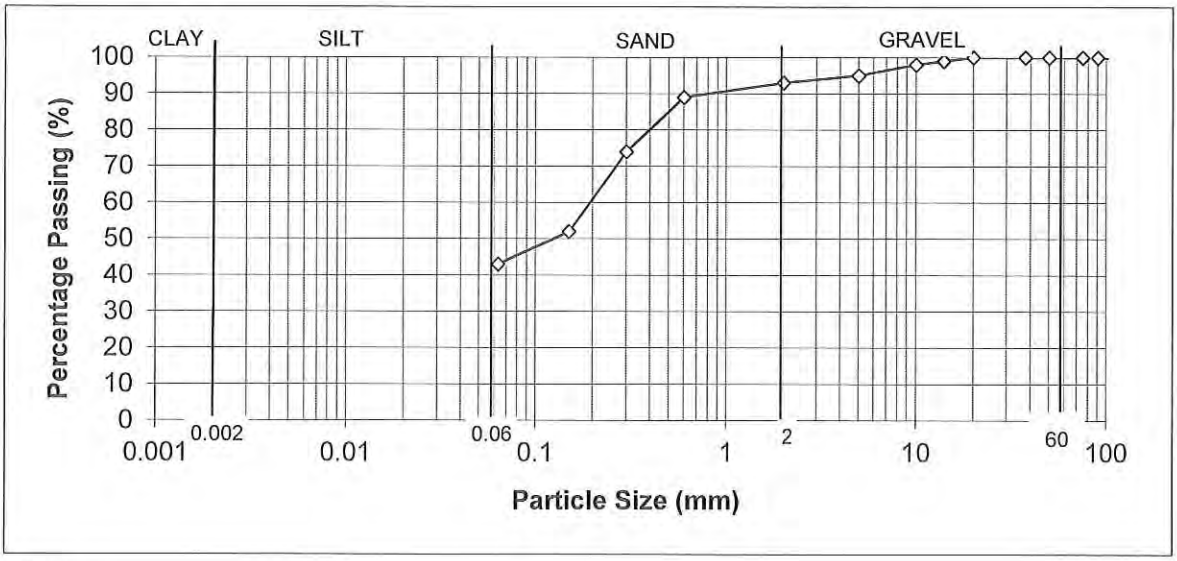
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	LK Consult Ltd
SITE	Gateacre, Liverpool
JOB NUMBER	MRN 2347/58

SAMPLE LABEL	WS103/1.1m	DATE SAMPLED	N/A
LAB SAMPLE No	58316	DATE RECEIVED	01-Apr-14
DATE TESTED	02-Apr-14	SAMPLED BY	Client

MATERIAL	Red brown sandy Clay with trace gravel
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		10	98	
90	100		5	95	
75	100		2	93	
50	100		0.6	89	
37.5	100		0.3	74	
20	100		0.15	52	
14	99		0.063	43	



REMARKS

As received moisture content = 18%

SIGNED

NAME A Richardson (Deputy Laboratory Manager) DATE 11-Apr-14

MURRAY RIX

33C Vauxhall Ind. Estate, Greg Street
Reddish, Stockport SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871

UKAS TESTING
1580

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

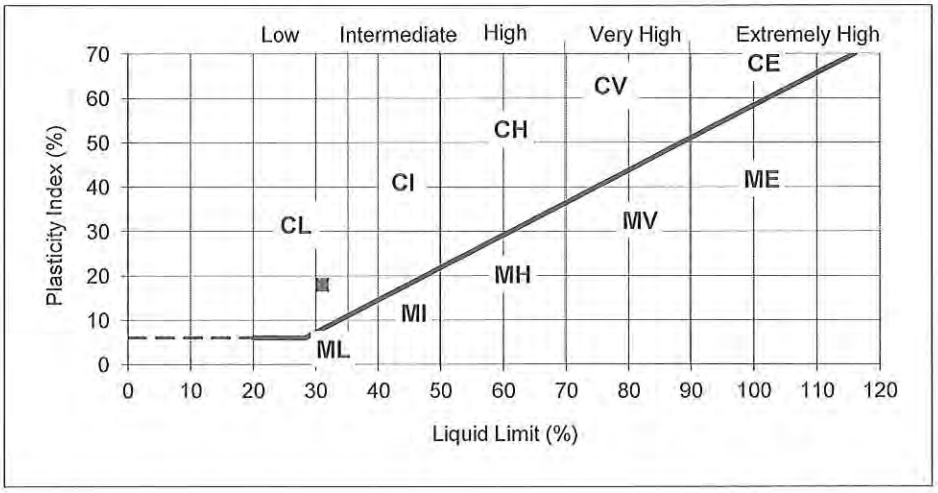
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	LK Consult Lyd
SITE	Gateacre, Liverpool
JOB NUMBER	MRN 2347/58

SAMPLE LABEL	WS104/1.0-1.5m	DATE SAMPLED	N/A
SAMPLE No.	58317	DATE RECEIVED	01-Apr-14
DATE TESTED	02-Apr-14	SAMPLED BY	Client

MATERIAL	Firm brown silty Clay with trace gravel
ADVISED SOURCE	Site Won

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
11	31	13	18	98



REMARKS
Sample was tested in natural condition

SIGNED

NAME A Richardson DATE 11-Apr-14
(Deputy Laboratory Manager)

MURRAY RIX

33C Vauxhall Ind. Estate, Greg Street
Reddish, Stockport SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871

UKAS TESTING
1580

TEST CERTIFICATE

LIQUID AND PLASTIC LIMIT

BS 1377: PART 2: 1990 Clause 4.4 ONE POINT METHOD & Clause 5.3

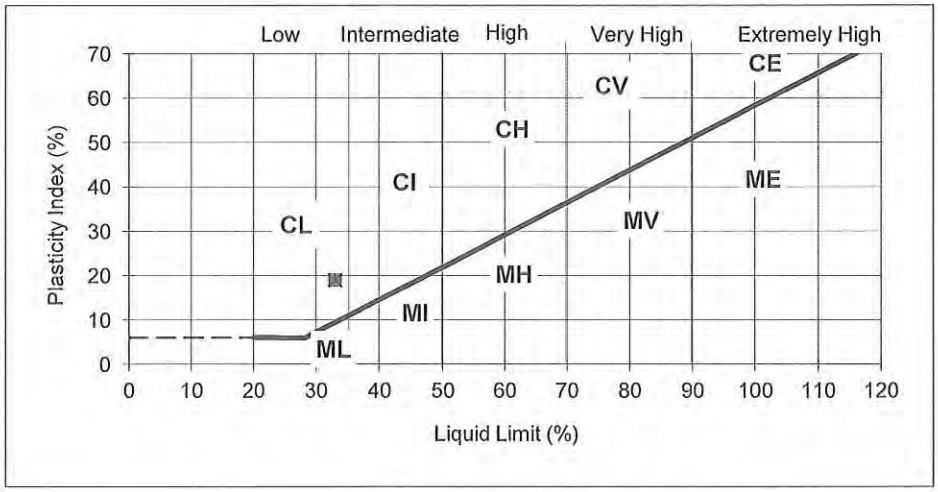
MOISTURE CONTENT METHOD BS 1377: PART 2: 1990 Clause 3.2

CLIENT	LK Consult Lyd
SITE	Gateacre, Liverpool
JOB NUMBER	MRN 2347/58

SAMPLE LABEL	WS107/0.7-0.9m	DATE SAMPLED	N/A
SAMPLE No.	58318	DATE RECEIVED	01-Apr-14
DATE TESTED	02-Apr-14	SAMPLED BY	Client

MATERIAL	Red / brown silty Clay with trace gravel
ADVISED SOURCE	Site Won

Moisture Content (Natural) (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17	33	14	19	90



REMARKS
Sample was tested in natural condition

SIGNED

NAME A Richardson DATE 11-Apr-14
(Deputy Laboratory Manager)

MURRAY RIX

33C Vauxhall Ind. Estate, Greg Street
Reddish, Stockport SK5 7BR
TEL 0161 475 0870 FAX 0161 475 0871

UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS 1377: PART 2: Clause 9.2: 1990

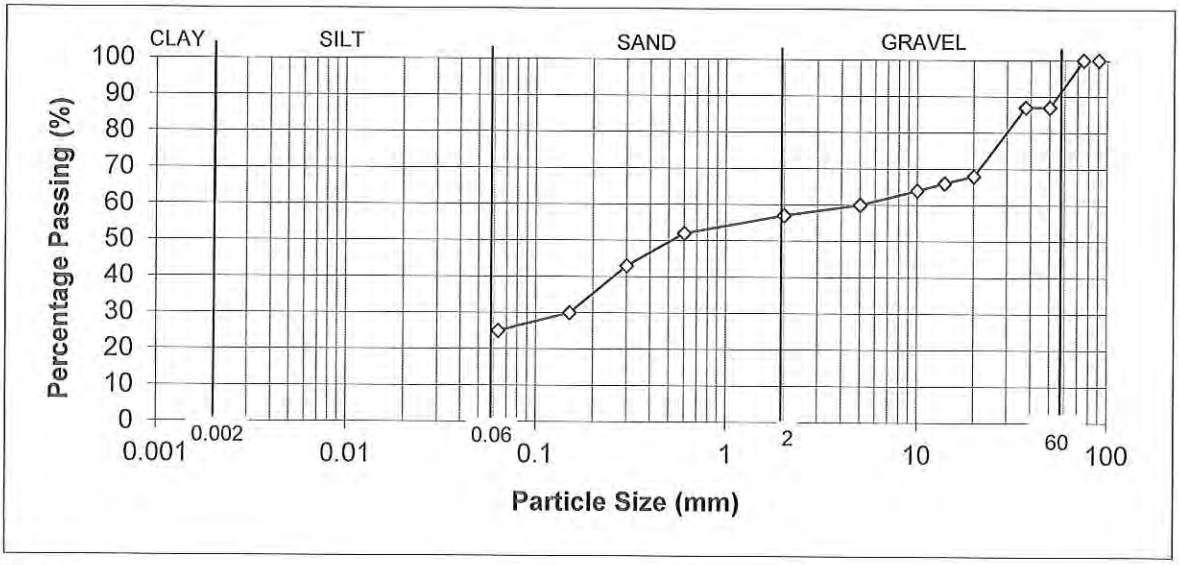
Determination of Moisture Content in accordance with BS 1377: PART 2: Clause 3: 1990 (Oven Dry)

CLIENT	LK Consult Ltd
SITE	Gateacre, Liverpool
JOB NUMBER	MRN 2347/58

SAMPLE LABEL	WS109/0.3-0.8m	DATE SAMPLED	N/A
LAB SAMPLE No	58319	DATE RECEIVED	01-Apr-14
DATE TESTED	02-Apr-14	SAMPLED BY	Client

MATERIAL	Red brown sandy Clay with much gravel
ADVISED SOURCE	Site Won

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		10	64	
90	100		5	60	
75	100		2	57	
50	87		0.6	52	
37.5	87		0.3	43	
20	68		0.15	30	
14	66		0.063	25	



REMARKS

As received moisture content = 14%

SIGNED

NAME A Richardson (Deputy Laboratory Manager) DATE 11-Apr-14

APPENDIX E

GENERIC SOIL ASSESSMENT CRITERIA

Author	Atkins
Revision	3
Date	31/03/2011
Title	**SSVs derived using CLEA for 1% SOM, sand soil type, Residential with the consumption of homegrown produce land use**

Compound	SSV mg/kg	Notes
1,1,1-Trichloroethane	2.23	
1,1,1,2-Tetrachloroethane	0.353	
1,1,2,2-Tetrachloroethane	0.695	
1,1,2-Trichloroethane	0.258	
1,1-Dichloroethane	0.827	
1,1-Dichloroethene	0.0857	
1,2-Dichloroethane	0.00190	
1,2,4-Trimethylbenzene	0.906	
1,2-Dichloropropane	0.00784	
2,4-Dichloro-o-cresol	31.1	
2,4-Dimethylphenol	17.2	The dermal approach published by EIC has been followed. In the phenol SGV report, additional consideration was given to localised dermal effects. This may be applicable to phenol derivatives but has not been considered.
2,4-Dinitrotoluene	1.41	
2,6-bis(1,1-dimethyl)-4-(1-methylpropyl)-phenol	21.7	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 18.7 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
2,6-Dinitrotoluene	0.751	
2-Chloronaphthalene	1.42	
2-Methylphenol	78.1	The dermal approach published by EIC has been followed. In the phenol SGV report, additional consideration was given to localised dermal effects. This may be applicable to phenol derivatives but has not been considered. Users must consider total exposure from all methylphenol isomers and not consider them in isolation. In line with the approach published by EIC when assessing total cresols, the lowest SSV of each methylphenol isomer may be chosen to compare to the total methylphenol concentration.
3-Methylphenol	77.4	The dermal approach published by EIC has been followed. In the phenol SGV report, additional consideration was given to localised dermal effects. This may be applicable to phenol derivatives but has not been considered. Users must consider total exposure from all methylphenol isomers and not consider them in isolation. In line with the approach published by EIC when assessing total cresols, the lowest SSV of each methylphenol isomer may be chosen to compare to the total methylphenol concentration.
4-Methylphenol	76.8	The dermal approach published by EIC has been followed. In the phenol SGV report, additional consideration was given to localised dermal effects. This may be applicable to phenol derivatives but has not been considered. Users must consider total exposure from all methylphenol isomers and not consider them in isolation. In line with the approach published by EIC when assessing total cresols, the lowest SSV of each methylphenol isomer may be chosen to compare to the total methylphenol concentration.
Acenaphthene	588	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 157 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Anthracene	8270	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 3.48 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.

Author	Atkins
Revision	3
Date	31/03/2011
Title	**SSVs derived using CLEA for 1% SOM, sand soil type, Residential with the consumption of homegrown produce land use**

Compound	SSV mg/kg	Notes
Antimony	113	
Arsenic	32.0	Value presented is the Environment Agency Arsenic SGV published in May 2009. As plant concentration factors are used in deriving the SGV, assessment criteria do not change with soil type and SOM.
Barium	43.4	
Benzene	0.0493	Based on information within Environment Agency benzene SGVs published in March 2009.
Benzo(a)anthracene	4.52	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 1.71 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Benzo(a)pyrene	0.818	
Benzo(b)fluoranthene	7.72	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 1.22 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Benzo(g,h,i)perylene	96.2	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.0187 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Benzo(k)fluoranthene	84.4	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.686 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Beryllium	60.3	
Biphenyl	82.8	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 34.1 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Bis (2-ethylhexyl) phthalate	282	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 8.66 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the SSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Bromobenzene	0.319	

Author Atkins
Revision 3
Date 31/03/2011

Title **SSVs derived using CLEA for 1% SOM, sand soil type, Residential with the consumption of homegrown produce land use**

Compound	SSV mg/kg	Notes
Bromodichloromethane	0.00598	
Bromoform	1.40	
Butyl benzyl phthalate	1410	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 26.1 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the SSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Cadmium	10.0	Value presented is the Environment Agency Cadmium SGV published in July 2009. As plant concentration factors are used in deriving the SGV, assessment criteria do not change with soil type and SOM.
Carbon disulphide	0.0739	
Carbon tetrachloride	0.00656	
Chlorobenzene	3.49	
Chloroethane	3.05	
Chloroform / Trichloromethane	0.307	
Chloromethane	0.00301	
Chromium III	12800	
Chromium VI	14.2	
Chrysene	585	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.440 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Cis-1,2-dichloroethene	0.0393	
Copper	3970	
Cyanide	34.0	Based on acute exposure for a 0-6 year old child, using 5th percentile bodyweight from CLR10. Information is not available in SR3 and supporting documents regarding the 5th percentile bodyweight of SR3 bodyweight data. It is not considered likely that new data would significantly affect the SSV.
DDD	26.3	
Dibenz(a,h)anthracene	0.838	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.00393 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Dibromochloromethane	0.0623	
Dichloromethane	0.382	

Author	Atkins
Revision	3
Date	31/03/2011
Title	**SSVs derived using CLEA for 1% SOM, sand soil type, Residential with the consumption of homegrown produce land use**

Compound	SSV mg/kg	Notes
Diethyl phthalate	108	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 12.8 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the SSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Di-n-butyl phthalate	12.9	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 4.62 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value. In line with the approach published by the EIC, the lower of the oral and inhalation assessment criteria has been selected. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the SSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Di-n-octyl phthalate	2250	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 32.6 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value. In line with the EIC report section 3.7, where the toxicity effects are the same, the potential additivity of phthalates should be considered by assessors when using the SSV for these substances. Guidance on additivity is provided in the Environment Agency for England and Wales SR2 document.
Dinoseb	0.0477	
Ethylbenzene	38.2	Based on information within Environment Agency ethylbenzene SGVs published in March 2009.
Fluoranthene	822	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 18.9 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Fluorene	615	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 125 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Formaldehyde	1.89	

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Revision	3
Date	31/03/2011
Title	**SSVs derived using CLEA for 1% SOM, sand soil type, Residential with the consumption of homegrown produce land use**

Compound	SSV mg/kg	Notes
Hexachloroethane	0.0735	
Indeno(1,2,3-c,d)pyrene	7.31	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.0614 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Iso-propylbenzene	34.4	
Lead	276	
Mercury (elemental)	0.0607	Based on information in the Environment Agency Mercury SGV report published in March 2009.
Mercury (inorganic)	170	Value presented is the Environment Agency inorganic mercury SGV published in March 2009. As plant concentration factors are used in deriving the SGV, assessment criteria do not change with soil type and SOM.
Mercury (methyl)	6.28	Based on information within the Environment Agency Mercury SGV report published in March 2009.
Methyl tert-butyl ether	20.0	
Molybdenum	74.6	
m-Xylene	17.9	The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration. Based on information within Environment Agency xylene SGVs published in March 2009. Users must consider total exposure from all xylene isomers and not consider them in isolation. The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration.
Naphthalene	0.585	
Nickel	130	Value presented is the Environment Agency Nickel SGV published in May 2009. As plant concentration factors are used in deriving the SGV, assessment criteria do not change with soil type and SOM.
Nicotine	0.0916	
o-Xylene	18.9	The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration. Based on information within Environment Agency xylene SGVs published in March 2009. Users must consider total exposure from all xylene isomers and not consider them in isolation. The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration.
Phenol	162	Based on information within the Environment Agency Phenol SGV report published in July 2009. Derived by comparing oral exposure to the oral HCV and inhalation and dermal exposure to the inhalation HCV.
Prochloraz	8.49	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.116 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Propylbenzene	85.6	
p-Xylene	17.2	The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration. Based on information within Environment Agency xylene SGVs published in March 2009. Users must consider total exposure from all xylene isomers and not consider them in isolation. The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration.
Pyrene	563	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 2.20 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.

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Revision	3
Date	31/03/2011
Title	**SSVs derived using CLEA for 1% SOM, sand soil type, Residential with the consumption of homegrown produce land use**

Compound	SSV mg/kg	Notes
Selenium	350	Value presented is the Environment Agency selenium SGV published in March 2009. As plant concentration factors are used in deriving the SGV, assessment criteria do not change with soil type and SOM.
Styrene	9.42	
Sum of PCDDs, PCDFs and dioxin-like PCBs	No SSV. Due to publication of the Dioxins, Furans and Dioxin-like PCB SGVs in September 2009, please see the Frequently Asked Questions for more information.	
Tetrachloroethene	0.455	
Toluene	86.9	Based on information within Environment Agency toluene SGVs published in March 2009.
TPH aliphatic C10-C12	1390	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 49.9 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aliphatic C12-C16	5100	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 21.0 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aliphatic C16-C35	145000	This fraction is not considered volatile and the inhalation of vapour pathways have not been considered (TPHCWG, 1997).
TPH aliphatic C5-C6	30.1	
TPH aliphatic C6-C8	69.8	
TPH aliphatic C8-C10	9.79	
TPH aromatic C10-C12	57.3	
TPH aromatic C12-C16	142	
TPH aromatic C16-C21	272	This fraction is not considered volatile and the inhalation of vapour pathways have not been considered (TPHCWG, 1997).
TPH aromatic C21-C35	888	This fraction is not considered volatile and the inhalation of vapour pathways have not been considered (TPHCWG, 1997).
TPH aromatic C5-C7	0.0493	Benzene is the only consituent of this fraction (TPHCWG 1997). Based on information within the Environment Agency benzene SGVs published in March 2009.
TPH aromatic C7-C8	86.9	Toluene is the only consituent of this fraction (TPHCWG 1997). Based on information within the Environment Agency toluene SGVs published in March 2009.
TPH aromatic C8-C10	14.8	
Trans-1,2-dichloroethene	0.0671	
Tributyl tin oxide	0.248	
Trichloroethene	0.0382	
Trichloromethylbenzene	0.000157	
Vanadium	113	
Vinyl chloride	0.000202	
Zinc	16900	

Note:
All values provided are rounded to 3 significant figures.
It is noted for some compounds that the SSV is sufficiently high that free product is likely to be encountered. Please see the Frequently Asked Questions for more advice.
In some instances the risk based value may be lower than the laboratory detection limit. Please see the Frequently Asked Questions for more advice.

Author Atkins
Revision 5
Date 31/03/2011

Title **SSVs derived using CLEA for 6% SOM and sandy loam soil type, Residential with homegrown produce land use**

Compound	SSV mg/kg	Notes
1,1,1,2-Tetrachloroethane	4.82	
1,1,1-Trichloroethane	27.9	
1,1,2,2-Tetrachloroethane	6.34	
1,1,2-Trichloroethane		Please see the EIC GAC report.
1,1-Dichloroethane		Please see the EIC GAC report.
1,1-Dichloroethene		Please see the EIC GAC report.
1,2,4-Trimethylbenzene	8.28	
1,2-Dichloroethane	0.0139	
1,2-Dichloropropane		Please see the EIC GAC report.
2,4-Dichloro-o-cresol	167	
2,4-Dimethylphenol		Please see the EIC GAC report.
2,4-Dinitrotoluene		Please see the EIC GAC report.
2,6-bis(1,1-dimethyl)-4-(1-methylpropyl)-phenol	53.5	
2,6-Dinitrotoluene		Please see the EIC GAC report.
2-Chloronaphthalene		Please see the EIC GAC report.
2-Methylphenol		Please see the EIC GAC report.
3-Methylphenol		Please see the EIC GAC report.
4-Methylphenol		Please see the EIC GAC report.
Acenaphthene	2130	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 937 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Anthracene	18300	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 20.9 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Antimony	180	
Arsenic	32.0	Value presented is Environment Agency SGV published in May 2009.
Barium		Please see the EIC GAC report.
Benzene	0.330	Value presented is Environment Agency SGV published in March 2009.
Benzo(a)anthracene	8.54	
Benzo(a)pyrene	0.998	
Benzo(b)fluoranthene	9.86	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 7.29 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Benzo(g,h,i)perylene	103	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.112 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Benzo(k)fluoranthene	100	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 4.12 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Beryllium	60.9	

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Date 31/03/2011

Title **SSVs derived using CLEA for 6% SOM and sandy loam soil type, Residential with homegrown produce land use**

Compound	SSV mg/kg	Notes
Biphenyl	462	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 201 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Bis (2-ethylhexyl) phthalate		Please see the EIC GAC report.
Bromobenzene		Please see the EIC GAC report.
Bromodichloromethane		Please see the EIC GAC report.
Bromoform		Please see the EIC GAC report.
Butyl benzyl phthalate		Please see the EIC GAC report.
Cadmium	10.0	Value presented is Environment Agency SGV published in July 2009.
Carbon disulphide	0.839	
Carbon tetrachloride	0.0892	
Chlorobenzene (mono)	45.7	
Chloroethane		Please see the EIC GAC report.
Chloroform / Trichloromethane	2.87	
Chloromethane		Please see the EIC GAC report.
Chromium III	12900	
Chromium VI	14.5	
Chrysene	927	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 2.64 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Cis-1,2-dichloroethene		Please see the EIC GAC report.
Copper	4020	
Cyanide	34.0	Based on acute exposure for a 0-6 year old child, using 5th percentile bodyweight from CLR10. Information is not available in SR3 and supporting documents regarding the 5th percentile bodyweight of SR3 bodyweight data. It is not considered likely that new data would significantly affect the SSV.
DDD	39.7	
Dibenzo(a,h)anthracene	1.00	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.0236 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Dibromochloromethane	0.757	
Dichloromethane		Please see the EIC GAC report.
Diethyl phthalate		Please see the EIC GAC report.
Di-n-butyl phthalate		Please see the EIC GAC report.
Di-n-octyl phthalate		Please see the EIC GAC report.
Dinoseb	0.527	
Ethylbenzene	350	Value presented is Environment Agency SGV published in March 2009.
Fluoranthene	2160	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 113 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.

Author Atkins
Revision 5
Date 31/03/2011

Title **SSVs derived using CLEA for 6% SOM and sandy loam soil type, Residential with homegrown produce land use**

Compound	SSV mg/kg	Notes
Fluorene	1930	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 746 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Formaldehyde	7.16	
Hexachloroethane		Please see the EIC GAC report.
Indeno(1,2,3-c,d)pyrene	9.75	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.368 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Iso-propylbenzene	418	
Lead	342	
Mercury (elemental)	1.00	Value presented is Environment Agency SGV published in March 2009. Based on inhalation exposure only.
Mercury (inorganic)	170	Value presented is Environment Agency SGV published in March 2009.
Mercury (methyl)	11.0	Value presented is Environment Agency SGV published in March 2009.
Methyl tert-butyl ether		Please see the EIC GAC report.
Molybdenum		Please see the EIC GAC report.
m-Xylene	240	Value presented is Environment Agency SGV published in March 2009. Users must consider total exposure from all xylene isomers and not consider them in isolation. The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration.
Naphthalene	8.71	
Nickel	130	Value presented is Environment Agency SGV published in May 2009.
Nicotine	0.332	
o-Xylene	250	Value presented is Environment Agency SGV published in March 2009. Users must consider total exposure from all xylene isomers and not consider them in isolation. The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration.
Phenol	420	Value presented is Environment Agency SGV published in July 2009.
Prochloraz	44.0	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 0.682 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Propylbenzene	769	

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Revision	5
Date	31/03/2011

Title **SSVs derived using CLEA for 6% SOM and sandy loam soil type, Residential with homegrown produce land use**

Compound	SSV mg/kg	Notes
p-Xylene	230	Value presented is Environment Agency SGV published in March 2009. Users must consider total exposure from all xylene isomers and not consider them in isolation. The lowest SSV of each xylene isomer may be chosen to compare to the total xylene concentration.
Pyrene	1550	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the combined assessment criterion calculated by the CLEA software, assuming that free phase product is not present. The inhalation of vapour pathway contributes less than 10% of total exposure which is unlikely to significantly affect the SSV. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 13.2 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
Selenium	350	Value presented is Environment Agency SGV published in March 2009.
Styrene	53.7	
Sum of PCDDs, PCDFs and dioxin-like PCBs		No SSV. Due to publication of the Dioxins, Furans and Dioxin-like PCB SGVs in September 2009, please see the Frequently Asked Questions for more information.
Tetrachloroethene	6.15	
Toluene	610	Value presented is Environment Agency SGV published in March 2009.
TPH aliphatic C10-C12	4140	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 297 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aliphatic C12-C16	5260	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 126 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aliphatic C16-C35	145000	This fraction is not considered volatile and the inhalation of vapour pathways have not been considered (TPHCWG, 1997).
TPH aliphatic C5-C6	259	
TPH aliphatic C6-C8	14700	The lower of the aqueous or vapour based saturation limits has been exceeded in the calculation. The SSV presented is the assessment criterion calculated using the approach outlined within SR4, assuming that free product is not present. Users may wish to consider the fact that the lower of the aqueous or vapour based saturation limits is 769 mg/kg and should confirm that free phase product is not observed where measured concentrations exceed this value.
TPH aliphatic C8-C10	144	
TPH aromatic C10-C12	389	
TPH aromatic C12-C16	687	
TPH aromatic C16-C21	804	This fraction is not considered volatile and the inhalation of vapour pathways have not been considered (TPHCWG, 1997).
TPH aromatic C21-C35	1220	This fraction is not considered volatile and the inhalation of vapour pathways have not been considered (TPHCWG, 1997).
TPH aromatic C5-C7 (benzene)	0.330	Benzene is the only constituent of this fraction (TPHCWG 1997). Value presented is Environment Agency SGV published in March 2009.
TPH aromatic C7-C8 (toluene)	610	Toluene is the only constituent of this fraction (TPHCWG 1997). Value presented is Environment Agency SGV published in March 2009.
TPH aromatic C8-C10	177	
Trans-1,2-dichloroethene		Please see the EIC GAC report.
Tributyl tin oxide		Please see the EIC GAC report.
Trichloroethene	0.493	
Trichloromethylbenzene	0.00165	
Vanadium	115	
Vinyl chloride	0.000986	
Zinc	17200	

Note:
All values provided are rounded to 3 significant figures.
It is noted for some compounds that the SSV is sufficiently high that free product is likely to be encountered. Please see the Frequently Asked Questions for more advice.
In some instances the risk based value may be lower than the laboratory detection limit. Please see the Frequently Asked Questions for more advice.

Category 4 Screening Levels (C4SL)

Substance	Residential (with home-grown produce)	Residential (without home-grown produce)	Allotments	Commercial	Public Open Space 1	Public Open Space 2
Arsenic	37 mg/kg	40 mg/kg	49 mg/kg	640 mg/kg	79 mg/kg	168 mg/kg
Benzene	0.87 mg/kg	3.3 mg/kg	0.18 mg/kg	98 mg/kg	140 mg/kg	230 mg/kg
Benzo(a)pyrene	5 mg/kg	5.3 mg/kg	5.7 mg/kg	76 mg/kg	10 mg/kg	21 mg/kg
Cadmium	26 mg/kg	149 mg/kg	4.9 mg/kg	410 mg/kg	220 mg/kg	880 mg/kg
Chromium VI	21 mg/kg	21 mg/kg	170 mg/kg	49 mg/kg	23 mg/kg	250 mg/kg
Lead	200 mg/kg	310 mg/kg	80 mg/kg	2330 mg/kg	630 mg/kg	1300 mg/kg

APPENDIX F

STATISTICAL ANALYSIS OUTPUT SHEETS

Test Results

Pb

Client/client ref:

Project ref: LKC 14 1086

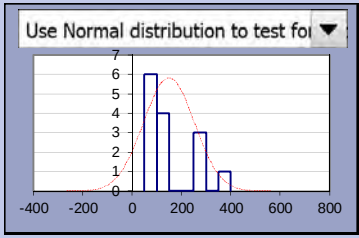
Site ref: Gateacre Garden Centre

Data description: Made ground

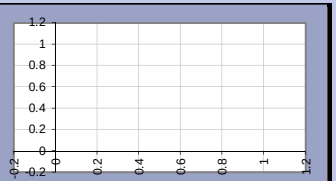
Date: 30-Oct-2014

User details: MP

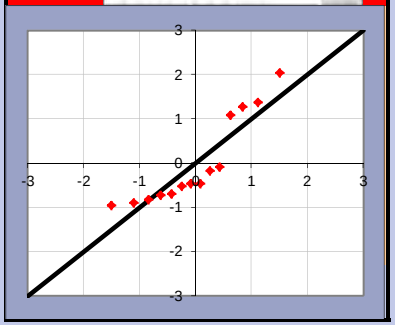
Dataset:	Pb
Sample mean $\overline{x}$	148.21
Sample standard deviation, s	103.27
Sample size, n	14
Critical concentration, Cc	200



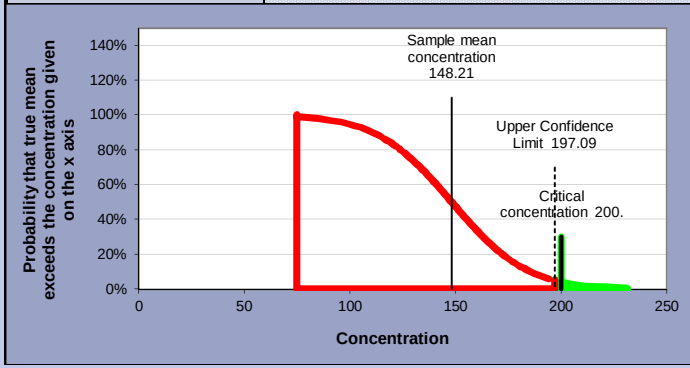
Outliers & non-detects	
Outliers present?	No
Significance level	5%
Outliers excluded	0
Non-detects	0



Normality test	
Significance level:	1%
Non-normal distribution	
Change:	One-sample t-test



Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?
Null hypothesis:	The true mean concentration is equal to or greater than the critical concentration: μ ≥ Cc
Alternative hypothesis:	The true mean concentration is less than the critical concentration: μ < Cc



Evidence against Null hypothesis:	**96%**
Base decision on:	evidence level
Evidence level required:	**95%**
Balance of probability?	N/A
Reject Null Hypothesis?	Yes

μ < Cc (re this dataset)

Back to data | **Back to summary** | **Go to outlier test** | **Go to normality test**

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