

**LAND AT
FORMER MMU CAMPUS
DIDSBURY**

**POST DEMOLITION SITE
INVESTIGATION, RISK
ASSESSMENT AND UPDATED
REMEDIATION STRATEGY**



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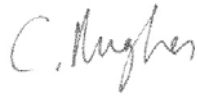
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LK Consult Ltd

Document Verification

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CONTENTS

1	INTRODUCTION	1
2	GROUND INVESTIGATION – POST DEMOLITION	3
3	RISK ASSESSMENT – POST DEMOLITION	4
4	REMEDIATION STRATEGY	7
5	CONCLUSIONS	10

FIGURES

Figure 1: Site Location Plan

Figure 2: Site Boundary and Proposed Layout Plan

Figure 3: Sampling Location Plan

Figure 4: Soil Exceedance Plan

APPENDICES

Appendix A: Soil Profile Logs

Appendix B: Certificates of Analysis – Soils

Appendix C: Generic Assessment Criteria – Soils

Appendix D: Validation Checklist

1 INTRODUCTION

1.1 Introduction

LK Consult Ltd (LKC) has been commissioned by PJ Livesey Holdings Ltd to undertake a post demolition site investigation at the former MMU Campus site, Didsbury.

This post demolition work was required due to the large number of buildings that remained when Remedios Ltd originally undertook the site investigation in 2014 and the need to better characterise the site and reduce uncertainty of ground conditions in areas previously inaccessible.

The planning application site boundary is approximately 3.89ha in size and centred at NGR 384868E 390547N (Figure 1). The proposed development for the whole site will comprise 42 houses with gardens, construction of a new apartment block, refurbishment of the former 'Admin Building' to apartments with landscaped areas and town houses and refurbishment of the former 'Chapel' to apartments with landscaped areas (Figure 2).

1.2 Previous Reports

The following reports have been undertaken by a number of consultants, including LKC:

- 'Phase I Desk Study Report for MMU, Didsbury' by Remedios Ltd (ref: 140168, dated August 2014).
- 'Phase II Ground Engineering Interpretive Report for MMU, Didsbury' by Remedios Ltd (ref: 140178, dated November 2014).
- 'Additional Contamination Hotspot Investigation Report for MMU, Didsbury' by Remedios Ltd (ref: 140178, dated 8th January 2015).
- 'Ground Gas Addendum Letter Report for MMU, Didsbury' by Remedios Ltd (ref: 140178, dated 26th January 2015).
- 'Letter correspondence on Regulator queries for MMU, Didsbury' by Remedios Ltd (ref: 140178, dated 2nd June 2015).
- 'Site Investigation Brief for MMU, Didsbury' by LKC (ref: LKC 16 1066, dated 23rd February 2016).
- 'Email agreeing reduction in environmental capping layer thickness and use of 450mg/kg residential assessment criteria for lead' by LKC (dated 30th June 2016).
- 'Site Works and Validation Checklist for MMU, Didsbury' by LKC (ref: LKC 16 1066, dated 26th July 2016).
- 'Completion Report – Former Admin Building' for MMU, Didsbury' by LKC (ref: LKC 16 1066-01, dated 28th October 2016).

LKC understand all previous work has been approved by the appropriate Regulators.

1.3 Summary of Previous Work

Previous work by Remedios Ltd and subsequent work and correspondence by LKC are summarised below:

- Site has been an educational facility since earliest mapping of 1851.
- Site is underlain by Till and sands and gravel superficial deposits (Secondary A Aquifer) over Wilmslow Sandstone Formation (Principal Aquifer).
- The site investigation by Remedios Ltd comprised a combination of window sample boreholes and trial pits.

- The investigation by Remedios Ltd included soil sampling and gas monitoring. No groundwater was encountered.
- Remedios Ltd recommended an environmental capping layer in soft landscaped areas and gardens around the former Tennis Court, where a PAH hotspot was identified. This was to mitigate the risk from the direct contact pathway ([Pollutant Linkage 1](#)).
- Remedios Ltd concluded the risk to groundwater was considered low, due to no significant water present and clay band encountered during the investigation ([Pollutant Linkage 2](#)).
- Remedios Ltd concluded the risk from hazardous gas was considered low, where no protection was required ([Pollutant Linkage 3](#)).
- LKC recommended a post demolition site investigation to fully characterise the site and ascertain if the current contamination pollutant linkages were still valid.
- LKC agreed with MCC that lead soil results could be compared to the old SGV of 450mg/kg.
- LKC agreed with MCC that the environmental capping layer could comprise 450mm in rear gardens and 300mm in front gardens and landscaped areas with a break layer comprising either 100mm MOT stone (with less soil required) or geotextile layer.
- Further assessment of the data by LKC noted only 2 soil exceedances (lead 1,200mg/kg and arsenic 120mg/kg). Therefore, contamination may not be widespread across the site. Due to time constraints LKC recommended either an environmental capping layer ([Option 1](#)) or higher density soil sampling on a block by block or landscaped area basis ([Option 2](#)) to ascertain if an environmental capping layer is required.
- The landscaped areas around the former 'Admin Building' was suitable for use without the requirement for remediation.

2 GROUND INVESTIGATION – POST DEMOLITION

2.1 Investigation

It was agreed with MCC to undertake *circa* 18 machine excavated trial pits within the footprint of the former buildings (ref TP101-118).

It should be noted that TP118 was not undertaken as the building in this location will not be demolished for some time. It is assumed in that area to take either Option 1 (environmental capping layer) or Option 2 (additional site investigation in garden areas).

Investigated locations are presented in Figure 3. The scope of works was prior agreed with Manchester City Council.

Made ground was encountered in all investigation location generally comprising gravelly sandy clay with ash, pottery and brick overlying natural gravelly sand. All relevant soil profile logs are presented in Appendix A.

2.2 Sampling Protocol

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation¹.

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 for chemical testing. If collection was not possible the same day then samples were stored in the sample storage fridge at the LK Group offices below 4°C. Samples were tracked using appropriate Chain of Custody forms provided by Chemtest.

Soils were tested for an appropriate suite of contaminants based on previous findings. No visual or olfactory evidence of volatile contamination was identified in any samples (PID <1ppm) and ground conditions were consistent with previous work.

Based on the above at least one sample from each location was taken to represent made ground and tested for the following:

- Arsenic, cadmium, chromium (total and hexavalent), copper, lead, mercury, nickel, selenium, vanadium, zinc, water soluble sulphate, pH, USEPA PAH 16, asbestos identification and organic matter.

Many of the contamination tests are UKAS or MCERTS accredited and further details are given in the Certificate of Analysis presented in Appendix B.

¹ EA (2000). "Technical Aspects of Site Investigation. Volumes 1 & 2 Text Supplements Research and Development Technical Report." P5-065/Tr.

3 RISK ASSESSMENT – POST DEMOLITION

3.1 Soil Risk Assessment

Current good practice requires that the findings from a site investigation should be evaluated on a site specific basis, using a risk based approach².

With regards to the soil risk assessment LKC will use the following hierarchy:

- Category 4 Screening Levels (C4SLs).
- LQM Suitable 4 Use Levels (S4ULs).
- ATRISK Soil Screening Values (SSVs) and CL:AIRE Generic Assessment Criteria (GACs).

C4SLs have recently been published^{3,4}. The recent change to the contaminated land guidance has changed the evaluation of risk from 'minimal' (referred to as Health Criteria values (HCVs))⁵ used to generate Soil Guideline Values (SGVs) to 'low' (referred to as Lowest Level of Toxicological Concern (LLTCs)). The policy companion document and supporting letter by Defra, dated 3rd September 2014, states that C4SLs '*could be used under the planning regime, as well as within Part 2A*'. Based on these comments LKC considers the justifications and assumptions used to generate 'low' risk are suitable for the planning regime.

Where no C4SLs have been generated LKC will use the LQM S4ULs⁶. Similar assumptions and land uses to C4SLs have been used. However, toxicological information has been based on 'minimal risk' as per previous guidelines and assumptions^{7,8,9}.

If contaminants are not present as C4SLs and S4ULs then LKC will use ATRISK SSVs or CL:AIRE GACs¹⁰. These follow the 'minimal' risk principal and more stringent exposure parameters and will be conservative.

The use of the old Soil Guideline Value (SGV) for lead of 450mg/kg was agreed with Manchester City Council (MCC).

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 a carcinogen and most toxic of the PAHs^{11,12} and naphthalene the most volatile and soluble¹³. The new C4SLs indicate B(a)P as a surrogate

² EA (2004). "Model Procedures for the Management of Land Contamination." R&D Publication CLR 11.

³ Defra (2014). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Policy Companion Document."

⁴ CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."

⁵ EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.

⁶ LQM (2014). "The LQM/CIEH S4ULs for Human Health Risk Assessment."

⁷ EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.

⁸ EA (2008). "A Review of Body Weight and Height Data used within the Contaminated Land Exposure Assessment Model (CLEA)." Project SC050021/Technical Review 1.

⁹ EA (2009). "Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values." Science report SC050021/SR7.

¹⁰ CL:AIRE (2009). "The Soil Generic Assessment Criteria for Human Health Risk Assessment."

¹¹ EA (2002). "Contaminants in Soils: Collation of Toxicological Data and Intake Values for Humans. Benzo[a]pyrene." R&D Publication TOX2.

¹² USEPA (1984). "Health Effects Assessment of Polycyclic Aromatic Hydrocarbons (PAHs). EPA 540/1-86-013."

¹³ EA (2003). "Review of the Fate and Transport of Selected Contaminants in the Soil Environment." Draft technical report P5-079/TR1.

marker for carcinogenic PAHs, if it falls within appropriate limits, since the risk from other non-carcinogenic PAHs are considered negligible¹⁴.

For B(a)P to be used as a surrogate marker it should follow the profile described by the HPA (2008)¹⁵ and CL:AIRE (2013). Naphthalene will be treated separately using the LQM S4ULs.

Considering the 'residential' land use LKC compared all soil data to a 'residential with home produce' land use.

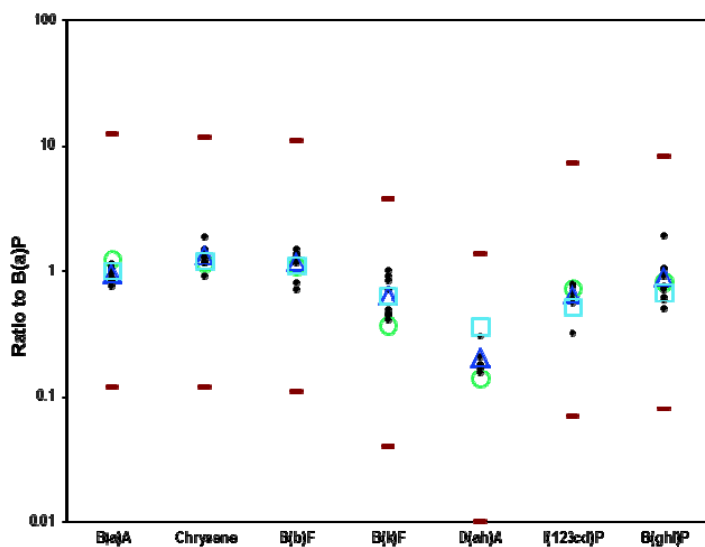
All criteria have been generated using the CLEA V1.06 model¹⁶ based either on 1%, 2.5% and 6% Soil Organic matter (SOM). Results will be compared to the nearest appropriate SOM.

A summary of the generic assessment criteria is provided in Appendix C. ATRISK SSVs and CL:AIRE GACs were not required for this dataset and have not been included.

B(a)P as Surrogate Marker

Based on the above assumption for PAHs, LKC undertook an assessment of the data for the site with regards to using B(a)P as a surrogate marker for carcinogenic PAHs as per HPA and CL:AIRE guidelines. The primary toxicological study related to Culp *et.al*¹⁷, which was based on coal tar mixtures (>80,000mg/kg of total PAHs) fed in food to mice over a two year carcinogenicity study.

Graph 1-1 summarises the study site data with respect to how the ratios of carcinogenic PAHs relate to B(a)P, within the confidence limits provided in the HPA document.



Graph 1-1: The ratio of PAH to B(a)P in soil for all available data at the site based on 12 samples (where values were >LOD to allow the calculation of a ratio).

Notes:

B(a)P = Benzo(a)pyrene; D(ah)A = Dibenzo(ah)anthracene; B(a)A = Benzo(a)anthracene; B(b)F = Benzo(b)fluoranthene; B(k)F = benzo(k)fluoranthene; I(123cd)P = Indeno(123cd)pyrene; B(ghi)P = Benzo(ghi)perylene.

● = Ratio to B(a)P for all data ○ = Mean ratio to B(a)P for Culp data △ = Mean ratio to B(a)P from all data at the site
□ = Mean ratio to B(a)P for UK data presented by HPA ■ = Upper and Lower limits (order of magnitude from Culp data)

¹⁴ CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."

¹⁵ HPA (2010). "HPA Contaminated Land Information Sheet: Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)." Version 3.

¹⁶ EA (2008). "CLEA Software (Version 1.05) Handbook." Science Report – SC050021/SR4.

¹⁷ Culp, S; Gaylor, D; Sheldon, W; Goldstein, L and Beland, F (1998). "A Comparison of Tumours Induced by Coal Tar and Benzo-a-pyrene in a 2-Year Bioassay." Carcinogenesis. Vol 19, no. 1, pp. 117-124.

All the data points that could be used to calculate ratios fall inside the upper or lower limits.

Based on this distribution of data LKC considers B(a)P can be used as a surrogate marker for carcinogenic PAHs and the C4SL criteria is suitable for this dataset.

3.2 Soil Results Comparison Against Assessment Criteria

Elevated and pertinent results from the post demolition site investigation are presented in Table 3-1 below and all analysis sheets are presented in Appendix B.

Contaminant		Units	No. of samples	Elevated Results	Sample Location (Depth mbgl)	Criteria	Source of Criteria
PAHs	B(a)P	mg/kg	18	6.7	TP102 (0.4-0.6)	5	C4SL
				21	TP104 (0-0.5)		
				15	TP105 (0-0.5)		
General	pH	pH	18	Range 6.0 to 11.4			
	SOM	%	18	Range <0.4 to 7.4			
	Asbestos	-	18	None Detected.			

Table 3-1: Summary of elevated and pertinent analytical results.

Notes:

Only results that exceeded assessment criteria have been shown and results from **all depths** are noted. Results have been compared to the nearest appropriate SOM.

B(a)P was exceeded in 3 locations around the proposed Plots 12-14 and car park area north of these plots. The previous investigation noted 1 exceedance for arsenic around Plot 13 and 1 exceedance for lead around Plot 35-36. A summary plan of soil exceedances from both investigations are presented in Figure 4.

Elevate contaminants are likely associated with the ash, brick and pottery component of the made ground. This is prevalent across the site and based upon the soil sampling results contamination appears to be highly heterogeneous.

Based on the above the direct contact pollutant linkage appears to be not prevalent across the site. However, as a precaution Pollutant Linkage 1 (direct contact) is still considered at this stage to be present across the site and as stated earlier either a precautionary environmental capping layer or more localised plot by plot / landscaped area soil sampling is recommended.

3.3 Groundwater Risk Assessment

Based upon the previous controlled water risk assessment by Remedios and similar composition of soil from the post demolition site investigation the risk from Pollutant Linkage 2 (controlled waters) is still considered low and no specific remediation is required.

3.4 Gas Risk Assessment

Based upon the previous gas risk assessment by Remedios and similar composition of soil from the post demolition site investigation the risk from Pollutant Linkage 3 (hazardous gas) is still considered low and no specific remediation is required.

4 REMEDIATION STRATEGY

4.1 Recommendations

The recommendations provided below are considered appropriate for the site based on the site investigation work undertaken and are similar to previous recommendations:

- i) **Option 1:** Environmental capping layer comprising 450mm clean suitable soil in rear gardens and 300mm in front gardens and areas of landscaping over either 100mm MOT stone (with less soil required) or geotextile marker.
- ii) **Option 2:** Further sampling and risk assessment on a block by block basis (nominally a total of 4 soil samples per plot with 1 in the front garden) or selected soil samples in any landscaped areas. If soil results are below generic assessment criteria then no specific clean validated environmental cover depth will be required, but a nominal 150mm covering of topsoil as a growing medium.
- iii) Validation testing of any site won or imported material to be re-used onsite in gardens and soft landscaping to ensure it is 'suitable for use'. All site won or imported material should be tested at a rate of 1 sample per 50m³ for topsoil and 1 sample per 150m³ for subsoil. Soil results will be compared to generic assessment criteria as prescribed in Appendix C.
- iv) Details of unexpected contamination.
- v) Provision of waste transfer noted for any disposal of contaminated soil offsite.

Details of remediation and validation are presented in the validation checklist in Appendix D.

4.2 Schematic of the Environmental Capping Layer

4.2.1 Private Gardens

Private garden areas should comprise a cover layer depth of at least 450mm. A typical construction detail is provided below. Subsoil may be replaced by topsoil if required.

If suitable break layer material is not available, then the **break layer may be substituted for a separation geotextile** and the subsoil / topsoil depth increased by 100mm to maintain the required capping layer material depth

GROUND LEVEL

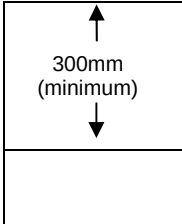
450mm (minimum)		150mm (minimum) chemically validated TOPSOIL
		200mm chemically validated SUBSOIL
		100mm PHYSICAL BREAK LAYER (typically MOT Type 1)
		Existing MADE GROUND

4.2.2 Soft Landscaped Areas and Front Gardens

Soft landscaping areas and front gardens should comprise a cover layer depth of at least 300mm. A typical construction detail is provided below.

If suitable break layer material is not available, then the **break layer may be substituted for a separation geotextile** and the subsoil / topsoil depth increased by 100mm to maintain the required capping layer material depth

GROUND LEVEL

		200mm (minimum) chemically validated TOPSOIL
		100mm PHYSICAL BREAK LAYER (typically MOT Type 1)
		Existing MADE GROUND

4.3 Validation of Imported / Site Won Material

Chemical validation of all imported soils to be used on site in gardens and soft landscaping areas should be undertaken. Imported soils should be accompanied by a certificate of analysis and source details.

A summary of the required imported material sampling requirements are presented in Table 4-1. Ideally, the material should be sampled at source to prevent double handling if soil fails, with confirmatory sampling undertaken on importation to site. However, where this is not possible then material imported should be segregated based on source and soil type. Validation samples should be taken prior to placement in gardens to ensure suitability for use.

If material is site won then this should be segregated and stockpiled onsite before testing. Appropriate exemptions will need to be required before material can be used onsite.

Material Type	Source	Suite of Analysis	Sampling Rate
Topsoil	Greenfield	Suite A	1 sample per 50m ³ (minimum of 3 samples per source)
	Brownfield / Unknown / Site Won	Suite B	
Subsoil	Brownfield / Unknown / Site Won	Suite B	1 sample per 150m ³ (minimum of 3 samples per source)
Physical Stone Break Layer	First Generation i.e. quarried sand (subsoil) or stone (break layer)	No testing is required. Certification of material provenance is required.	
	Recycled Stone (6F2 / min. fines)	Suite B	1 sample per 500m ³ (minimum of 3 samples per source)

Table 4-1: Recommended validation sampling requirements for environmental capping layer soils.

Notes:

Suite A - Heavy metals, pH, water soluble sulphate, speciated PAH, soil organic matter and asbestos screen.

Suite B - Heavy metals, pH, water soluble sulphate, speciated PAH, phenol, total and free cyanide, soil organic matter, asbestos screen, banded petroleum hydrocarbons (TPH CWG), BTEX, MTBE.

Any soil with visual or olfactory evidence of hydrocarbons should be rejected.

In addition, it should be ensured that the matrix of the topsoil is suitable as a growing medium and no undesirable material is present (in line with BS3882¹⁸). LKC advise this information is provided by the soil supplier before material is imported onto site.

Imported / site won material to be used in gardens will be compared against residential with plant uptake criteria. Soft landscaping around apartment blocks and general Public Open Space (POS) will be compared to either 'residential without home produce' or 'POS_{resi}' generic assessment criteria. Appropriate remedial target criteria are presented in Appendix C.

4.4 Other Considerations

4.4.1 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 (including asbestos containing material) be encountered at the site, LKC and the Local Authority should be informed and further assessment of the material may be required.

Currently no unexpected contamination has been identified onsite.

4.4.2 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 guidance¹⁹) should be adopted by all workers involved with site enabling and construction works.

4.5 Site Completion Report

It is 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.

The aim of the completion reports will be to demonstrate to the Local Authority that the site has been suitably remediated to the extent that construction works may commence and, in accordance with the National Planning Policy Framework (NPPF)²⁰:

- The site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;
- After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990²¹; and,
- Adequate site investigation information, prepared by a competent person, is presented.

Once the above is satisfied the Local Authority should be able to discharge all the relevant contaminated land conditions.

¹⁸ BS (2015). "Specifications for Topsoil and Requirements for use." BS3882:2015.

¹⁹ HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land" London HMSO.

²⁰ DCL (2012). "National Planning Policy Framework." Department of Communities and Local Government. March 2012.

²¹ Defra (2006). "Environmental Protection Act 1990: Part 2A Contaminated land." Defra Circular 01/2006.

5 CONCLUSIONS

The post demolition site investigation indicates made ground is of similar composition to the rest of the site.

The primary risk is from direct contact from contaminated soil and due to the limited exceedances two options have been provided:

- i) **Option 1:** Environmental capping layer comprising 450mm clean suitable soil in rear gardens and 300mm in front gardens and areas of landscaping over either 100mm MOT stone (with less soil required) or geotextile marker.
- ii) **Option 2:** Further sampling and risk assessment on a block by block basis (nominally a total of 4 soil samples per plot with 1 in the front garden) or selected soil samples in any landscaped areas. If soil results are below generic assessment criteria then no specific clean validated environmental cover depth will be required, but a nominal 150mm covering of topsoil as a growing medium.

All site won or imported material for the environmental capping layer will require testing at the prescribed rate detailed in the Validation Checklist (Appendix D) and compared to generic assessment criteria presented in Appendix C.

Once validation has been completed and appropriate assessment undertaken this should be presented in a Completion Report and submitted to MCC for review.

Once the Completion Report has been approved the contaminated land conditions should be able to be discharged.

FIGURES

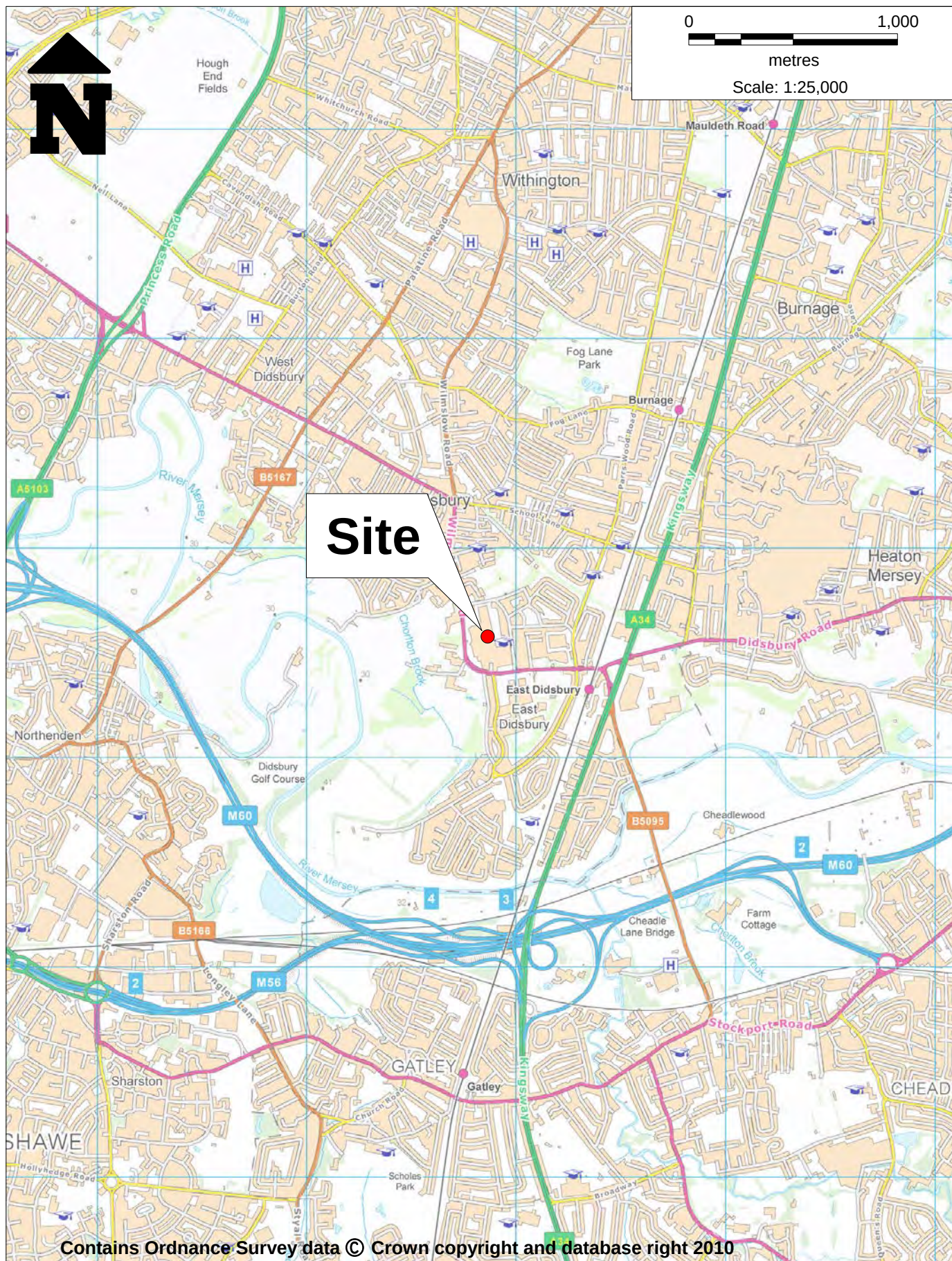
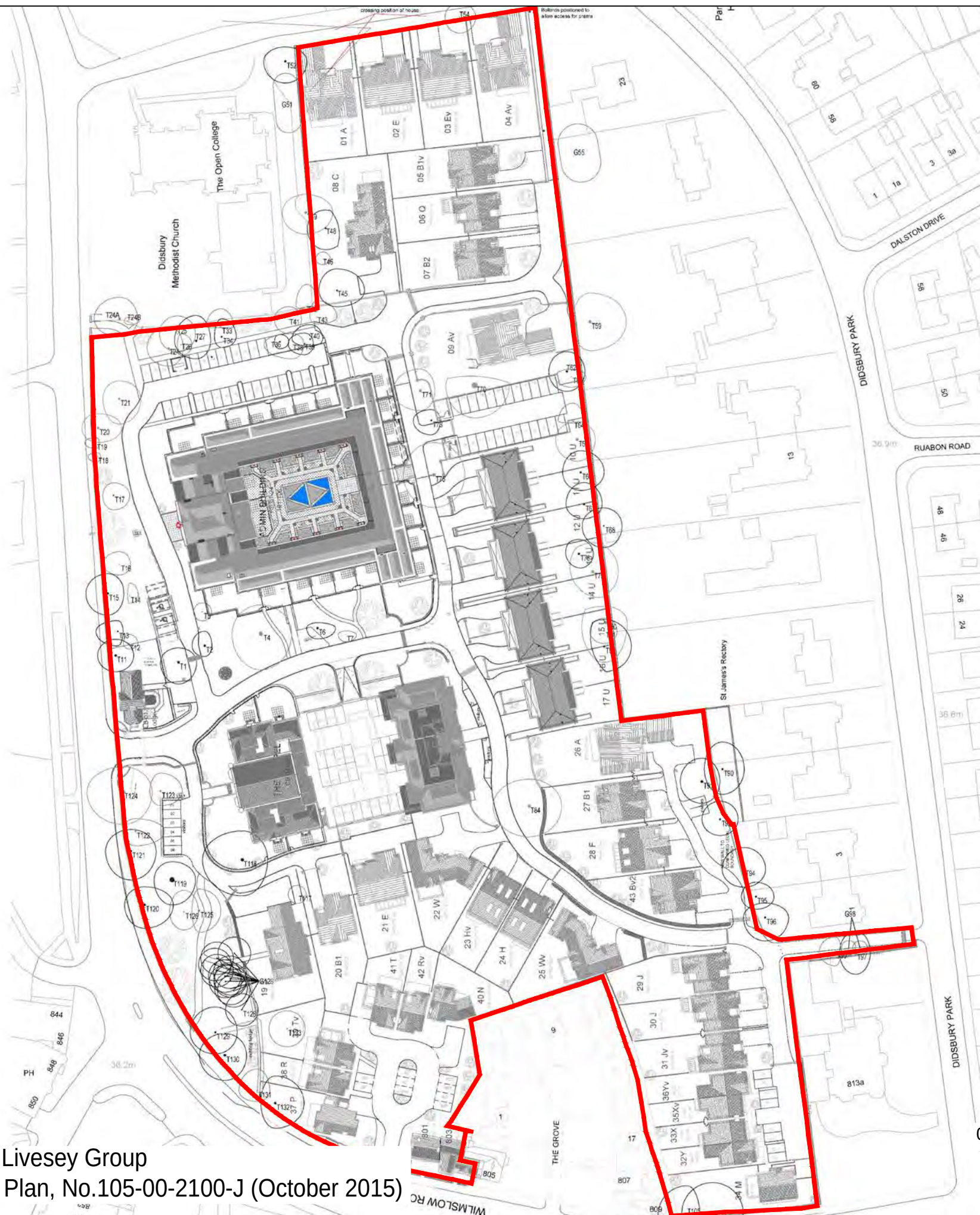
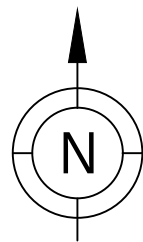
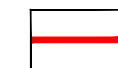


Figure 1: Site Location Plan, MMU, Didsbury

Drawn: October 2016 Scale: 1:25,000 @ A4 (see scale bar)



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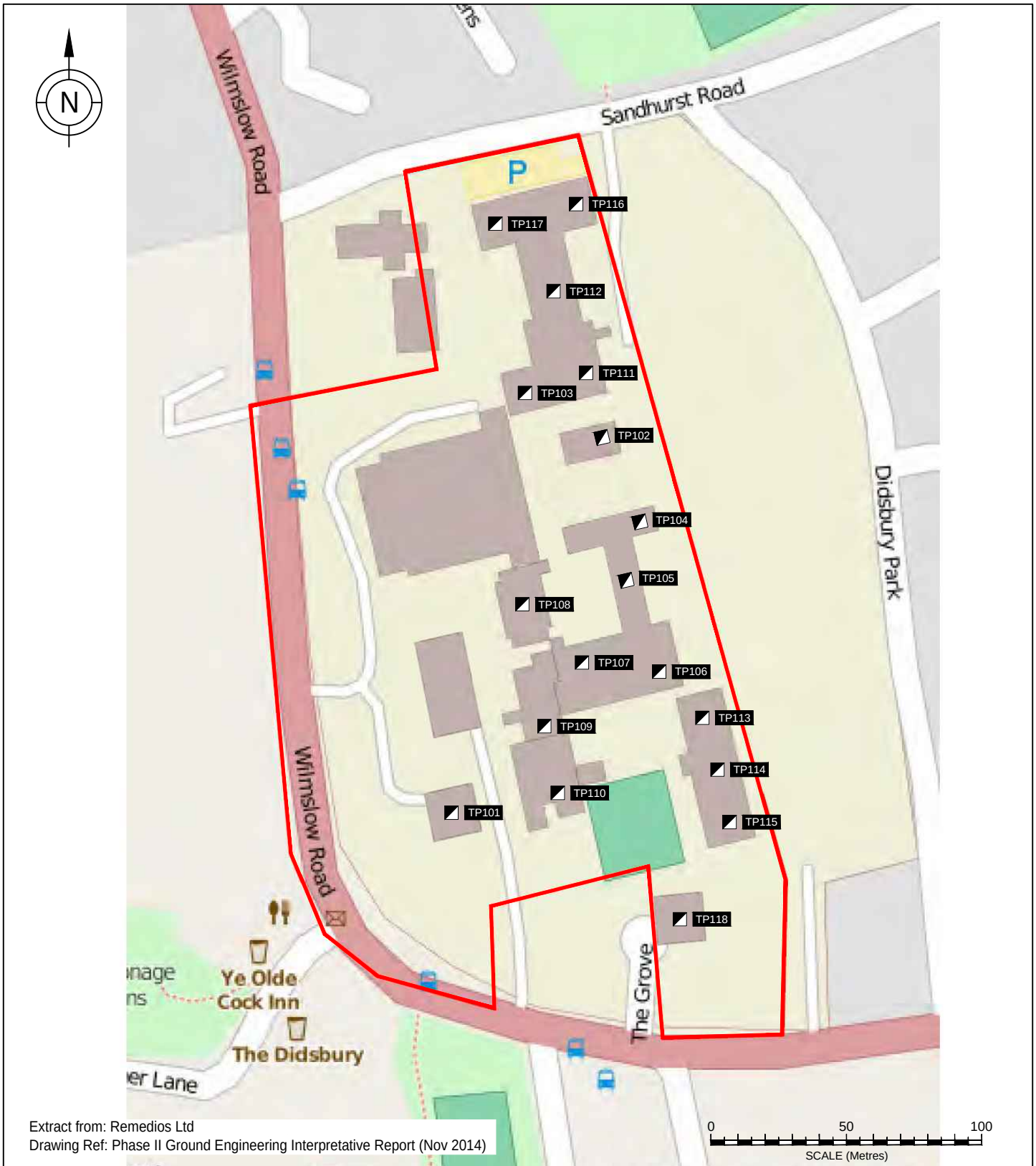
Site Boundary

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.



Client: P.J. Livesey Group Ltd			
Site: MMU, Didsbury			
Title: Site Boundary & Proposed Site Use Plan			
Job No.: LKC 16 1066	Scale (See Scale Bar): 1:1250 @ A3	Figure: 2	Revision:
Drawn By: AC	Checked By: PQ	Drawn: Oct 2016	

Extract from: P.J. Livesey Group
Drawing Ref: Site Plan, No.105-00-2100-J (October 2015)



KEY



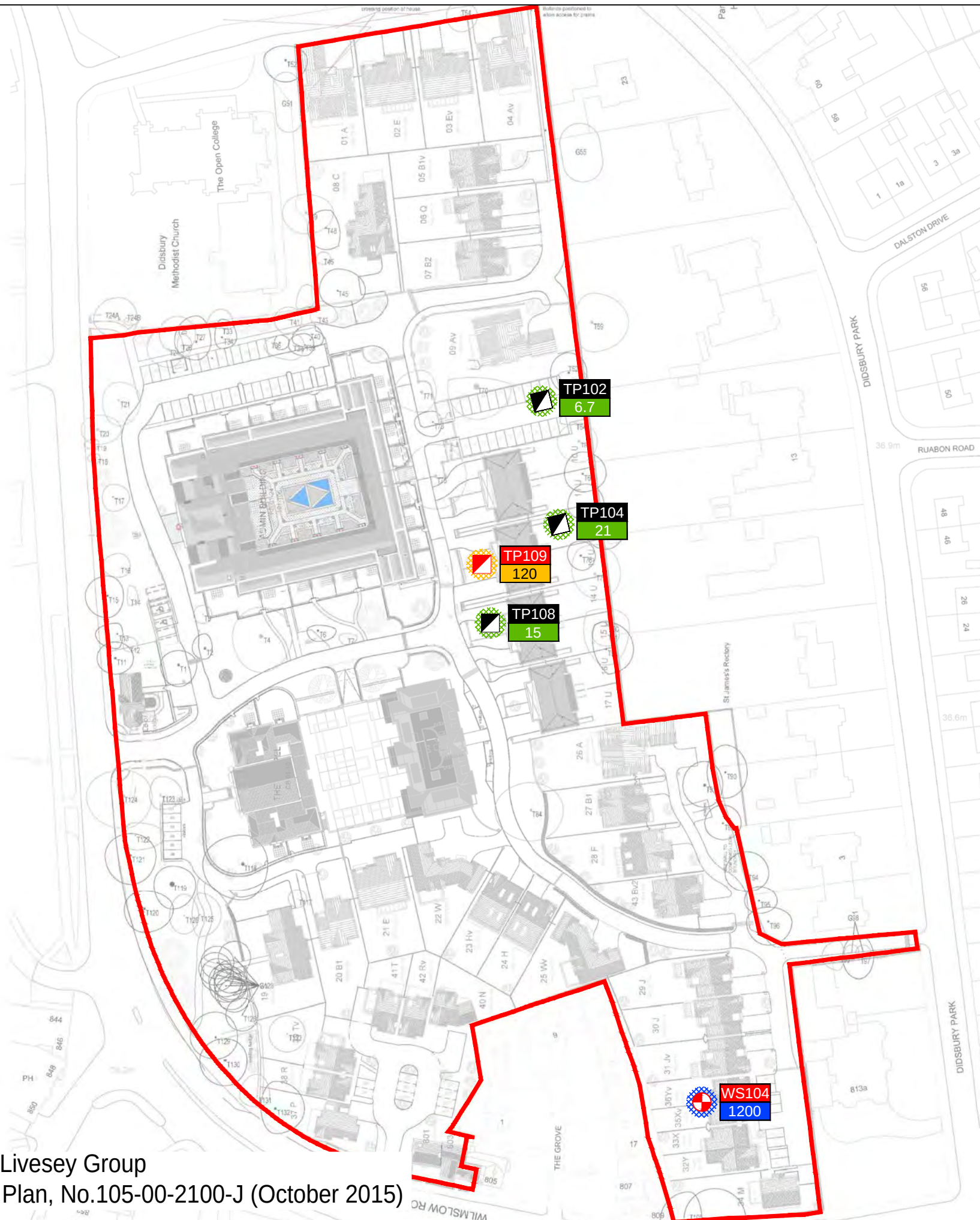
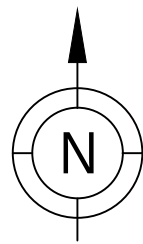
Site Boundary



Trial Pit (TP)

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.

Client: P.J. Livesey Group Limited				Title: Post-Demolition Sampling Location Plan			
Site: MMU, Didsbury							
Job No.: LKC 16 1066	Drawn By: AC	Checked By: PQ	Drawn: Dec 2016	Scale (See Scale Bar): 1:2000 @ A4		Figure: 3	



KEY

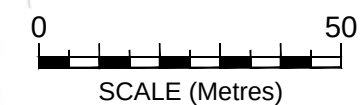
-  Site Boundary
-  LKC Trial Pit (TP)
-  Remedios Trial Pit (TP)
-  Remedios Window Sample Borehole (WS)
-  B(a)P Exceeded (mg/kg)
-  Pb Exceeded (mg/kg)
-  As Exceeded (mg/kg)

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.



Client: P.J. Livesey Group Ltd			
Site: MMU, Didsbury			
Title: Exceedance Plan			
Job No.: LKC 16 1066	Scale (See Scale Bar): 1:1250 @ A3	Figure: 4	Revision:
Drawn By: AC	Checked By: PQ	Drawn: Dec 2016	

Extract from: P.J. Livesey Group
Drawing Ref: Site Plan, No.105-00-2100-J (October 2015)



APPENDIX A

SOIL PROFILE LOGS

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

MMU, Didsbury

**Trial Pit
Number
TP101****Excavation Method**

Trial Pit.

Dimensions**Ground Level (mOD)****Client**

P.J. Livesey Group Ltd

**Job
Number**

LKC 16 1066

Location**Dates**

08/03/2016

Project Contractor

Bemus

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	D1 PID = 0.0ppm				(0.20)	MADE GROUND: Dark brown/black gravelly slightly clayey sand with occasional subangular cobbles of sandstone, rare whole bricks, coal, pottery fragments, ash and clinker. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
0.20-0.80	D2				0.20			
					(0.60)	Brown gravelly slightly clayey SAND with occasional rootlets. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
					0.80			
1.00-1.50	D3				(1.00)	Brownish orange very gravelly SAND with abundant subangular cobbles of sandstone. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
					1.80			
						Complete at 1.80m		

**Remarks**

Trial pit dry and stable.

Scale (approx)

1:20

Logged By

KW

Figure No.

LKC 16 1066.TP101



Site	MMU, Didsbury
------	---------------

**Trial Pit
Number**
TP102

Excavation Method	
Trial Pit.	

Dimensions

Ground Level (mOD)

Client	P.J. Livesey Group Ltd
---------------	------------------------

Job Number	LKC 16 1066
------------	-------------

Location

Dates	06/07/2016
--------------	------------

Project Contractor	Bemus
---------------------------	-------

Sheet
1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	D1 PID = 0.0ppm				(0.40)	MADE GROUND: Dark brown gravelly clayey sand with abundant angular to subangular cobbles of brick and sandstone, occasional fragments of pottery, glass, ash and clinker. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
0.40-0.60	D2				0.40 (0.20) 0.60	MADE GROUND: Red brick sand and gravel subbase. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
1.50-2.00	B1				(2.20)	Light brownish orange very gravelly SAND with occasional subangular cobbles of sandstone. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
					(2.80)	Complete at 2.80m		



Remarks

Trial pit dry and stable

Scale (approx)

1:20

Logged By

KW

Figure No.

LKC 16 1066.TP102

Excavation Method Trial Pit.	Dimensions	Ground Level (mOD)	Client P.J. Livesey Group Ltd	Job Number LKC 16 1066
	Location	Dates 06/07/2016	Project Contractor Bemus	Sheet 1/1

[illegible]

Remarks

Trial pit dry and stable.

Scale (approx)

1:20

Logged By

KW

Figure No.

LKC 16 1066.TP103

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

MMU, Didsbury

**Trial Pit
Number****TP104****Excavation Method**

Trial Pit.

Dimensions**Ground Level (mOD)****Client**

P.J. Livesey Group Ltd

**Job
Number**

LKC 16 1066

Location**Dates**

06/07/2016

Project Contractor

Bemus

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.60	D1 PID = 0.0ppm				(0.80)	MADE GROUND: Dark brown very gravelly slightly clayey sand with abundant angular to subangular cobbles of brick and sandstone; occasional fragments of glass, pottery, ash and clinker. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
1.00-1.50	D2				0.80	Light brownish orange very gravelly SAND with occasional subangular cobbles of sandstone. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone. Colour lightens with depth.		
1.50-2.00	B1				(1.80)			
					2.60	Complete at 2.60m		

**Remarks**

Trial pit dry and stable.

Scale (approx)

1:20

Logged By

KW

Figure No.

LKC 16 1066.TP104

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

MMU, Didsbury

**Trial Pit
Number
TP105****Excavation Method**

Trial Pit.

Dimensions**Ground Level (mOD)****Client**

P.J. Livesey Group Ltd

**Job
Number**

LKC 16 1066

Location**Dates**

06/07/2016

Project Contractor

Bemus

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.60	D1 PID = 0.0ppm				(0.60)	MADE GROUND: Dark brown gravelly slightly clayey sand with abundant angular to subangular cobbles of brick and sandstone; occasional glass, pottery, tarmac, ash and clinker. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
0.60-1.00	D2				0.60	Brownish orange very gravelly SAND with abundant subangular cobbles of sandstone. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
1.00-1.50	B1				(0.80)			
					1.40	Complete at 1.40m		

**Remarks**

Trial pit dry and stable.

Scale (approx)

1:20

Logged By

KW

Figure No.

LKC 16 1066.TP105

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

MMU, Didsbury

**Trial Pit
Number****TP106****Excavation Method**

Trial Pit.

Dimensions**Ground Level (mOD)****Client**

P.J. Livesey Group Ltd

**Job
Number**

LKC 16 1066

Location**Dates**

06/07/2016

Project Contractor

Bemus

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.60	D1 PID = 0.0ppm				(0.60)	MADE GROUND: Dark brown very gravelly slightly clayey sand with abundant angular to subangular cobbles of brick and sandstone; occasional fragments of glass, ash and clinker. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
0.60-1.00	D2				0.60	Brownish orange very gravelly SAND with subangular cobbles of sandstone. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded comprising sandstone.		
1.50-2.00	B1				(1.80)			
					2.40	Complete at 2.40m		

**Remarks**

Trial pit dry and stable.

Scale (approx)

1:20

Logged By

KW

Figure No.

LKC 16 1066.TP106



LK CONSULT LTD

Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site

MMU, Didsbury

**Trial Pit
Number
TP107**

Excavation Method

Trial Pit.

Dimensions

Ground Level (mOD)

Client

P.J. Livesey Group Ltd

**Job
Number
LKC 16 1066**

Location

Dates

06/07/2016

Project Contractor

Bemus

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50	D1 PID = 0.0ppm				(0.60)	MADE GROUND: Dark brown gravelly slightly clayey sand with abundant angular to subangular cobbles of brick and sandstone; occasional glass, pottery, timber, rootlets, clothing, food wrappers, tarmac, ash and clinker. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
1.00-1.50	D2				0.60	Brownish orange very gravelly SAND with abundant subangular cobbles of sandstone. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
1.50-2.00	B1				(1.40)			
					2.00	Complete at 2.00m		



Remarks

Trial pit dry and stable.

Scale (approx)

1:20

Logged By

KW

Figure No.

LKC 16 1066.TP107



LK CONSULT LTD

Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site

MMU, Didsbury

Trial Pit Number

TP108

Excavation Method

Trial Pit.

Dimensions

Ground Level (mOD)

Client

P.J. Livesey Group Ltd

Job Number

LKC 16 1066

Location

Dates

06/07/2016

Project Contractor

Bemus

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50	D1 PID = 0.0ppm					MADE GROUND: Dark brown gravelly slightly clayey sand with abundant angular to subangular cobbles of brick and sandstone; occasional glass, pottery, tarmac, ash and clinker. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
					(1.10)	Possible former brick drain encountered at 0.5mbgl.		
1.10-1.50	D2				1.10	Brownish orange very gravelly SAND with abundant subangular cobbles of sandstone. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
					(1.40)			
2.00-2.50	B1				2.50	Complete at 2.50m		



Remarks

Trial pit dry and stable.

Scale (approx)

1:20

Logged By

KW

Figure No.

LKC 16 1066.TP108



LK CONSULT LTD

Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site

MMU, Didsbury

**Trial Pit
Number**

TP109

Excavation Method

Trial Pit

Dimensions

Ground Level (mOD)

Client

P.J. Livesey Group Ltd

**Job
Number**

LKC 16 1066

Location

Dates

06/07/2016

Project Contractor

Bemus

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.70	D1 PID = 0.0ppm				(0.70)	MADE GROUND: Dark brown gravelly slightly clayey sand with abundant angular to subangular cobbles of brick and sandstone; occasional glass, pottery, tarmac, ash and clinker. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone. Possible brick wall encountered at 0.3mbgl.		
0.70-1.00	D2				0.70	Brownish orange very gravelly SAND with abundant subangular cobbles of sandstone. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
1.50-2.00	B1				(1.70)			
					2.40	Complete at 2.40m		



Remarks

Trial pit dry and stable.

Scale (approx)

1:20

Logged By

KW

Figure No.

LKC 16 1066.TP109

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

MMU, Didsbury

**Trial Pit
Number
TP110****Excavation Method**

Trial Pit.

Dimensions**Ground Level (mOD)****Client**

P.J. Livesey Group Ltd

**Job
Number**

LKC 16 1066

Location**Dates**

06/07/2016

Project Contractor

Bemus

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50	D1 PID = 0.0ppm				(0.10) 0.10	MADE GROUND: Compacted red brick and gravel. Gravel is fine to coarse angular to subrounded comprising sandstone.		
					(0.60)	MADE GROUND: Dark brown gravelly slightly clayey sand with abundant angular to subangular cobbles of brick and sandstone; occasional glass, pottery, tarmac, ash and clinker. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
					0.70			
1.00-1.50	D2				(1.40)	Brownish orange very gravelly SAND with abundant subangular cobbles of sandstone. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.		
1.50-2.00	B1				2.10	Complete at 2.10m		

**Remarks**

Trial pit dry and stable.

Scale (approx)

1:20

Logged By

KW

Figure No.

LKC 16 1066.TP110



LK CONSULT LTD
Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site MMU, Didsbury	Trial Pit Number TP111
Client P.J. Livesey Group Ltd	Job Number LKC 16 1066
Project Contractor Bemus	Sheet 1/1

Excavation Method Trial Pit.		Dimensions		Ground Level (mOD)		Client		Job Number	
		Location		Dates 06/07/2016		Project Contractor		Sheet	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.00-0.40	D1 PID = 0.0ppm				(0.40)	MADE GROUND: Dark brown black gravelly sandy clay with abundant angular to subangular cobbles of brick and sandstone; occasional glass, pottery, brick, rootlets, ash and clinker. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.			
0.50-1.00	D2				0.40 (0.10) 0.50	MADE GROUND: White to grey subangular sandstone subbase. Sandstone is fine to coarse angular to subrounded.			
					(0.80)	MADE GROUND: Brownish orange very gravelly slightly clayey sand with occasional brick fragments and rootlets. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.			
					1.30	Brownish orange very gravelly SAND with subangular cobbles of sandstone. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded comprising sandstone.			
					(1.20)				
2.50-2.70	B1				2.50 (0.20) 2.70	Brownish red slightly gravelly slightly sandy CLAY. Sand is fine to medium. Gravel is fine to medium angular to subrounded comprising sandstone.			
			Water strike(1) at 2.70m.			Complete at 2.70m			V1



Remarks Trial pit stable.		
Scale (approx) 1:20	Logged By KW	Figure No. LKC 16 1066.TP111



LK CONSULT LTD
Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

Site MMU, Didsbury	Trial Pit Number TP112
Client P.J. Livesey Group Ltd	Job Number LKC 16 1066
Project Contractor Bemus	Sheet 1/1

Excavation Method Trial Pit.		Dimensions		Ground Level (mOD)		Client		Job Number	
		Location		Dates 01/08/2016		Project Contractor		Sheet	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.10-2.00	D2					MADE GROUND: Brownish orange cobbly very gravelly sand with abundant brick fragments and occasional half bricks. Sand is fine to medium. Gravel is fine to coarse angular to subrounded comprising sandstone.			
0.50-1.00	D1 PID = 0.0ppm				(1.20)				
					1.20	Brownish orange slightly gravelly SAND with subangular cobbles of sandstone. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded comprising sandstone.			
					(1.30)				
					2.50	Complete at 2.50m			



Remarks Trial pit stable.		
Scale (approx) 1:20	Logged By PQ	Figure No. LKC 16 1066.TP112

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

MMU, Didsbury

**Trial Pit
Number****TP113****Excavation Method**

Trial Pit

Dimensions**Ground Level (mOD)****Client**

P.J. Livesey Group Ltd

**Job
Number**

LKC 16 1066

Location**Dates**

30/11/2016

Project Contractor

Bemus

Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50 0.00-0.50	ES1 PID <0.1ppm					MADE GROUND: Brown slightly cobbly gravelly sand with occasional wood. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded, of brick, concrete, coal, sandstone, and pebble.		
					(0.50)			
					0.50			
					(0.50)	Pale orange slightly gravelly SAND. Sand is medium to coarse. Gravel is fine to medium, sub-rounded to rounded, of pebble and sandstone.		
					1.00			
					(1.00)	Pale orange gravelly SAND. Sand is medium to coarse. Gravel is fine to medium, sub-rounded to rounded, of pebble and sandstone.		
					2.00			
					2.05	Black very gravelly sandy CONGLOMERATE (possible iron pan cemented gravel). Sand is coarse. Gravel is fine to medium, sub-rounded to rounded, of pebble.		
					(0.65)	Pale orange very gravelly SAND. Sand is medium to coarse. Gravel is fine to medium, sub-rounded to rounded, of pebble and sandstone.		
					2.70	Complete at 2.70m		

**Remarks**

No groundwater encountered.

Scale (approx)

1:20

Logged By

NS

Figure No.

LKC 16 1066.TP113

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

MMU, Didsbury

**Trial Pit
Number
TP114****Excavation Method**

Trial Pit

Dimensions**Ground Level (mOD)****Client**

P.J. Livesey Group Ltd

**Job
Number
LKC 16 1066****Location****Dates**

30/11/2016

Project Contractor

Bemus

**Sheet
1/1**

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.30 0.00-0.30	ES1 PID <0.1ppm				(0.30) 0.30	MADE GROUND: Dark brown very gravelly sandy clay with occasional brick and wire. Sand is fine to coarse. Gravel is fine to coarse, angular to rounded, of brick, concrete, coal, tarmacadam, sandstone, and pebble.		
					(0.70) 1.00	Orange gravelly SAND. Sand is medium to coarse. Gravel is fine to coarse, sub-rounded to rounded, of pebble and sandstone.		
					(1.50) 2.50	Orange very gravelly SAND. Sand is medium to coarse. Gravel is fine to medium, sub-rounded to rounded, of pebble and sandstone.		
2.50	SV 50.67kPa		Water strike(1) at 2.50m. 54, 54, 44/Av. 50.67		(0.20) 2.70	Firm consistency medium strength brown sandy CLAY. Sand is fine to medium.		▽1
						Complete at 2.70m		

**Remarks****Scale (approx)**

1:20

Logged By

NS

Figure No.

LKC 16 1066.TP113

**LK CONSULT LTD**Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com**Site**

MMU, Didsbury

**Trial Pit
Number
TP115****Excavation Method**

Trial Pit

Dimensions**Ground Level (mOD)****Client**

P.J. Livesey Group Ltd

**Job
Number
LKC 16 1066****Location****Dates**

30/11/2016

Project Contractor

Bemus

**Sheet
1/1**

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.50 0.00-0.50	ES1 PID <0.1ppm				0.05 (0.25) 0.30 (0.20) 0.50 (0.70) 1.20 (1.30) 2.50	MADE GROUND: Dark brown sandy slightly gravelly clay with frequent rootlets and occasional wood. Sand is fine to medium. Gravel is fine to medium, angular to sub-rounded, of brick, sandstone, coal, slate and limestone. MADE GROUND: Light grey sandy gravel (MOT). Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded, of limestone. MADE GROUND: Orange / red sandy gravelly cobbles with occasional wood and wire. Sand is fine to coarse. Gravel and cobbles are fine to coarse, angular to rounded, of brick, slate and coal. Yellow / orange gravelly SAND. Sand is medium to coarse. Gravel is fine to medium, sub-rounded to rounded, of pebble and sandstone. Yellow / orange very gravelly SAND. Sand is medium to coarse. Gravel is fine to medium, sub-rounded to rounded, of pebble and sandstone.	    	
2.50	SV 50.67kPa		54, 54, 44/Av. 50.67			Complete at 2.50m		

**Remarks**

No groundwater encountered.

Scale (approx)

1:20

Logged By

NS

Figure No.

LKC 16 1066.TP113

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Excavation Method		Dimensions		Ground Level (mOD)		Client		Job Number	
Trial Pit						P.J. Livesey Group Ltd		LKC 16 1066	
		Location		Dates 30/11/2016		Project Contractor Bemus		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20-0.35 0.20-0.35	ES1 PID <0.1ppm				0.05	MADE GROUND: Brick Paving.			
					0.10 (0.10)	MADE GROUND: Tarmacadam.			
					0.20	MADE GROUND: Concrete.			
					(0.20)	MADE GROUND: Light grey sandy gravel (MOT). Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded, of limestone.			
					0.40	Orange brown gravelly SAND. Sand is medium to coarse. Gravel is fine to medium, sub-rounded to rounded, of pebble and sandstone with rare coal fragments.			
					(0.80)				
					1.20	Orange brown very gravelly SAND. Sand is medium to coarse. Gravel is fine to medium, sub-rounded to rounded, of pebble and sandstone.			
					(1.40)				
2.50	SV 49kPa		49, 49,49/Av. 49.00		2.60	Complete at 2.60m			



Remarks

No groundwater encountered.

Scale (approx)

1:20

Logged By

NS

Figure No.

LKC 16 1066.TP113

APPENDIX B

CERTIFICATES OF ANALYSIS - SOIL



Final Report

Report No.: 16-05652-1

Initial Date of Issue: 16-Mar-2016

Client Leyden Kirby

Client Address: Eton Business Park
Eton Hill Road
Radcliffe
Manchester
Lancashire
M26 2ZS

Contact(s): Rachel Peart

Project LKC 16 1066 - MMU Didsbury

Quotation No.:		Date Received:	09-Mar-2016
Order No.:	731808	Date Instructed:	10-Mar-2016
No. of Samples:	1	Target Date:	14-Mar-2016
Turnaround (Wkdays):	5	Results Due:	16-Mar-2016

Date Approved: 16-Mar-2016

Approved By:



Details: Robert Monk, Technical Development
Chemist

Results - Soil

Client: Leyden Kirby	Chemtest Job No.:				16-05652
Quotation No.:	Chemtest Sample ID.:				265094
	Client Sample ID.:				TP101
	Sample Type:				SOIL
	Top Depth (m):				0.00
	Bottom Depth (m):				0.2
	Date Sampled:				08-Mar-2016
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected
Moisture	N	2030	%	0.020	22
Soil Colour	N	2040		N/A	Black
Other Material	N	2040		N/A	Stones, Wood
Soil Texture	N	2040		N/A	Clay
pH	M	2010		N/A	7.6
Sulphate (2:1 Water Soluble) as SO ₄	M	2120	g/l	0.010	0.10
Arsenic	M	2450	mg/kg	1.0	17
Cadmium	M	2450	mg/kg	0.10	0.37
Chromium	M	2450	mg/kg	1.0	22
Copper	M	2450	mg/kg	0.50	52
Mercury	M	2450	mg/kg	0.10	0.37
Nickel	M	2450	mg/kg	0.50	21
Lead	M	2450	mg/kg	0.50	220
Selenium	M	2450	mg/kg	0.20	0.43
Vanadium	U	2450	mg/kg	5.0	24
Zinc	M	2450	mg/kg	0.50	140
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	M	2625	%	0.40	7.1
Naphthalene	M	2700	mg/kg	0.10	0.18
Acenaphthylene	M	2700	mg/kg	0.10	0.18
Acenaphthene	M	2700	mg/kg	0.10	0.31
Fluorene	M	2700	mg/kg	0.10	0.40
Phenanthrene	M	2700	mg/kg	0.10	2.3
Anthracene	M	2700	mg/kg	0.10	0.66
Fluoranthene	M	2700	mg/kg	0.10	3.9
Pyrene	M	2700	mg/kg	0.10	3.9
Benzo[a]anthracene	M	2700	mg/kg	0.10	1.8
Chrysene	M	2700	mg/kg	0.10	2.5
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	2.5
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	1.6
Benzo[a]pyrene	M	2700	mg/kg	0.10	1.9
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	1.5
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	0.58
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	2.0
Total Of 16 PAH's	M	2700	mg/kg	2.0	26

Report Information

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- > "greater than"

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

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

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Sample Deviation Codes

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

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt

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

Charges may apply to extended sample storage

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

customerservices@chemtest.co.uk



Final Report

Report No.: 16-16428-1

Initial Date of Issue: 15-Jul-2016

Client LK Consult

Client Address: Eton Business Park
Eton Hill Road
Radcliffe
Manchester
Lancashire
M26 2ZS

Contact(s): Rachel Peart

Project LKC 16 1066 - MMU, Didsbury

Quotation No.: **Date Received:** 11-Jul-2016

Order No.: 732001 **Date Instructed:** 11-Jul-2016

No. of Samples: 11

Turnaround (Wkdays): 5 **Results Due:** 15-Jul-2016

Date Approved: 15-Jul-2016

Approved By:

Details: Glynn Harvey, Laboratory Manager

Results - Soil

Client: LK Consult	Chemtest Job No.:				16-16428	16-16428	16-16428	16-16428	16-16428	16-16428	16-16428	16-16428	16-16428
Quotation No.:	Chemtest Sample ID.:				321954	321957	321958	321960	321963	321966	321969	321972	321975
	Client Sample ID.:				TP111	TP102	TP102	TP103	TP104	TP105	TP106	TP107	TP108
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00
	Bottom Depth (m):				0.40	0.40	0.60	0.30	0.50	0.60	0.60	0.50	0.50
	Date Sampled:				06-Jul-2016	06-Jul-2016	06-Jul-2016	06-Jul-2016	06-Jul-2016	06-Jul-2016	06-Jul-2016	06-Jul-2016	06-Jul-2016
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-
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	%	0.020	14	10	18	11	7.5	8.6	7.8	11	8.1
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand	Sand	Sand	Sand	Sand
pH	M	2010		N/A	10.1	10.7	6.0	8.0	8.5	8.2	8.8	10.3	11.0
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.21	0.23	0.25	0.079	0.072	0.23	0.16	1.2	0.59
Arsenic	M	2450	mg/kg	1.0	12	22	32	9.4	14	12	10	10	10
Cadmium	M	2450	mg/kg	0.10	0.34	0.19	0.12	0.15	0.53	0.29	0.64	0.13	0.18
Chromium	M	2450	mg/kg	1.0	5.2	11	18	23	17	8.1	8.4	12	13
Copper	M	2450	mg/kg	0.50	15	22	69	24	36	19	15	19	18
Mercury	M	2450	mg/kg	0.10	0.11	< 0.10	0.61	0.26	0.33	0.15	0.12	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	3.4	8.8	15	19	18	8.5	10	10	11
Lead	M	2450	mg/kg	0.50	46	41	130	62	170	68	29	85	82
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	1.0	< 0.20	0.23	0.23	0.24	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	11	16	26	24	19	18	14	16	17
Zinc	M	2450	mg/kg	0.50	52	45	53	57	110	42	47	57	71
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	2.2	1.5	2.2	1.9	3.3	7.4	1.9	1.6	2.4
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.99	< 0.10	1.6	0.49	0.18	< 0.10	0.69
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.76	< 0.10	2.8	< 0.10	< 0.10	< 0.10	0.79
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.43	< 0.10	2.1	< 0.10	0.61	< 0.10	3.3
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.11	< 0.10	2.4	< 0.10	0.69	< 0.10	3.3
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	0.32	3.6	0.33	28	2.6	6.8	0.23	40
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.97	< 0.10	9.7	0.80	1.7	< 0.10	12
Fluoranthene	M	2700	mg/kg	0.10	0.74	1.1	11	1.0	47	3.7	6.3	0.46	43
Pyrene	M	2700	mg/kg	0.10	0.67	0.67	13	1.2	50	3.7	6.2	0.52	41
Benzo[a]anthracene	M	2700	mg/kg	0.10	0.44	0.22	5.4	0.57	22	1.3	1.9	< 0.10	16
Chrysene	M	2700	mg/kg	0.10	0.96	0.56	10	1.3	27	2.0	2.3	0.88	18
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	0.43	9.2	0.50	26	1.2	2.3	< 0.10	18
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	3.3	< 0.10	9.3	< 0.10	0.82	< 0.10	6.7
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	6.7	0.70	21	1.5	2.0	< 0.10	15
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	5.2	< 0.10	14	0.92	1.5	< 0.10	10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	1.2	< 0.10	3.5	< 0.10	< 0.10	< 0.10	2.3
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	0.70	4.2	0.72	15	1.1	1.9	< 0.10	8.7
Total Of 16 PAH's	M	2700	mg/kg	2.0	2.8	4.0	76	6.3	280	19	35	2.1	240

Client: LK Consult	Chemtest Job No.:				16-16428	16-16428
Quotation No.:	Chemtest Sample ID.:				321978	321981
	Client Sample ID.:				TP109	TP110
	Sample Type:				SOIL	SOIL
	Top Depth (m):				0.00	0.00
	Bottom Depth (m):				0.70	0.50
	Date Sampled:				06-Jul-2016	06-Jul-2016
	Asbestos Lab:				COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	10	12
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand
pH	M	2010		N/A	11.4	11.2
Sulphate (2:1 Water Soluble) as SO ₄	M	2120	g/l	0.010	1.1	1.4
Arsenic	M	2450	mg/kg	1.0	12	16
Cadmium	M	2450	mg/kg	0.10	0.16	0.17
Chromium	M	2450	mg/kg	1.0	15	17
Copper	M	2450	mg/kg	0.50	14	17
Mercury	M	2450	mg/kg	0.10	< 0.10	0.13
Nickel	M	2450	mg/kg	0.50	9.9	12
Lead	M	2450	mg/kg	0.50	120	220
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	19	25
Zinc	M	2450	mg/kg	0.50	86	110
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	1.0	1.3
Naphthalene	M	2700	mg/kg	0.10	< 0.10	0.19
Acenaphthylene	M	2700	mg/kg	0.10	0.35	0.42
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	1.1	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	0.79	1.0
Pyrene	M	2700	mg/kg	0.10	0.95	1.1
Benzo[a]anthracene	M	2700	mg/kg	0.10	0.36	0.45
Chrysene	M	2700	mg/kg	0.10	0.39	0.57
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	0.58
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	0.39	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	0.43	0.39
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	0.74
Total Of 16 PAH's	M	2700	mg/kg	2.0	4.8	5.4

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

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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
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Sample Retention and Disposal

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

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

customerservices@chemtest.co.uk



2183



Final Report

Report No.: 16-18491-1

Initial Date of Issue: 09-Aug-2016

Client LK Consult

Client Address: Eton Business Park
Eton Hill Road
Radcliffe
Manchester
Lancashire
M26 2ZS

Contact(s): Rachel Peart
Contaminated Land

Project LKC 16 1066 MMU Didsbury

Quotation No.: **Date Received:** 03-Aug-2016

Order No.: 732040 **Date Instructed:** 03-Aug-2016

No. of Samples: 1

Turnaround (Wkdays): 5 **Results Due:** 09-Aug-2016

Date Approved: 09-Aug-2016

Approved By:

Details: Keith Jones, Technical Manager

Project: LKC 16 1066 MMU Didsbury

Results - Soil

Client: LK Consult	Chemtest Job No.:		16-18491		
Quotation No.:	Chemtest Sample ID.:		332482		
	Client Sample ID.:		TP112		
	Sample Type:		SOIL		
	Top Depth (m):		0.10		
	Bottom Depth (m):		2.00		
	Date Sampled:		01-Aug-2016		
	Asbestos Lab:		COVENTRY		
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected
Moisture	N	2030	%	0.020	4.4
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Stones, Wood
Soil Texture	N	2040		N/A	Sand
pH	M	2010		N/A	8.1
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.47
Arsenic	M	2450	mg/kg	1.0	6.7
Cadmium	M	2450	mg/kg	0.10	< 0.10
Chromium	M	2450	mg/kg	1.0	7.9
Copper	M	2450	mg/kg	0.50	8.8
Mercury	M	2450	mg/kg	0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	11
Lead	M	2450	mg/kg	0.50	63
Selenium	M	2450	mg/kg	0.20	0.20
Vanadium	U	2450	mg/kg	5.0	16
Zinc	M	2450	mg/kg	0.50	34
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	M	2625	%	0.40	0.62
Naphthalene	M	2700	mg/kg	0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	0.81
Anthracene	M	2700	mg/kg	0.10	0.21
Fluoranthene	M	2700	mg/kg	0.10	2.0
Pyrene	M	2700	mg/kg	0.10	3.8
Benzo[a]anthracene	M	2700	mg/kg	0.10	0.67
Chrysene	M	2700	mg/kg	0.10	0.81
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	0.90
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	0.32
Benzo[a]pyrene	M	2700	mg/kg	0.10	0.70
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	0.39
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	0.35
Total Of 16 PAH's	M	2700	mg/kg	2.0	11

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

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customerservices@chemtest.co.uk



Final Report

Report No.: 16-29471-1

Initial Date of Issue: 07-Dec-2016

Client LK Consult

Client Address: Eton Business Park
Eton Hill Road
Radcliffe
Manchester
Lancashire
M26 2ZS

Contact(s): Paul Quimby
Contaminated Land

Project LKC 16 1066 MMU, Didsbury

Quotation No.: **Date Received:** 01-Dec-2016

Order No.: 732219 **Date Instructed:** 01-Dec-2016

No. of Samples: 5

Turnaround (Wkdays): 5 **Results Due:** 07-Dec-2016

Date Approved: 07-Dec-2016

Approved By:

Details: Keith Jones, Technical Manager

Results - Soil

Client: LK Consult	Chemtest Job No.:				16-29471	16-29471	16-29471	16-29471	16-29471
Quotation No.:	Chemtest Sample ID.:				385514	385515	385516	385517	385518
	Client Sample ID.:				TP113	TP114	TP115	TP116	TP117
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.0	0.0	0.0	0.0	0.2
	Bottom Depth (m):				0.5	0.3	0.5	0.5	0.35
	Date Sampled:				30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD					
ACM Type	U	2192		N/A	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	8.2	16	10	5.6	5.5
Soil Colour	N	2040		N/A	Brown	Black	Brown	Brown	Black
Other Material	N	2040		N/A	Stones	Stones	Stones, Roots	Stones	Stones, Roots
Soil Texture	N	2040		N/A	Sand	Clay	Clay	Sand	Sand
pH	M	2010		N/A	9.8	8.6	8.9	9.0	8.7
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.22	0.20	0.13	< 0.010	0.064
Arsenic	M	2450	mg/kg	1.0	3.6	12	10	17	13
Cadmium	M	2450	mg/kg	0.10	0.13	0.30	0.26	0.87	0.51
Chromium	M	2450	mg/kg	1.0	8.6	14	13	9.4	36
Copper	M	2450	mg/kg	0.50	9.2	34	24	13	78
Mercury	M	2450	mg/kg	0.10	< 0.10	0.22	0.16	0.13	0.23
Nickel	M	2450	mg/kg	0.50	14	15	12	14	89
Lead	M	2450	mg/kg	0.50	14	270	130	37	120
Selenium	M	2450	mg/kg	0.20	< 0.20	0.24	< 0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	9.1	17	17	11	32
Zinc	M	2450	mg/kg	0.50	30	66	50	35	170
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	M	2625	%	0.40	< 0.40	4.5	1.2	1.1	4.5
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	0.66	0.70	< 0.10	0.49
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	0.30	< 0.10	0.33
Fluoranthene	M	2700	mg/kg	0.10	0.20	2.0	0.82	< 0.10	0.77
Pyrene	M	2700	mg/kg	0.10	0.23	2.2	0.87	< 0.10	0.98
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	1.2	0.40	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	1.5	0.69	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	1.3	0.62	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	0.79	0.53	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	1.1	0.53	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	0.75	0.17	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	0.23	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	1.0	0.40	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	13	6.0	< 2.0	2.6

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

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

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

All Asbestos testing is performed at the indicated laboratory

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

Charges may apply to extended sample storage

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

customerservices@chemtest.co.uk

APPENDIX C

GENERIC ASSESSMENT CRITERIA - SOIL

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	170 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	5.0 mg/kg	5.3 mg/kg	5.7 mg/kg	77 mg/kg	10 mg/kg	21 mg/kg
Cadmium	22 mg/kg	150 mg/kg	3.9 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	21 mg/kg	250 mg/kg
Lead	200 mg/kg	310 mg/kg	80 mg/kg	2300 mg/kg	630 mg/kg	1300 mg/kg

Summary Table for the Generic Assessment Criteria for Human Health Risk Assessment Land Quality Management (LQM) S4ULs.

All GAC are based on sandy loam soils with a pH 7.

All GAC are based on sandy loam soils with a pH 7.			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Metals	Inorganic Arsenic	6%	37	40	43	640	79	170
	Beryllium	6%	1.7	1.7	35	12	2.2	63
	Boron	6%	290	11,000	45	240,000	21,000	46,000
	Cadmium	6%	11	85	1.9	190	120	532
	Chromium (III)	6%	910	910	18,000	8,600	1,500	33,000
	Chromium (VI)	6%	6.0	6.0	1.8	33	7.7	220
	Copper	6%	2,400	7,100	520	68,000	12,000	44,000
	Elemental Mercury	6%	1.2	1.2	21	58 (25.8) ^{vap}	16	30 (25.8) ^{vap}
	Inorganic Mercury	6%	40	56	19	1,100	120	240
	Methylmercury	6%	11	15	6.0	320	40	68
	Nickel	6%	180	180	230	980	230	3,400
	Selenium	6%	250	430	88	12,000	1,100	1,800
	Vanadium	6%	410	1,200	91	9,000	2,000	5,000
Zinc	6%	3,700	40,000	620	730,000	81,000	170,000	
BTEX Compounds	Benzene	1%	0.087	0.38	0.017	27	72	90
		2.5%	0.17	0.70	0.034	47	72	100
		6%	0.37	1.4	0.075	90	73	110
	Toluene	1%	130	880 (869) ^{vap}	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{vap}
		2.5%	290	1,900	51	110,000 (1,920) ^{vap}	56,000	95,000 (1,920) ^{vap}
		6%	660	3,900	120	180,000 (4,360) ^{vap}	56,000	100,000 (4,360) ^{vap}
	Ethylbenzene	1%	47	83	16	5,700 (518) ^{vap}	24,000	17,000 (518) ^{vap}
		2.5%	110	190	39	13,000 (1,220) ^{vap}	24,000	22,000 (1,220) ^{vap}
		6%	260	440	91	27,000 (2,840) ^{vap}	25,000	27,000 (2,840) ^{vap}
	o-xylene	1%	60	88	28	6,600 (478) ^{sol}	41,000	17,000 (478) ^{sol}
		2.5%	140	210	67	15,000 (1,120) ^{sol}	42,000	24,000 (1,120) ^{sol}
		6%	330	480	160	33,000 (2,620) ^{sol}	43,000	33,000 (2,620) ^{sol}
	m-xylene	1%	59	82	31	6,200 (625) ^{vap}	41,000	17,000 (625) ^{vap}
		2.5%	140	190	74	14,000 (1,470) ^{vap}	42,000	24,000 (1,470) ^{vap}
		6%	320	450	170	31,000 (3,460) ^{vap}	43,000	32,000 (3,460) ^{vap}
	p-xylene	1%	56	79	29	5,900 (576) ^{sol}	41,000	17,000 (576) ^{sol}
		2.5%	130	180	69	14,000 (1,350) ^{sol}	42,000	23,000 (1,350) ^{sol}
		6%	310	430	160	30,000 (3,170) ^{sol}	43,000	31,000 (3,170) ^{sol}

NOTES

^{sol/vap} = solubility / vapour limit (potentially use if free product identified, although highly conservative).

f = oral, dermal and inhalation exposures compared to oral HCV.

All GAC are based on sandy loam soils with a pH 7.

All GAC are based on sandy loam soils with a pH 7.			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Polycyclic Aromatic Hydrocarbons (PAHs)	Acenaphthene	1%	210	3,000 (57.1) ^{sol}	34	84,000 (57.0) ^{sol}	15,000	29,000
		2.5%	510	4,700 (141) ^{sol}	85	97,000 (141) ^{sol}	15,000	30,000
		6%	1,100	6,000 (336) ^{sol}	200	100,000	15,000	30,000
	Acenaphthylene	1%	170	2,900 (86.1) ^{sol}	28	83,000 (86.1) ^{sol}	15,000	29,000
		2.5%	420	4,600 (212) ^{sol}	69	97,000 (212) ^{sol}	15,000	30,000
		6%	920	6,000 (506) ^{sol}	160	100,000	15,000	30,000
	Anthracene	1%	2,400	31,000 (1.17) ^{vap}	380	520,000	74,000	150,000
		2.5%	5,400	35,000	950	540,000	74,000	150,000
		6%	11,000	37,000	2,200	540,000	74,000	150,000
	Benz(a)anthracene	1%	7.2	11	2.9	170	29	49
		2.5%	11	14	6.5	170	29	56
		6%	13	15	13	180	29	62
	Benzo(a)pyrene (only)	1%	2.2	3.2	0.97	35	5.7	11
		2.5%	2.7	3.2	2.0	35	5.7	12
		6%	3.0	3.2	3.5	36	5.7	13
	Benzo(b)fluoranthene	1%	2.6	3.9	0.99	44	7.1	13
		2.5%	3.3	4.0	2.1	44	7.2	15
		6%	3.7	4.0	3.9	45	7.2	16
	Benzo(ghi)perylene	1%	320	360	290	3,900	640	1,400
		2.5%	340	360	470	4,000	640	1,500
		6%	350	360	640	4,000	640	1,600
	Benzo(k)fluoranthene	1%	77	110	37	1,200	190	370
		2.5%	93	110	75	1,200	190	410
		6%	100	110	130	1,200	190	440
	Chrysene	1%	15	30	4.1	350	57	93
		2.5%	22	31	9.4	350	57	110
		6%	27	32	19	350	57	120
	Dibenzo(ah)anthracene	1%	0.24	0.31	0.14	3.5	0.57	1.1
		2.5%	0.28	0.32	0.27	3.6	0.58	1.3
		6%	0.3	0.32	0.43	3.6	0.58	1.4
	Fluoranthene	1%	280	1,500	52	23,000	3,100	6,300
		2.5%	560	1,600	130	23,000	3,100	6,300
		6%	890	1,600	290	23,000	3,100	6,400
	Fluorene	1%	170	2,800 (36.0) ^{sol}	27	63,000 (30.9) ^{sol}	9,900	20,000
		2.5%	400	3,800 (76.5) ^{sol}	67	68,000	9,900	20,000
		6%	860	4,500 (183) ^{sol}	160	71,000	9,900	20,000
	Indeno(123-cd)pyrene	1%	27	45	9.5	500	82	150
		2.5%	36	46	21	510	82	170
		6%	41	46	39	510	82	180
	Naphthalene	1%	2.3 ^f	2.3 ^f	4.1 ^f	190 ^f (76.4) ^{sol}	4,900 ^f	1,200 ^f (76.4) ^{sol}
		2.5%	5.6 ^f	5.6 ^f	10 ^f	460 ^f (183) ^{sol}	4,900 ^f	1,900 ^f (183) ^{sol}
		6%	13 ^f	13 ^f	24 ^f	1,100 ^f (432) ^{sol}	4,900 ^f	3,000
	Phenanthrene	1%	95	1,300 (36.0) ^{sol}	15	22,000	3,100	6,200
		2.5%	220	1,500	38	22,000	3,100	6,200
		6%	440	1,500	90	22,000	3,100	6,300
	Pyrene	1%	620	3,700	110	54,000	7,400	15,000
		2.5%	1,200	3,800	270	54,000	7,400	15,000
		6%	2,000	3,800	620	54,000	7,400	15,000
Coal Tar (B(a)P as surrogate marker)	1%	0.79	1.2	0.32	15	2.2	4.4	
	2.5%	0.98	1.2	0.67	15	2.2	4.7	
	6%	1.1	1.2	1.2	15	2.2	4.8	

NOTES

^{sol} / ^{vap} = solubility / vapour limit (potentially use if free product identified, although highly conservative).

^f = naphthalene is based on comparison of inhalation exposure with TDI_{Inhal} for localised effect.

All GAC are based on sandy loam soils with a pH 7.

LQM Generic Assessment Criteria (mg/kg) Dry weight soil

Contaminant	SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Aliphatic							
EC 5-6	1%	42	42	730	3,200 (304) ^{sol}	570,000(304) ^{sol}	95,000 (304) ^{sol}
EC>6-8	1%	100	100	2,300	7,800 (144) ^{sol}	600,000	150,000 (144) ^{sol}
EC>8-10	1%	27	27	320	2,000 (78) ^{sol}	13,000	14,000 (78) ^{vap}
EC>10-12	1%	130 (48) ^{vap}	130 (48) ^{vap}	2,200	9,700 (48) ^{sol}	13,000	21,000 (48) ^{vap}
EC>12-16	1%	1,100 (24) ^{sol}	1,100 (24) ^{sol}	11,000	59,000 (24) ^{sol}	13,000	25,000 (24) ^{sol}
EC>16-35	1%	65,000 (8.48) ^{f, sol}	65,000 (8.48) ^{f, sol}	260,000 ^f	160,000 ^f	250,000 ^f	450,000 ^f
EC>35-44	1%	65,000 (8.48) ^{f, sol}	65,000 (8.48) ^{f, sol}	260,000 ^f	160,000 ^f	250,000 ^f	450,000 ^f
Aliphatic							
EC 5-6	2.5%	78	78	1,700	5,900 (558) ^{sol}	590,000	130,000 (558) ^{sol}
EC>6-8	2.5%	230	230	5,600	17,000 (322) ^{sol}	610,000	220,000 (322) ^{sol}
EC>8-10	2.5%	65	65	770	4,800 (190) ^{vap}	13,000	18,000 (190) ^{vap}
EC>10-12	2.5%	330 (118) ^{vap}	330 (118) ^{vap}	4,400	23,000 (118) ^{vap}	13,000	23,000 (118) ^{vap}
EC>12-16	2.5%	2,400 (59) ^{sol}	2,400 (59) ^{sol}	13,000	82,000 (59) ^{sol}	13,000	25,000 (59) ^{sol}
EC>16-35	2.5%	92,000 (21) ^{f, sol}	92,000 (21) ^{f, sol}	270,000 ^f	1,700,000 ^f	250,000 ^f	480,000 ^f
EC>35-44	2.5%	92,000 (21) ^{f, sol}	92,000 (21) ^{f, sol}	270,000 ^f	1,700,000 ^f	250,000 ^f	480,000 ^f
Aliphatic							
EC 5-6	6%	160	160	3,900	12,000 (1,150) ^{sol}	600,000	180,000 (1,150) ^{sol}
EC>6-8	6%	530	530	13,000	40,000 (736) ^{sol}	620,000	320,000 (736) ^{sol}
EC>8-10	6%	150	150	1,700	11,000 (451) ^{vap}	13,000	21,000 (451) ^{vap}
EC>10-12	6%	760 (283) ^{vap}	760 (283) ^{vap}	7,300	47,000 (283) ^{vap}	13,000	24,000 (283) ^{vap}
EC>12-16	6%	4,300 (142) ^{sol}	4,400 (142) ^{sol}	13,000	90,000 (142) ^{sol}	13,000	26,000 (142) ^{sol}
EC>16-35	6%	110,000 ^f	110,000 ^f	270,000 ^f	1,800,000 ^f	250,000 ^f	490,000 ^f
EC>35-44	6%	110,000 ^f	110,000 ^f	270,000 ^f	1,800,000 ^f	250,000 ^f	490,000 ^f
Aromatic							
EC5-7(benzene as non-threshold)	1%	70	370	13	26,000 (1,220) ^{sol}	56,000	76,000 (1,220) ^{sol}
EC>7-8(toluene)	1%	130	860	22	56,000 (869) ^{vap}	56,000	87,000 (869) ^{vap}
EC>8-10	1%	34	47	8.6	3,500 (613) ^{vap}	5,000	7,200 (613) ^{vap}
EC>10-12	1%	74	250	13	16,000 (364) ^{sol}	5,000	9,200 (364) ^{sol}
EC>12-16	1%	140	1,800	23	36,000 (169) ^{sol}	5,100	10,000
EC>16-21	1%	260 ^f	1,900 ^f	46 ^f	28,000 ^f	3,800 ^f	7,600 ^f
EC>21-35	1%	1,100 ^f	1,900 ^f	370 ^f	28,000 ^f	3,800 ^f	7,800 ^f
EC>35-44	1%	1,100 ^f	1,900 ^f	370 ^f	28,000 ^f	3,800 ^f	7,800 ^f
Aromatic							
EC5-7(benzene as non-threshold)	2.5%	140	690	27	46,000 (2,260) ^{sol}	56,000	84,000 (2,260) ^{sol}
EC>7-8(toluene)	2.5%	290	1,800	51	110,000 (1,920) ^{sol}	56,000	95,000 (1,920) ^{sol}
EC>8-10	2.5%	83	110	21	8,100 (1,500) ^{vap}	5,000	8,500 (1,500) ^{vap}
EC>10-12	2.5%	180	590	31	28,000 (899) ^{sol}	5,000	9,700 (899) ^{sol}
EC>12-16	2.5%	330	2,300 (419) ^{sol}	57	37,000	5,100	10,000
EC>16-21	2.5%	540 ^f	1,900 ^f	110 ^f	28,000 ^f	3,800 ^f	7,700 ^f
EC>21-35	2.5%	1,500 ^f	1,900 ^f	820 ^f	28,000 ^f	3,800 ^f	7,800 ^f
EC>35-44	2.5%	1,500 ^f	1,900 ^f	820 ^f	28,000 ^f	3,800 ^f	7,800 ^f
Aromatic							
EC5-7(benzene as non-threshold)	6%	300	1,400	57	86,000 (4,710) ^{sol}	56,000	92,000 (4,710) ^{sol}
EC>7-8(toluene)	6%	660	3,900	120	180,000 (4,360) ^{vap}	56,000	100,000 (4,360) ^{vap}
EC>8-10	6%	190	270	51	17,000 (3,580) ^{vap}	5,000	9,300 (3,580) ^{vap}
EC>10-12	6%	380	1,200	4	34,000 (2,150) ^{sol}	5,000	10,000
EC>12-16	6%	660	2,500	130	38,000	5,100	10,000
EC>16-21	6%	930 ^f	1,900 ^f	260 ^f	28,000 ^f	3,800 ^f	7,800 ^f
EC>21-35	6%	1,700 ^f	1,900 ^f	1,600 ^f	28,000 ^f	3,800 ^f	7,900 ^f
EC>35-44	6%	1,700 ^f	1,900 ^f	1,600 ^f	28,000 ^f	3,800 ^f	7,900 ^f
Aliphatic	1%	1,600 ^f	1,900 ^f	1,200 ^f	28,000 ^f	3,800 ^f	7,800 ^f
+Aromatic	2.5%	1,800 ^f	1,900 ^f	2,100 ^f	28,000 ^f	3,800 ^f	7,800 ^f
>EC44	6%	1,900 ^f	1,900 ^f	3,000 ^f	28,000 ^f	3,800 ^f	7,900 ^f

NOTES

^{sol}/^{vap} = solubility / vapour limit (potentially use if free product identified, although highly conservative).

^f = oral, dermal and inhalation exposures compared to oral HCV.

All GAC are based on sandy loam soils with a pH 7.

		LQM Generic Assessment Criteria (mg/kg) Dry weight soil						
Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Chloalkanes and Alkenes & Explosives	1,2 Dichloroethane (DCA)	1%	7.1E-03	9.2E-03	4.6E-03	0.67	29	21
		2.5%	1.1E-02	1.3E-02	8.3E-03	0.97	29	24
		6%	1.9E-02	2.3E-02	1.6E-02	1.7	29	28
	1,1,1 Trichloroethane (TCA)	1%	8.8	9.0	48	660	140,000	57,000 (1,425) ^{vap}
		2.5%	18	18	110	1,300	140,000	76,000 (2,915) ^{vap}
		6%	39	40	240	3,000	140,000	100,000 (6,392) ^{vap}
	1,1,2,2-Tetrachloroethanes (PCA)	1%	1.6	3.9	0.41	270	1,400	1,800
		2.5%	3.4	8.0	0.89	550	1,400	2,100
		6%	7.5	17	2.0	1,100	1,400	2,300
	1,1,1,2-Tetrachloroethanes (PCA)	1%	1.2	1.5	0.79	110	1,400	1,500
		2.5%	2.8	3.5	1.9	250	1,400	1,800
		6%	6.4	8.2	4.4	560	1,400	2,100
	Tetrachloroethene (PCE)	1%	0.18	0.18	0.65	19	1,400	810 (424) ^{sol}
		2.5%	0.39	0.40	1.5	42	1,400	1,100 (951) ^{sol}
		6%	0.90	0.92	3.6	95	1,400	1,500
	Tetrachloromethane (carbon tetrachloride)	1%	2.6E-02	2.6E-02	0.45	2.9	890	190
		2.5%	5.6E-02	5.6E-02	1.0	6.3	920	270
		6%	0.13	0.13	2.4	14	950	400
	Trichloroethene (TCE)	1%	1.6E-02	1.7E-02	4.1E-02	1.2	120	70
		2.5%	3.4E-02	3.6E-02	9.1E-02	2.6	120	91
		6%	7.5E-02	8.0E-02	0.21	5.7	120	120
	Trichloromethane (chloroform)	1%	0.91	1.2	0.42	99	2,500	2,600
		2.5%	1.7	2.1	0.83	170	2,500	2,800
		6%	3.4	4.2	1.7	350	2,500	3,100
	Chloroethene (vinyl chloride)	1%	6.4E-04	7.7E-04	5.5E-04	5.9E-02	3.5	4.8
		2.5%	8.7E-04	1.0E-03	1.0E-03	7.7E-02	3.5	5.0
		6%	1.4E-03	1.5E-03	1.8E-03	0.12	3.5	5.4
	2,4,6-Trinitrotoluene (TNT)	1%	1.6	65	0.24	1,000	130	260
		2.5%	3.7	66	0.58	1,000	130	270
		6%	8.1	66	1.4	1,000	130	270
	RDX	1%	120	13,000	17	210,000	26,000	49,000 (18.7) ^{sol}
		2.5%	250	13,000	38	210,000	26,000	51,000
		6%	540	13,000	85	210,000	27,000	53,000
	HMX	1%	5.7	6,700	0.86	110,000	13,000	23,000 (0.35) ^{vap}
		2.5%	13	6,700	1.9	110,000	13,000	23,000 (0.39) ^{vap}
		6%	26	6,700	3.9	110,000	13,000	24,000 (0.48) ^{vap}
Pesticides	Aldrin	1%	5.7	7.3	3.2	170	18	30
		2.5%	6.6	7.4	6.1	170	18	31
		6%	7.1	7.5	9.8	170	18	31
	Dieldrin	1%	0.97	7.0	0.17	170	18	30
		2.5%	2.0	7.3	0.41	170	18	30
		6%	3.5	7.4	0.96	170	18	31
	Atrazine	1%	3.3	610	0.5	9,300	1,200	2,300
		2.5%	7.8	620	1.2	9,400	1,200	2,400
		6%	17.4	620	2.7	9,400	1,200	2,400
	Dichlorvos	1%	3.2E-02	6.4	4.9E-03	140	16	26
		2.5%	6.6E-02	6.5	1.0E-02	140	16	26
		6%	0.14	6.6	2.2E-02	140	16	27
	Endosulfans (2 isomers)	1%	7.4	160 (3.0E-03) ^{vap}	1.2	5,600 (3.0E-03) ^{vap}	1,200	2,300
		2.5%	18	280 (7.0E-03) ^{vap}	2.9	7,400 (7.0E-03) ^{vap}	1,200	2,400
		6%	41	410 (1.6E-02) ^{vap}	6.8	8,400 (1.6E-02) ^{vap}	1,200	2,500
	Hexachlorocyclohexane (3 isomers), inc Lindane	1%	8.5E-02	3.7	1.3E-02	65	8.1	15
		2.5%	0.2	3.8	3.2E-02	65	8.1	15
		6%	0.46	3.8	7.7E-02	65	8.1	16

NOTES

^{sol} / ^{vap} = solubility / vapour limit (potentially use if free product identified, although highly conservative).

All GAC are based on
sandy loam soils with a pH
7.

All GAC are based on sandy loam soils with a pH 7.			LQM Generic Assessment Criteria (mg/kg) Dry weight soil					
Contaminant		SOM	Res +	Res -	Allot.	Comm.	POS _{resi}	POS _{park}
Chlorobenzenes	Chlorobenzene	1%	0.46	0.46	5.9	56	11,000	1,300 (675) ^{sol}
		2.5%	1.0	1.0	14	130	13,000	2,000 (1,520) ^{sol}
		6%	2.4	2.4	32	290	14,000	2,900
	Dichlorobenzenes (3 isomers)	1%	23	24	94	2,000 (571) ^{sol}	90,000	24,000 (571) ^{sol}
		2.5%	55	57	230	4,800 (1,370) ^{sol}	95,000	36,000 (1,370) ^{sol}
		6%	130	130	540	11,000 (3,240) ^{sol}	98,000	51,000 (3,270) ^{sol}
	Trichlorobenzenes (3 isomers)	1%	2.6	2.6	55	220	15,000	1,700 (318) ^{vap}
		2.5%	6.4	6.4	140	530	17,000	2,600 (786) ^{vap}
		6%	15	15	320	1,300	19,000	4,000 (1,880) ^{vap}
	Tetrachlorobenzenes (3 isomers)	1%	0.66	0.75	0.38	49 (39.4) ^{vap}	78	110 (39) ^{vap}
		2.5%	1.6	1.9	0.90	120 (98.1) ^{vap}	79	120
		6%	3.7	4.3	2.2	240 (235) ^{vap}	79	130
	Pentachlorobenzene	1%	5.8	19	1.2	640 (43.0) ^{sol}	100	190
		2.5%	12	30	3.1	770 (107) ^{sol}	100	190
		6%	22	38	7.0	830	100	190
	Hexachlorobenzene	1%	1.8 (0.20) ^{vap}	4.1 (0.20) ^{vap}	0.47	110 (0.20) ^{vap}	16	30
		2.5%	3.3 (0.50) ^{vap}	5.7 (0.50) ^{vap}	1.1	120	16	30
		6%	4.9	6.7 (1.2) ^{vap}	2.5	120	16	30
Chlorophenol	Chlorophenols (4 congeners)	1%	0.87 ^g	94	0.13 ^g	3,500	620	1,100
		2.5%	2.0	150	0.30	4,000	620	1,100
		6%	4.5	210	0.70	4,300	620	1,100
	Pentachlorophenol	1%	0.22	27 (16.4) ^{vap}	3.0E-02	400	60	110
		2.5%	0.52	29	8.0E-02	400	60	120
		6%	1.2	31	0.19	400	60	120
Others	Carbon Disulphide	1%	0.14	0.14	4.8	11	11,000	1,300
		2.5%	0.29	0.29	10	22	11,000	1,900
		6%	0.62	0.62	23	47	11,000	2,700
	Hexachlorobutadiene	1%	0.29	0.32	0.25	31	25	48
		2.5%	0.7	0.78	0.61	66	25	50
		6%	1.6	1.8	1.4	120	25	51
	Phenol	1%	280	750	66	760 ^{dir} (31,000)	760 ^{dir} (11,000)	760 ^{dir} (8,600)
		2.5%	550	1,300	140	1,500 ^{dir} (35,000)	1,500 ^{dir} (11,000)	1,500 ^{dir} (9,700)
		6%	1,100	2,300	280	3,200 ^{dir} (37,000)	3,200 ^{dir} (11,000)	3,200 ^{dir} (11,000)

NOTES

^{sol / vap} = solubility / vapour limit (potentially use if free product identified, although highly conservative).

^{dir} = S4uls based on threshold protective of direct skin contact with phenol (brackets long term exposure for illustration purposes).

^g = derived based on 2,3,4,6-tetrachlorophenol.

APPENDIX D

VALIDATION CHECKLIST

Site Works / Validation Check List – LKC 16 1066 – MMU Didsbury Housing Development



Plots	Validation Work	Additional Notes
Imported / Site Won Soil / stone	-Require information from soil provider on source and amount of soil provided (if sourced offsite). -LKC will need to collect and analyse a suitable number of samples per stockpile/source. -Topsoil tested at 1 sample 50m³. -Subsoil tested at 1 sample per 150m³. -Stone tested at 1 sample per 500m³. -If provenance proven that subsoil is natural quarried material then no testing required. -A minimum of 3 samples per source is required. -If site won material then should be stockpiled and tested at the same rate, but will need appropriate exemptions / permits to re-use onsite.	-Soil sampling should be undertaken from source or from a stockpile onsite. Can be sampled when in gardens; however, may have to be removed if unsuitable. -Soil samples will be undertaken on an accelerated 3 working day turnaround.
Option 2 Block Specific SI	-Useful if time constraints and where you do not wish for an environmental capping layer. -Nominal 3 soil sample from rear garden and 1 soil sample from front. -Selected soil sampling in landscaped (POS) areas. -All data in that block / POS will be risk assessed and a Block by Block / POS assessment and recommendations provided in a report. -This additional sampling will apply near TPO's, where the full environmental capping layer may not be able to be achieved. Due to root protection.	-If data fail then an environmental capping layer will still be required and a report will not be needed. - If soil passes and no formal environmental capping layer is required then a formal depth is not necessary. A nominal 150mm topsoil is recommended as a growing medium and to cover undesirable material.
Option 1 Garden Areas	Rear Gardens <i>Unless a Block by Block site investigation is undertaken and soil passes.</i> -450mm total depth soil capping layer (includes minimum 150m topsoil) required for these plots. -This includes a Hi-Viz geotextile at the base of the capping layer OR 100mm MOT type 1 (minimal fines) and 350mm depth soil capping layer (includes minimum 150mm topsoil).	-Site manager to photograph laying of separation geotextile OR 100mm MOT in each garden area. -LKC need to validate the depth of the cover layer by digging small hole in each garden area, measuring the depth and taking validatory photos.
Option 1 Landscaped Areas	All Front gardens and Landscaped Areas <i>Unless a Block by Block / POS site investigation is undertaken and soil passes.</i> -300mm total depth soil capping layer (includes minimum 150m topsoil) required for these landscaped areas. -This includes a Hi-Viz geotextile at the base of the capping layer OR 100mm MOT type 1 (minimal fines) and 200mm depth soil capping layer (includes minimum 150mm topsoil).	-Site manager to photograph laying of separation geotextile OR 100mm MOT in each garden area. -LKC need to validate the depth of the cover layer by digging small hole in each garden area, measuring the depth and taking validatory photos.
Site	Unexpected Contamination -During earthworks if contractor finds visual or olfactory evidence of contamination and/or asbestos then LKC should be informed and if necessary material will need to be sampled so that it can be disposed of at an appropriate licensed tip. -Material should be stockpiled on Visqueen and covered prior to disposal and/or testing. -All disposal tickets will be required for the Completion Report.	-If considerable earthworks or soil movement is occurring it would be advisable that LKC undertake a Watching Brief during earthworks.
Site	Local Authority Site Completion Report -Manchester Council require a Site Completion Report for whole site once all validation complete. -Individual plot reports may be required for NHBC for individual plot sales before site is fully completed.	-Can only be done once development is completed. -Manchester Council may provide a letter of comfort for each plot that has been completed satisfactory (if individual plot reports undertaken).

NOTE:

Minimum 24 hours notice to attend site.

Contacts

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SUITABILITY OF ANY IMPORTED MATERIAL AS CLEAN COVER

Recommended validation sampling requirements for environmental capping layer soils presented in the following table.

Material Type	Source	Suite of Analysis	Sampling Rate
Topsoil	Greenfield	Suite A	1 sample per 50m ³ (minimum of 3 samples per source)
	Brownfield / Unknown / Site Won	Suite B	
Subsoil	Brownfield / Unknown / Site Won	Suite B	1 sample per 150m ³ (minimum of 3 samples per source)
	First Generation i.e. quarried sand (su (break layer)	No testing is required. Certification of material provenance is required.	
Physical Stone Break Layer	Recycled Stone (6F2 / min. fines)	Suite B	1 sample per 500m ³ (minimum of 3 samples per source)

Recommended validation sampling requirements for environmental capping layer soils.

Notes:

Suite A - Heavy metals, pH, water soluble sulphate, speciated PAH, soil organic matter and asbestos screen.

Suite B - Heavy metals, pH, water soluble sulphate, speciated PAH, phenol, total and free cyanide, soil organic matter, asbestos screen, banded petroleum hydrocarbons (TPH CWG), BTEX, MTBE.

ENVIRONMENTAL COVER LAYER

Private Gardens

Private garden areas should comprise a cover layer depth of at least 450mm. A typical construction detail is provided below. Subsoil may be replaced by topsoil if required.

GROUND LEVEL

450mm (minimum)		150mm (minimum) chemically validated TOPSOIL
		200mm chemically validated SUBSOIL
		100mm PHYSICAL BREAK LAYER (typically MOT Type 1)
		Existing MADE GROUND

Soft Landscaped Areas and Front Gardens

Soft landscaping areas and front gardens should comprise a cover layer depth of at least 300mm. A typical construction detail is provided below:

GROUND LEVEL

300mm (minimum)		200mm (minimum) chemically validated TOPSOIL
		100mm PHYSICAL BREAK LAYER (typically MOT Type 1)
		Existing MADE GROUND

If suitable break layer material is not available, then the **break layer may be substituted for a separation geotextile** and the subsoil / topsoil depth increased by 100mm to maintain the required capping layer material depth.

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