



Client:

Henderson Homes
Narlin, Clamhunger Lane
Mere
Knutsford
WA16 6QG

Architect/Consultant

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Phase II Contaminated Land Risk Assessment

Monet Lodge, Cavendish Road, Didsbury

Nov 2022

Site Ref: 6103/VMD-CLRA v1.00

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Phase II Contaminated Land Risk Assessment

1. Introduction

This report is an account of a Phase II Contaminated Land Risk Assessment carried out by GeoAssist Limited at the request of the Client Henderson Homes for the proposed development at Monet Lodge, Cavendish Road, Didsbury. The work was commissioned following acceptance of the quotation and an instruction to proceed issued by the Client Henderson Homes on 22nd September 2022.

The purpose of this Phase II investigation is to provide information following the conclusions of the phase I report, dated September 2022, in order to ensure that the site:

- Is assessed in accordance with the UK government methodology outlined online in Land Contamination Risk Management (LCRM)
- Satisfies the relevant requirements of the National Planning Policy Framework July 2021.
- Is suitable for the intended proposed land use. In this case, as a Residential Development with home grown produce.

The approximate grid reference for the centre of the site is 383750, 392600 and the total area of the site is approximately 1,200m². The area of the site scheduled for investigation is outlined with a solid red line on the site plan in Appendix A1. The positions of exploratory holes are also indicated on the plan. The proposed development plan is shown in appendix A2.

2. Description of the Site

2.1 Present

The site is a brownfield site in a residential suburban area of Didsbury located on land off Cavendish Road, Didsbury. The site forms an irregular shape, and the topography of the land is relatively level with the surrounding Land and property.

At the time of the site visit, the site was fenced off from public access and the surface cover was formed by long grass and shrubs.

A nursing home forms the Eastern boundary of the site and new build apartment blocks and properties form the southern and western boundary to the site with Cavendish Road and the site access present to the north. No visual

or olfactory observations of contaminants were noted during the site walkover.

2.2 Proposed

It is understood that the proposed development comprises the construction of a pair of semi-detached residential properties with associated access road, parking and landscaped areas.

3. Review Of Previous Reports

There is no indication that previous subsurface ground investigations have been undertaken on this site. The issues to be covered in the present investigation are to provide information in respect of any potentially unacceptable geo-environmental risks arising from previous land uses both on site and in the immediate area, and the potential for any sources of contamination to impact both present and future receptors, including:

- Human
- Controlled waters via established pathways
- Property
- Adjoining land

4. Intrusive Investigation

4.1 Intrusive Investigation objectives

The objectives of the site investigation are to collect data to confirm whether or not the soils beneath the site in their current state pose a risk by reason of substances within or under the land that;

- Significant harm is being caused or there is significant possibility of such harm being caused; or
- Pollution of controlled waters is being, or is likely to be, caused.

Data to describe the following parameters has been collected at a suitable spatial resolution in accordance with BS10175, 2015:

- Soil Characteristics including type of material
- Chemical profile of the soil.

These data will be used to refine a conceptual site model and confirm the existence of any established contaminant linkage in accordance with the UK government methodology outlined online in Land Contamination Risk Management (LCRM) as well as The Environment Agency Requirements for Land Contamination Reports, 2005.

4.2 Intrusive Investigation Strategy

The ground investigation was carried out in accordance with British Standard 5930: 2015 Code of Practice for Site Investigations and BS BS10175: 2011 Investigation of potentially contaminated sites where relevant.

All fieldwork was supervised by suitably qualified GeoAssist Limited Environmental Engineers.

The analytical testing was carried out in an independent UKAS accredited Laboratory.

4.3 Methods Used For Forming Exploratory Holes

The exploratory holes undertaken across the site as part of this investigation were established using windowless drive sample excavation methods and hand tool excavation. Information obtained from the Phase I Preliminary Contaminated Land Risk Assessment was used to inform a decision on the actual exploratory hole locations whilst taking account of positions that could be reasonably accessed with minimal preparation works using the drilling and excavation plant available. The location of services was also considered during the positioning of the exploratory holes along with the position of any proposed soft landscaping areas. A plan showing the locations of the exploratory holes established as part of the investigation forms Appendix A1 to this report.

4.4 Exploratory Hole Programme

Six exploratory holes referenced WS1 to WS6 were undertaken by GeoAssist using windowless sampling and dynamic probing techniques. Exploratory holes TP1 to TP3 were excavated in order to undertake infiltration tests. The location of the exploratory holes is shown on the site plan in Appendix A1.

The details of the strata in the exploratory holes were recorded by a suitably qualified Professional Engineer.

All intrusive work was carried out generally in accordance with British standard 5930: 1999/2015 Code of Practice for Site Investigations and British Standard 10175: 2011 where relevant and applicable.

The fieldwork was completed in two stages on 27th and 28th September 2022 and 1st and 3rd November 2022 in dry weather conditions.

4.5 Field Sampling and Testing

A non-targeted borehole layout was selected as the most appropriate strategy for this site as guided by the Phase I report. Representative samples were taken of all the strata encountered in the exploratory holes. Once exposed samples to be subjected to chemical analysis were immediately placed into a suitable container and stored in a cool dark sample box prior to submission to the laboratory in order to prevent alteration of the composition of the samples. In all cases 500ml wide necked amber glass jars were used with a Teflon faced foamed polyethylene cap liner that offers excellent chemical resistance with the compressibility and sealing properties of polyethylene foam. These containers were filled with sample, sealed and delivered to the laboratory for testing. Samples for volatile compounds were placed into appropriate containers with a screw cap and pierceable septum as supplied by the testing laboratory specifically appropriate to the determinand. These containers were filled with sample, sealed and delivered to the laboratory for testing. Observations of groundwater conditions were recorded throughout the fieldwork operations. All other samples were stored in airtight containers and returned to the laboratory for examination and geotechnical testing where necessary.

A photo ionisation detector (PID) was used to indicate the likelihood of the presence of volatile organic compounds during the fieldwork and in the laboratory. The results are indicated on the Borehole logs only where readings in excess of 10ppm were monitored. Readings in excess of 50ppm indicate that samples are required to be tested for Volatile Organic Compounds. No samples were found to exceed 10ppm.

5. Laboratory Investigation

5.1 Contamination Testing

In total six soil samples were collected and subjected to elements of the suite of chemical testing as outlined below. All tests were conducted by i2 Analytical under UKAS Testing No 4041. The results of all the chemical analysis tests are given in Appendix C1.

Table 5.1 Analytical Determinands

Soils	
Arsenic	Acenaphthene
Boron (water-soluble)	Acenaphthylene
Cadmium	Anthracene
Chromium	Benzo(a)Anthracene
Chromium VI	Benzo(a)Pyrene
Copper	Benzo(b/k)Fluoranthene
Cyanide(Total)	Benzo(ghi)Perylene
Cyanide(free)	Chrysene
Lead	Dibenzo(ah)Anthracene
Mercury	Fluoranthene
Nickel	Fluorene
pH	Indeno(123-cd)Pyrene
Phenols(Mono)	Naphthalene
Selenium	Phenanthrene
SO4(Total)	Pyrene
Sulphide	
Sulphur(Free)	Asbestos screen & ID
Thiocyanate	
Zinc	

6. Subsurface Stratigraphy

The subsoil profile obtained from the exploratory holes consists of variable made ground overlying silty sands with gravels overlying silty clay. The silty sand varies from very loose to medium dense in state of compaction. The clay is generally firm to stiff in consistency and is intermediate to high in plasticity.

Further details of the subsurface stratigraphy can be found in the exploratory hole log sheets which form Appendix B1 to this report.

Table 6.0 Subsoil Profile Summary

Strata	Depth of Strata (m) below ground level	
	Top	Base
Topsoil/Made Ground - Variable mixed granular	Ground Level	0.60 to 1.80
Superficial Natural Deposits Mainly silty Sands with gravels	0.60 to 1.80	3.60 to 3.80
Superficial Natural Deposits Slightly gravelly sandy silty Clay with occasional silty sand inclusions	3.60 to 3.80	>7.00

7. Groundwater

Seepage groundwater was encountered in exploratory holes WS1 to WS6 at depths between 1.70m and 2.30m during the course of the fieldwork. The groundwater conditions entered on the exploratory hole logs are those observed at the time of the boring operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken.

Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.

8. Ground Gas

Ground gas monitoring does not form part of this report as the Phase I report did not indicate a requirement for gas monitoring.

In addition, the subsurface stratigraphy has proved that no significant depth of made ground deposits exist beneath the site and no putrescible materials were present capable of generating ground gases at significant quantities such that the proposed development would be impacted.

The requirements for Radon gas measures are discussed in the Preliminary Contaminated Land Risk Assessment report.

9. Part IIA Legislation

Part IIA of the Environmental Protection Act 1990 (inserted by Section 57 of the Environment Act 1995) provides a new regime for the control of specific threats to health or the environment from existing land contamination. In accordance with the Act and the statutory guidance document on The Contaminated Land (England) Regulations 2000, the definition of contaminated land is intended to embody the concept of risk assessment. Within the meaning of the Act, land is only “contaminated land” where it appears to the regulatory authority, by reason of substances within or under the land that:

- § Significant harm is being caused or there is significant possibility of such harm being caused; or
- § Pollution of controlled waters is being, or is likely to be, caused.

The guidance defines “risk” as the combination of

- § The probability, or frequency, of occurrence of a defined hazard (for example, exposure of a property to a substance with the potential to cause harm); and
- § The magnitude (including the seriousness) of the consequences.

For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- § A source, i.e. a substance that is capable of causing pollution or harm;
- § A receptor (or target). i.e. something which could be adversely affected by the contaminant; and
- § A pathway, i.e. a route by which the contaminant can reach the receptor.

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

9.1 Assessment Methodology

In order to assess the environmental risk posed by potential contaminants within the near surface soils considering the final levels of the scheme, GeoAssist Limited undertook an initial screen of the laboratory results using GeoAssist Limited Generic Assessment Criteria (GACs) and where applicable Category 4 Screening Levels or Suitable 4 Use Levels as given as part of Appendix C2.

The GeoAssist Limited GACs and Category 4 Screening levels (C4SLs and S4UL herein) are generated in consideration of the proposed end use of the site, in this case as Residential land. Contaminant concentrations below the GACs and or C4SLs levels are considered not to warrant further risk assessment. Concentrations of potential contaminants above the GACs and C4SLs levels require further consideration of the potential pollutant linkages. It should be noted that exceedance of the GACs and or C4SLs levels does not necessarily mean that the site requires remediation, although this is dependent on the nature, type and depth of the contaminant and further justification may be required.

9.2 Soils

For assessment of the soil analysis results with regard to potential human health risks, GeoAssist Limited GACs are

selected from the following sources which represent minimal risk to site users:

CLEA Soil Guideline Values (SGVs). These values have been developed by the Department of the Environment, Food and Rural Affairs (DEFRA) and the Environment Agency (EA) using the Contaminated Land Exposure Assessment (CLEA) Model, and are considered to be protective of human health (considered to be a potential receptor on site). To date, SGVs have been published for only a limited suite of contaminants, with SGVs derived for each contaminant for three different land use scenarios namely:

- § residential
- § allotments
- § commercial and industrial.

The proposed assessment of this site is as Residential land as this is considered to be the most appropriate land use scenario for the current and proposed situation on site.

Chartered Institute of Environmental Health Generic Assessment Criteria (LQM CIEH GAC) have been used where available and where CLEA SGVs have not yet been published.

Where CLEA or LQIM CIEH GAC values are not available, Atkins at Risk GAC values have been selected as appropriate all of which represent a minimal risk to receptors.

C4SLs have been used in conjunction with the above GAC and these represent a Low Level of Toxicological Concern (LLTC herein). LLTC represent an intake of low concern that remains suitably protective of health, and definitely does not approach an intake level that could be defined as Significant Possibility of Significant Harm.

The CLEA guidelines state that for each contaminant, apart from lead, the upper 95th percentile of the mean measured concentration should be calculated where appropriate and this value should be compared to the applicable screening value (defined here as the GeoAssist Limited GACs). For Lead impacts the geometric mean should be calculated and compared to the GAC or C4SL.

The CLEA model states that, 'the contamination is assumed to be at or within 1 m of the surface (CLR10 page 10 now withdrawn).' It is considered that at depths greater than 1m, the probability of human exposure via the direct contact pathways are significantly reduced, leaving inhalation of volatile compounds as the dominant pathway. Typically, volatile compounds only significantly affect the indoor inhalation pathway.

9.3 Subsoil Deposits

The contaminants that were identified above the GeoAssist Limited GACs, SGVs or C4SLs for a Residential end use from the GeoAssist Limited investigations are summarized below:

Table 9.3 Summary identified impacts.

Determinand	GAC (mg/kg) Residential	Total tests / tests impacted (Made Ground)	No. of No. of in strata	No of samples exceeding SGV/GAC/ C4SL	Max Value (mg/kg)	Treat as Hotspot	US95 Value	Further action required
No Identified Impacts								

The analytical laboratory test results and analysis are presented in appendix C1 & C2 and have not identified any risks to end users of the Site from elevated levels of anthropogenic contamination within the near surface soils on the Site.

The results confirm that asbestos fibres have not been identified in the made ground samples submitted to the analysis laboratory for testing.

The results of all the chemical laboratory analytical tests form appendix C1 to this report and the analysis of the results forms appendix C2 to this report.

9.4 Discussion

The assessment of the chemical laboratory analytical tests has identified that the soils on this site pose a low risk to end users from Contaminants of Concern when assessed in accordance with the current UK methodology. Consequently, the risk to end user receptors from ground contamination is classified as low given a residential end use scenario.

Construction Workers

The risk to construction workers and site users during the construction phase is assessed to be low. Regardless of the low risks good working practice should be maintained as a matter of course. Standard PPE & RPE precautions should be adopted at the site strip stage including the use of disposable coveralls, particulate masks and damping down to suppress airborne dust where conditions dictate.

Site Users

The risk to site users of the completed development is low in all reasonably foreseeable circumstances.

10. Conceptual Model

The updated conceptual model based on the information and test results presented in this report including contamination sources, pathways and receptors is presented below.

Table 10.0 Amended Conceptual Site Model based on information as presented within this report.

Potential Source /Hazard	Nature of Hazard (Risk Level to site given a Residential end use)	Contaminants Associated with Source	Potential Pathway	Potential Receptor
<i>Previous ON SITE Land uses:</i>				
1. Previous Land Use Agricultural land	Ground contamination Low Risk	None Identified	Dermal Contact Ingestion Inhalation	Site Users Construction workers
	Gas from in-filled ground Low Risk	None Identified	Vertical and Lateral Migration	Site Users Future Buildings & Services
2. Previous Land Use Hospital	Ground contamination Low Risk	None Identified	Dermal Contact Ingestion Inhalation	Site Users Construction workers
	Gas from in-filled ground Low Risk	None Identified	Vertical and Lateral Migration	Site Users Future Buildings & Services
<i>Previous OFF SITE land uses within 250m as indicated by Historical Plans Including:</i>				
3. Pond Feature (Infilled)	Ground contamination Low Risk	None Identified	None	Site Users Construction workers
	Gas from in-filled ground Low Risk	None Identified	Vertical and Lateral Migration	Site Users Future Buildings & Services
4. Railway	Ground contamination Low Risk	None Identified	None	Site Users Construction workers
	Gas from in-filled ground Low Risk	None Identified	None	Site Users Future Buildings & Services
15. Coal Workings	Geotechnical Hazard Low Risk	None Identified	Ground Collapse Subsidence	Humans (site users) Future Buildings & Services
	Ground contamination Low Risk	None Identified	None	Site Users Services
	Mine Gas Low Risk	None Identified	None	Humans (site users) Future Buildings & Services

Only sources that have not been present on site in the past or currently are considered within the off site category. Unless the information is deemed to be pertinent to the analysis.

11. Conclusions

Evidence presented elsewhere within this report indicates that the site presents a Low Risk to end user receptors in its present state and the soils can be regarded as acceptable for residential use.

Any imported soils will need to be tested and declared as acceptable for use on site prior to placement. The LPA are likely to require validation sampling where such conditions exist.

11.1 Supplementary Recommendations

An preliminary UXO report for the site has been prepared for the site by Alpha Associates which has concluded a Low Level of HE bombs during WWII in the area and the presence of UXO on the site as likely. As a result, GeoAssist have taken additional steps to further characterise the risk from UXO at the site Including from additional sources of information not utilised in the Alpha Associates Report. Consequently, The UXO risk at the site has been recategorized as Low for the ground investigation phase of the development.

Any activities undertaken by contractors or the developer that disturb the ground must undertake their own assessment of the UXO risk for that particular activity, for example piling or bulk excavations.



Matthew Benson MSc. GMICE
Geotechnical/Environmental Engineer



Mark Richardson MSc CEng MICE
Technical Director

Field investigations have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions are, and can be, variable and have only been tested at isolated locations across the site. Therefore, the potential exists for ground conditions to be encountered which are different to those considered in this report. Chemical analysis was conducted for a number of parameters based on an expert understanding of the historical and operational data available at the time and it should not be inferred or otherwise, that other chemical species are not present.

This report has been prepared by GeoAssist Limited with all reasonable professional skill, care and diligence within the terms of the contract with Henderson Homes. The report is confidential to Henderson Homes, their/the named persons, advisors and bankers, and GeoAssist Limited accepts no responsibility of whatever nature to third parties to whom this report may be divulged. GeoAssist Limited owns the copyright in this report. All rights are reserved and unauthorised use is prohibited. Henderson Homes may use the report for their/her/his own purposes.

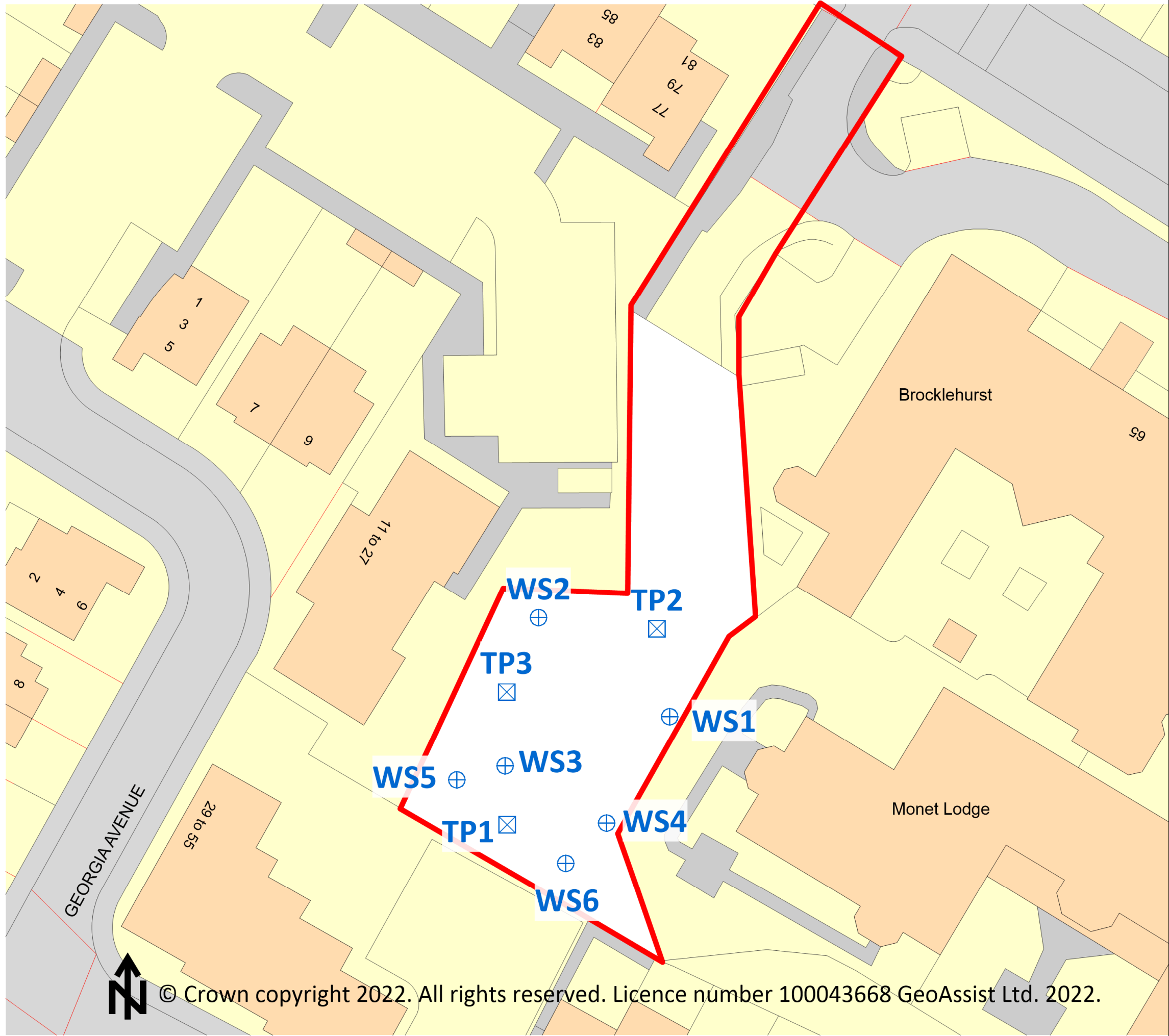
Appendix A

- A1 Site Plan & Exploratory Hole Locations
- A2 Proposed Site Plan

A1 Site Plan

Site Name	Monet Lodge
Location	Cavendish Road, Didsbury
GeoAssist Ref	6103VMD
Client	Henderson Homes
	Narlin, Clamhunger Lane Mere Knutsford WA16 6QG
Planning Consultant	BrennanConsult Ltd
NGR (centre of site)	383750,392600
Production Date	Sept 2022
Survey Method	
Surveyor	Others
Status	Final v1.00
Base Survey	OSGB36

Notes:



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A2 Site Plan Proposed

Site Name	Monet Lodge
Location	Cavendish Road, Didsbury
GeoAssist Ref	6103VMD
Client	Henderson Homes
	Narlin, Clamhunger Lane Mere Knutsford WA16 6QG
Planning Consultant	BrennanConsult Ltd
NGR (centre of site)	383750,392600
Production Date	Sept 2022
Survey Method	
Surveyor	Others
Status	Final v1.00
Base Survey	OSGB36

Notes:



Appendix B

B1 Exploratory Hole Logs

GeoAssist Limited		Exploratory Hole Record Sheet					Ref: WS1	
Consultant: BrennanConsult Ltd		Project: Monet Lodge Location: Cavendish Road, Didsbury					Sheet: 1	
Client: Henderson Homes		Equipment: Archway Dart Rig					Ground Level: 31.22 m.AOD Co-ordinates: Easting: 383750.9(m) Northing: 392575.1(m) Dates: 27/09/2022 to 27/09/2022	
Drilling Foreman: M Walton STRATUM DESCRIPTION Engineer/Geologist: M Benson		Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests Depth (m) from to			Field Records
					Sample Type/No	Blow Count N/(U)		
0 Grass over dark brown gravelly TOPSOIL with rootlets		0.30			0.30 0.40	C1		
Brown sandy gravel, brick and concrete fragments with rootlets - MADE GROUND		(0.40) 0.70	30.52					
Brown SAND and GRAVEL		1.00	30.22		1.00 1.20 1.30	CP1 D1	12	
1 Medium dense brown with occasional dark grey gravelly silty SAND		(1.00)						
2 Very loose to medium dense brown with occasional grey slightly silty very gravelly SAND		2.00	29.22		2.00 2.50 2.60 3.00	CP2 D2 CP3	3 12	
3								
4 Firm to stiff brown medium to high strength slightly gravelly sandy silty CLAY		3.60	27.62		3.80 3.90 4.00	D3 CP4	4	
4		(1.40)						
5 Stiff brown slightly gravelly sandy silty CLAY - Interpreted Stratum Dynamic probe only from 5.00m		5.00	26.22		5.00 6.00 6.90	CP5 CP6 CP7	12 19 24	
6		(2.00)						
7 Exploratory Hole complete at 7.00m		7.00	24.22					
8								
9								
10								
Remarks: 27/09/2022: Inspection pit excavated to 1.00m depth to avoid services The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken. Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.						Logged: M Benson Date: 29/09/2022 Checked: M Richardson Date: 14/10/2022 Site Ref: 6103/VMD Scale 1:50		

GeoAssist Limited		Exploratory Hole Record Sheet					Ref: WS2			
Consultant: BrennanConsult Ltd		Project: Monet Lodge Location: Cavendish Road, Didsbury					Sheet: 1			
Client: Henderson Homes		Equipment: Archway Dart Rig					Ground Level: 31.43 m.AOD Co-ordinates: Easting: 383738.8(m) Northing: 392584.3(m) Dates: 28/09/2022 to 28/09/2022			
Drilling Foreman: M Walton STRATUM DESCRIPTION Engineer/Geologist: M Benson		Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests Depth (m) from to			Sample Type/No	Blow Count N/(U)	Field Records
0 Grass over brown gravelly TOPSOIL with rootlets		0.25	31.18		0.30	0.40	C1			
Dark brown/grey sandy gravel with brick and concrete fragments - MADE GROUND		(0.65) 0.90			0.80	0.90	D1 CP1			
1 Medium dense brown gravelly slightly silty SAND					1.00				27	
					1.50	1.60	D2			
2		(2.80)			2.00		CP2		16	Wet from 2.00m depth
					3.00		CP3		12	
3		3.70	27.73		3.90	4.00	D3 CP4		5	Hand vane at 3.90m - 81kPa
4 Firm to stiff brown medium to high strength slightly gravelly sandy silty CLAY		(1.30) 5.00			4.00					Hand vane at 4.50m - 74kPa
5 Stiff slightly gravelly sandy silty CLAY - Interpreted Stratum Dynamic probe only from 5.00m			26.43		5.00		CP5		9	
6		(2.00)			6.00		CP6		21	
7 Exploratory Hole complete at 7.00m		7.00	24.43		6.90		CP7		27	28/09/2022: On completion of exploratory hole at 7.00m. Casing at 4.00m. Standing water level at 4.60m with casing. On withdrawal of casing exploratory hole backfilled and reinstated.
8										
9										
10										
Remarks: 28/09/2022: Inspection pit excavated to 1.00m depth to avoid services The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken. Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.								Logged: M Benson Date: 29/09/2022 Checked: M Richardson Date: 14/10/2022 Site Ref: 6103/VMD Scale 1:50		

Remarks: 27/09/2022: Inspection pit excavated to 1.00m depth to avoid services The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken. Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.	Logged: M Benson Date: 29/09/2022 Checked: M Richardson Date: 14/10/2022 Site Ref: 6103/VMD Scale 1:50
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Remarks: 27/09/2022: Inspection pit excavated to 1.00m depth to avoid services The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken. Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.	Logged: M Benson Date: 29/09/2022 Checked: M Richardson Date: 14/10/2022 Site Ref: 6103/VMD Scale 1:50
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GeoAssist Limited		Exploratory Hole Record Sheet				Ref: WS6		
Consultant: BrennanConsult Ltd		Project: Monet Lodge				Sheet: 1		
Client: Henderson Homes		Location: Cavendish Road, Didsbury				Ground Level: 31.35 m.AOD		
		Equipment: Archway Dart Rig				Co-ordinates: Easting: 383741.3(m) Northing: 392561.6(m)		
						Dates: 28/09/2022 to 28/09/2022		
Drilling Foreman: M Walton		Depth (Thick) (m)	Reduced Level (mAOD)	Strata Legend/ Standpipe Backfill	Samples/Tests			Field Records
STRATUM DESCRIPTION					Depth (m)	Sample	Blow	
Engineer/Geologist: M Benson					from	to	Type/No	N/(U)
0 Grass over dark brown gravelly TOPSOIL with rootlets		0.20	31.15					
Brown sand and gravel with brick and concrete fragments - MADE GROUND		(0.50) 0.70	30.65		0.30	0.40	C1	
Brown gravelly silty SAND								
1								
2		(2.10)						
		2.80	28.55					
3 Orange/brown with grey sandy GRAVEL		3.00	28.35					
Exploratory Hole complete at 7.00m								
4								
5								
6								
7								
8								
9								
10								
Remarks: 28/09/2022: Inspection pit excavated to 1.00m depth to avoid services The groundwater conditions entered on the exploratory hole logs are those observed at the time of the drilling operations and the water level may not have reached equilibrium with the surrounding water level prior to the record being taken. Standing groundwater levels will be subject to seasonal variation or changes in local drainage conditions and could be higher at certain times of the year particularly after periods of heavy rainfall.							Logged: M Benson Date: 29/09/2022 Checked: M Richardson Date: 14/10/2022 Site Ref: 6103/VMD Scale 1:50	

Appendix C

- C1 i2 Analytical Laboratory Test Results
- C2 Analysis of Results with Assessment Criteria



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Analytical Report Number : 22-87533

Project / Site name:	Monet Lodge Didsbury	Samples received on:	30/09/2022
Your job number:	6103 VMD	Samples instructed on/ Analysis started on:	30/09/2022
Your order number:	2220930	Analysis completed by:	11/10/2022
Report Issue Number:	1	Report issued on:	11/10/2022
Samples Analysed:	6 soil samples		


Signed:
Anna Goc
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 22-87533
Project / Site name: Monet Lodge Didsbury
Your Order No: 2220930

Lab Sample Number				2445228	2445229	2445230	2445231	2445232
Sample Reference				WS1	WS2	WS3	WS4	WS5
Sample Number				C1	C1	C1	C1	C1
Depth (m)				0.30	0.30	0.30	0.30	0.30
Date Sampled				28/09/2022	28/09/2022	28/09/2022	28/09/2022	28/09/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	8.3	3.3	5.4	3.7	6.2
Total mass of sample received	kg	0.001	NONE	0.3	0.3	0.3	0.3	0.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SSZ	SSZ	SSZ	DSA	DSA

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9	8.9	11	8.9	8.8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Sulphate as SO ₄	%	0.005	MCERTS	0.086	0.052	0.176	0.052	0.087
Sulphide	mg/kg	1	MCERTS	17	65	15	8.4	10
Total Sulphur	%	0.005	MCERTS	0.044	0.051	0.084	0.028	0.042

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.41	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.38	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.4	1.9	0.97	3.2	1.1
Anthracene	mg/kg	0.05	MCERTS	0.37	0.54	0.27	0.79	0.38
Fluoranthene	mg/kg	0.05	MCERTS	3.1	3.4	2.1	4	3.5
Pyrene	mg/kg	0.05	MCERTS	3.1	3.2	2	3.4	3.4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.8	1.4	1.1	1.8	2
Chrysene	mg/kg	0.05	MCERTS	1.5	1.7	1.1	1.5	1.8
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.6	1.4	0.96	1.5	2
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.3	1	0.91	1.1	1.4
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.9	1.7	1.3	1.7	2.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.95	0.75	0.66	0.79	1.1
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.25	0.23	< 0.05	0.22	0.28
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.1	0.94	0.78	0.92	1.3

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	18.3	18.1	12.1	21.7	20.6
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4041



Analytical Report Number: 22-87533

Project / Site name: Monet Lodge Didsbury

Your Order No: 2220930

Lab Sample Number				2445228	2445229	2445230	2445231	2445232
Sample Reference				WS1	WS2	WS3	WS4	WS5
Sample Number				C1	C1	C1	C1	C1
Depth (m)				0.30	0.30	0.30	0.30	0.30
Date Sampled				28/09/2022	28/09/2022	28/09/2022	28/09/2022	28/09/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.9	9	6.6	5.1	6.1
Barium (aqua regia extractable)	mg/kg	1	MCERTS	200	200	380	380	260
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.49	0.54	0.48	0.39	0.47
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	< 0.2	< 0.2	< 0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	0.7	0.5	0.5	0.4
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	12	14	14	9.8	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	21	21	22	20	19
Lead (aqua regia extractable)	mg/kg	1	MCERTS	51	33	38	31	41
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	15	12	13	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	16	20	17	12	15
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	54	56	59	43	51

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-87533
Project / Site name: Monet Lodge Didsbury
Your Order No: 2220930

Lab Sample Number	2445233
Sample Reference	WS6
Sample Number	C1
Depth (m)	0.30
Date Sampled	28/05/2022
Time Taken	None Supplied

Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	5.7
Total mass of sample received	kg	0.001	NONE	0.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	DSA

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0
Total Sulphate as SO ₄	%	0.005	MCERTS	0.066
Sulphide	mg/kg	1	MCERTS	13
Total Sulphur	%	0.005	MCERTS	0.041

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.68
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	1.9
Pyrene	mg/kg	0.05	MCERTS	2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.3
Chrysene	mg/kg	0.05	MCERTS	1
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.5
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.64
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.88
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.22
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.9

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	12.4
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Analytical Report Number: 22-87533
 Project / Site name: Monet Lodge Didsbury
 Your Order No: 2220930

Lab Sample Number		2445233		
Sample Reference		WS6		
Sample Number		C1		
Depth (m)		0.30		
Date Sampled		28/05/2022		
Time Taken		None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.4
Barium (aqua regia extractable)	mg/kg	1	MCERTS	410
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.59
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.6
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24
Lead (aqua regia extractable)	mg/kg	1	MCERTS	42
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	18
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	64

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 22-87533

Project / Site name: Monet Lodge Didsbury

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2445228	WS1	C1	0.3	Brown sandy loam with gravel and vegetation.
2445229	WS2	C1	0.3	Brown sandy loam with gravel and vegetation.
2445230	WS3	C1	0.3	Brown sandy loam with rubble and vegetation.
2445231	WS4	C1	0.3	Brown sandy loam with gravel and vegetation.
2445232	WS5	C1	0.3	Brown sandy loam with gravel and vegetation.
2445233	WS6	C1	0.3	Brown sandy loam with gravel and vegetation.

Analytical Report Number : 22-87533
Project / Site name: Monet Lodge Didsbury

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 °C)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

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

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C. Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Soils Risk Assessment

Site Reference: 6103 VMD
Project Site: Monet Lodge
Project Location: Cavendish Road, Didsbury
Client: Henderson Homes

I2 Reference	Residential	WS1 - C1	WS2 - C1	WS3 - C1	WS4 - C1	WS5 - C1	WS6 - C1
Customer Sample Ref:	C4SL / S4UL	0.3	0.3	0.3	0.3	0.3	0.3
	SOM 1% GAC	28/09/2022	28/09/2022	28/09/2022	28/09/2022	28/09/2022	28/09/2022
Determinand	LQM II						
Arsenic	27	6.9	9	6.6	5.1	6.1	7.4
Boron (water-soluble)	290	0.4	0.2	0.2	0.2	0.2	0.2
Cadmium	22	0.5	0.7	0.5	0.5	0.4	0.6
Chromium*	910	12	14	14	9.8	11	15
Chromium VI	21	1.2	1.2	1.2	1.2	1.2	1.2
Copper	2400	21	21	22	20	19	24
Cyanide(Total)	-	1	1	1	1	1	1
Cyanide(free)**	34	1	1	1	1	1	1
Lead	200	51	33	38	31	41	42
Mercury	1.2	0.3	0.3	0.3	0.3	0.3	0.3
Nickel	130	11	15	12	13	13	15
pH	-	9	8.9	11	8.9	8.8	8.5
Phenols(Mono)	1100	1	1	1	1	1	1
Selenium	250	1	1	1	1	1	1
SO4(Total)	-	0.086	0.052	0.176	0.052	0.087	0.066
Sulphide	-	17	65	15	8.4	10	13
Sulphur(Free)	-	0.044	0.051	0.084	0.028	0.042	0.041
Thiocyanate	-	5	5	5	5	5	5
Zinc	3700	54	56	59	43	51	64
Acenaphthene	1100	0.05	0.05	0.05	0.41	0.05	0.05
Acenaphthylene	920	0.05	0.05	0.05	0.05	0.05	0.05
Anthracene	11000	0.37	0.54	0.27	0.79	0.38	0.05
Benzo(a)Anthracene	-	1.8	1.4	1.1	1.8	2	1.3
Benzo(a)Pyrene SM	5	1.9	1.7	1.3	1.7	2.3	1.4
Benzo(b)Fluoranthene	-	1.6	1.4	0.96	1.5	2	1.5
Benzo(ghi)Perylene	-	1.1	0.94	0.78	0.92	1.3	0.9
Benzo(k)Fluoranthene	-	1.3	1	0.91	1.1	1.4	0.64
Chrysene	-	1.5	1.7	1.1	1.5	1.8	1
Dibenzo(ah)Anthracene	-	0.25	0.23	0.05	0.22	0.28	0.22
Fluoranthene	890	3.1	3.4	2.1	4	3.5	1.9
Fluorene	860	0.05	0.05	0.05	0.38	0.05	0.05
Indeno(123-cd)Pyrene	-	0.95	0.75	0.66	0.79	1.1	0.88
Naphthalene	13	0.05	0.05	0.05	0.05	0.05	0.05
Phenanthrene	440	1.4	1.9	0.97	3.2	1.1	0.68
Pyrene	2000	3.1	3.2	2	3.4	3.4	2
PAH(total)	500	18.3	18.1	12.1	21.7	20.6	12.4
Asbestos	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

All Units mg/kg unless otherwise stated

Indicates Exceedance of Applicable Level

*Criteria Assumes Chromium III

**Criteria is derived considering acute effects on 1-2yo Female Receptor ingesting a single dose of 3g of soil

***Criteria is derived considering Total TPH (C10 to C35) is formed entirely of a 50:50 Aliphatic and Aromatic Split C8-C10 range

Basis of Assessment Criteria:

EA 2005 WAC (Human Health Value)

C4SL

LQM S4UL

Atrisk 06