GeoAssist Limited

Civil, Environmental & Geotechnical

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396 Wilmsow Road
Manchester
M20 3BN

Architect/Consultant
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Phase II Contaminated Land Risk Assessment

Land to rear of 25 Ladybarn Road, Fallowfield, Manchester

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May 2021 Site Ref: 6070/VMF-CLRA v1.00

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Phase II Contaminated Land Risk Assessment

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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 Airshack Projects Ltd for the proposed development on Land to rear of 25 Ladybarn Road, Fallowfield, Manchester.

The work was commissioned following acceptance of the quotation and an instruction to proceed issued by the Client Airshack Projects Ltd on 22nd April 2021.

The purpose of this Phase II investigation is to provide information following the completion of a Phase I by others, 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 March 2012
- 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 385832, 393909 and the total area of the site is approximately 250m^2. 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 located directly off Moseley Road, Fallowfield, Manchester.

The site forms a roughly rectangular shape, and the topography of the site is relatively flat with the surrounding area.

The site consists of open ground, which had been largely cleared with the exception of some undergrowth and cutback trees. At the time of the site visit there were no structures on site. A 1st generation limestone access track was noted along the eastern boundary line of the site.

The site is bound by residential property to the east, south and west, Moseley Road bounds the site to the North

over which lies Residential accommodation.

Apart from some obvious surface (litter) no visual or olfactory observations of contaminants were noted during the site walkover.

2.2 Proposed

It is understood that the proposed development comprises 2 number semi detached residential dwelling houses with associated off road car parking, soft landscaping and residential gardens.

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 360 backhoe mini excavator methods. Information obtained from the Phase I 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 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

In total three exploratory holes referenced TP1, TP2 and TP3 were undertaken at the locations as 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. Upon completion of the fieldwork the exploratory holes were backfilled in accordance with the specification in order to prevent the establishment of any potential pollutant pathways and the surface reinstated.

All intrusive work was carried out in accordance with:

- British standard 5930: 2015 Code of Practice for Site Investigations
- British Standard 10175: 2011 where applicable

The fieldwork was completed on in a single visit to site on 04th May 2021.

4.5 Field Sampling and Testing

A non-targeted exploratory hole layout was selected as the most appropriate strategy for this site based on the findings of the Phase I by others. 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 indicted 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 seven 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 made ground to depths between 0.40m to 0.70m generally over a sandy silty Clay to the south of the site and a very sandy Clay to the north of the site.

Table 6.0 Subsoil Profile Summary

Strata	Depth of Strata (m) below ground level	
	Top	Base
Made Ground Variable mixed granular with clay in parts	Ground Level	0.40 to 0.70
Glacial Till – Sandy Silty CLAY	0.40 to 0.70	Not proven

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

7. Groundwater

Seepage groundwater was not encountered during the course of the fieldwork. The groundwater conditions entered on the exploratory hole logs are those observed at the time of the exploratory investigation 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

The subsurface stratigraphy has demonstrated that no significant depth of made ground deposits exist beneath the site and no putrescible materials were present capable of generating significant volumes of ground gases at quantities and pressures such that the proposed development is likely to be impacted by ground gases.

Consequently, the risk to any future development from potential ground gas ingress is classified as low based on the ground conditions actually encountered in the exploratory holes and no particular measures will need to be adopted based on the recommendations within Ciria C665 and Claire RB 17 best practice guidance.

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 with edible plant uptake. 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 with edible plant uptake 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 No. of tests / No. of tests in impacted strata (Made Ground)	No of samples exceeding SGV/GAC/ C4SL	Max Value (mg/kg)	Treat as Hotspot	US95 Value	Further action required
Arsenic	27	3/4	3	120	No	na	Yes remediate Made Ground in soft landscaped areas of final scheme
Lead	200	3/4	3	600	No	na	Yes remediate Made Ground in soft landscaped areas of final scheme
Mercury (elemental)	1.2	2/4	2	3.4	No	na	Yes remediate Made Ground in soft landscaped areas of final scheme
B[a]P	5	1/4	1	8.9	No	na	Yes remediate Made Ground in soft landscaped areas of final scheme

The analytical laboratory test results and analysis are presented in appendix C1 & C2 and have identified potential moderate risks to end users of the Site from elevated levels of anthropogenic contamination within the near surface soils on the Site. Namely elevated levels of Arsenic, Lead, Mercury and Benzo(a)Pyrene within samples of made ground only.

The results confirm that Asbestos fibres have not been identified within the made ground 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 moderate risk to end users from Contaminants of Concern when assessed in accordance with the current UK methodology.

Construction Workers

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

Site Users

The risk to site users of the completed development is moderate in all reasonably foreseeable circumstances and a remediation scheme will need to be approved by the Local Planning Authority and subsequently implemented and confirmed by validation testing.

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
		Previous ON SITE Land uses:		
1. Shallow Made Ground on site	Ground contamination Moderate Risk	Arsenic Lead Mercury BaP	Dermal Contact Ingestion Inhalation	Site Users Construction workers
	Gas from in-filled ground Low Risk	None	~~Vertical and Lateral Migration~~	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 Moderate Risk to end user receptors in its present state and will only be regarded as fit for purpose from a ground contamination perspective following the implementation of an approved remedial action plan.

A Remediation Plan will need to be prepared, submitted to, and approved by the LPA prior to on site development works being undertaken.

11.1 Supplementary Recommendations

None.

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.

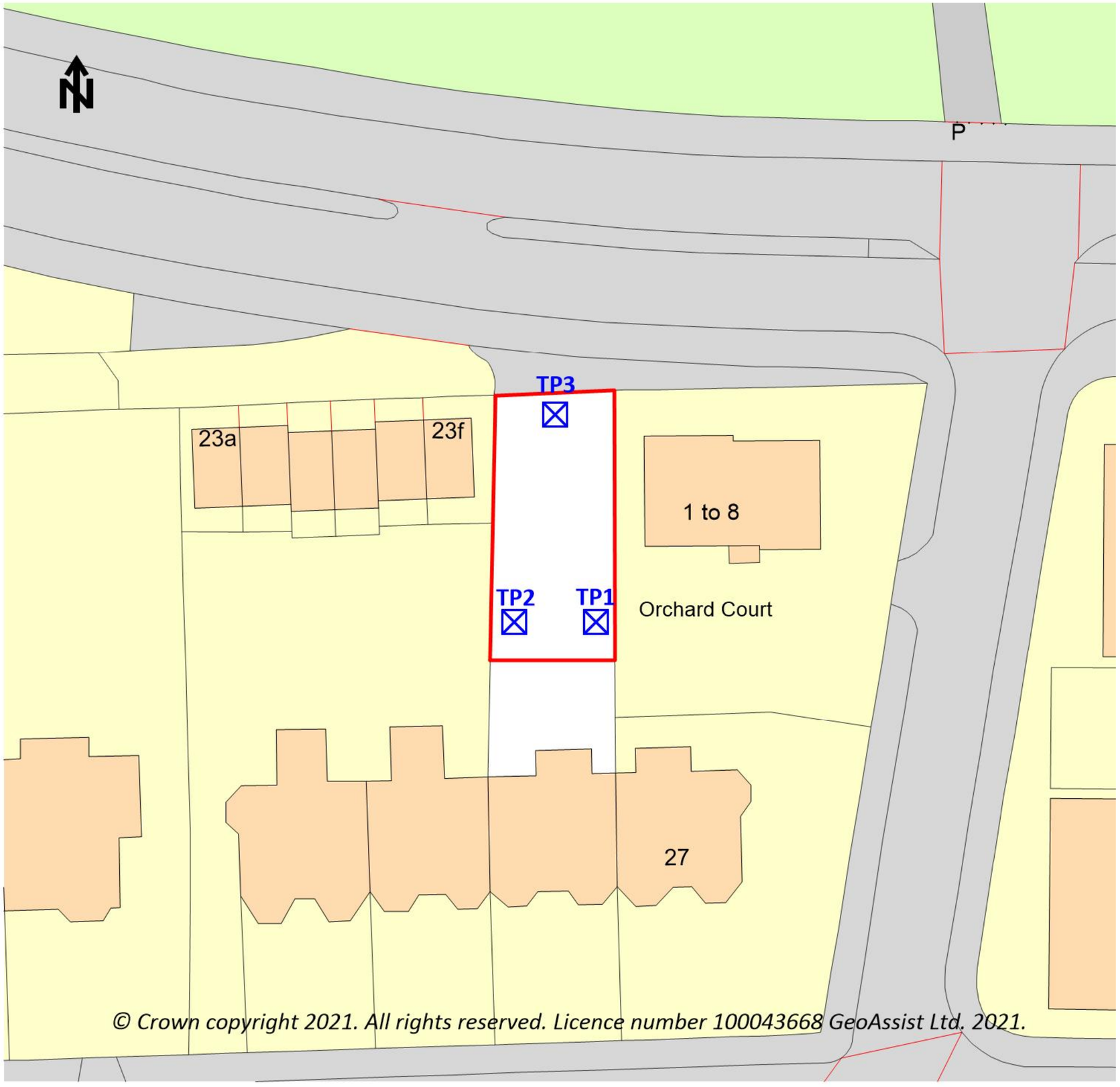
This report has been prepared by GeoAssist Limited with all reasonable professional skill, care and diligence within the terms of the contract with Airshack Projects Ltd. The report is confidential to Airshack Projects Ltd, their/the named persons, advisors and bankers, and GeoAssist Limited accepts 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. Airshack Projects Ltd may use the report for their/her/his own purposes.

Appendix A

A1 Site Plan & Exploratory Hole Locations

A2 Proposed Site Plan

6070GALv1.00



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A1 Site Plan

Site Name	Land to rear of 25 Ladybarn Road
Location	Fallowfield, Manchester
GeoAssist Ref	6070VMF
Client	Airshack Projects Ltd
	396 Wilmsow Road Manchester M20 3BN
Planning Consultant	
NGR (centre of site)	385832,393909
Production Date	May 2021
Survey Method	
Surveyor	Others
Status	Final v1.00
Base Survey	OSGB36

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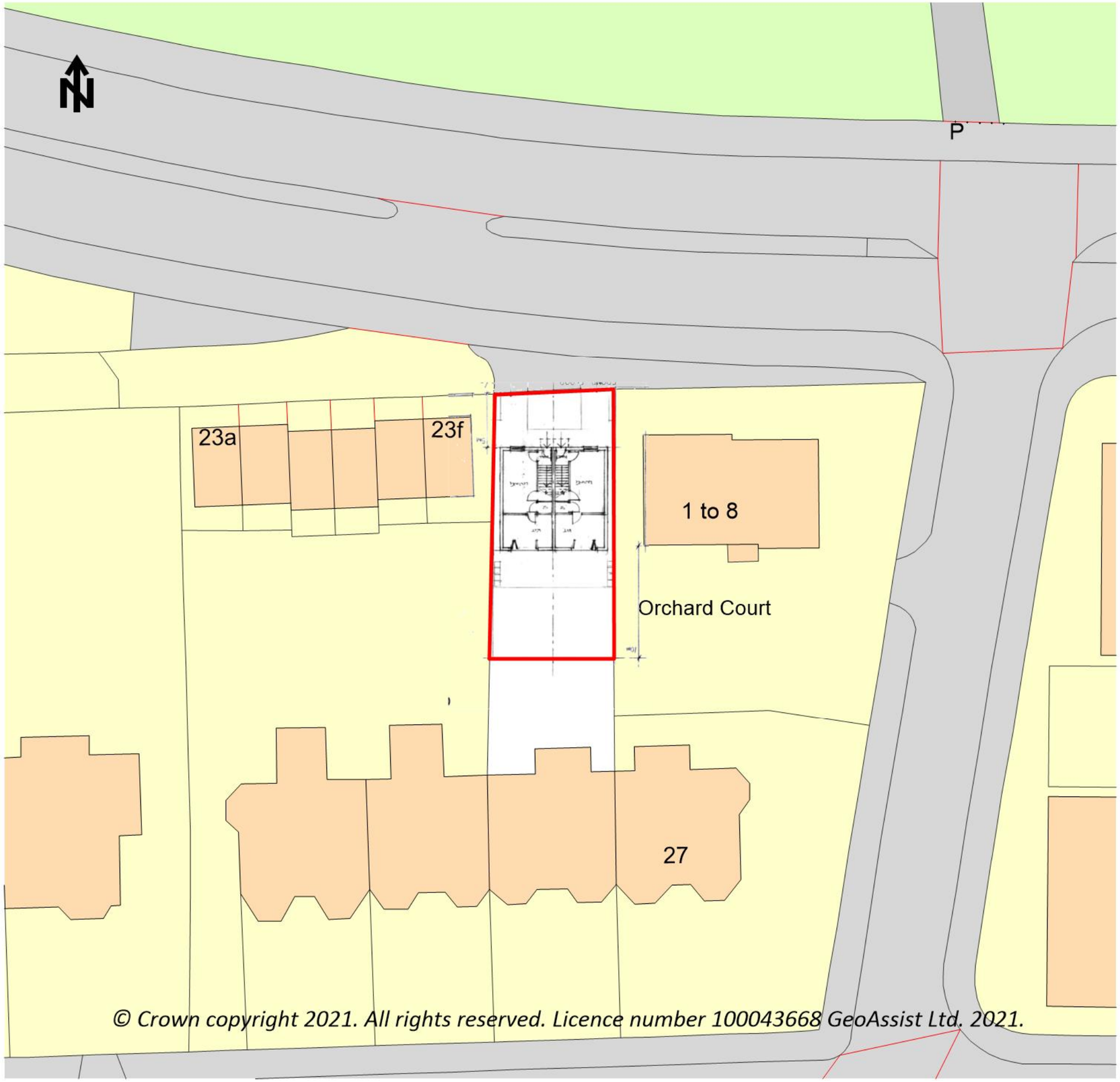
6070GALv1.00



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A2 Proposed Plan

Site Name	Land to rear of 25 Ladybarn Road
Location	Fallowfield, Manchester
GeoAssist Ref	6070VMF
Client	Airshack Projects Ltd
	396 Wilmsow Road Manchester M20 3BN
Planning Consultant	
NGR (centre of site)	385832,393909
Production Date	May 2021
Survey Method	
Surveyor	Others
Status	Final v1.00
Base Survey	OSGB36

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Appendix B

B1 Exploratory Hole Logs

GeoAssist Limited

Exploratory Hole Record Sheet

Ref: TP1

Sheet: 1

Project: Land to rear of 25 Ladybarn Road

Location: Fallowfield, Manchester

Consultant: Holborow& Ormesher Ltd

Client: Airshack Projects Ltd

Equipment: Mini Excavator

Ground Level: m.AOD

Co-ordinates: Easting: (m)
Northing: (m)

Dates: 04/05/2021 to 04/05/2021

Drilling Foreman: M Benson

Engineer/Geologist: M Benson

STRATUM DESCRIPTION	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 Grey gravel over brown/grey sandy TOPOSOIL	0.20							
Brown sand with brick and coal fragments - MADE GROUND	0.40			0.30	0.40	C1		
Brown sandy silty CLAY	(0.50) 0.90			0.50	0.60	C2		04/05/2021: On completion of exploratory hole at 0.90m. Standing water Nil. Exploratory hole backfilled and reinstated.
1 Exploratory Hole complete at 0.90m								
2								
3								
4								
5								

Remarks:

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: 04/05/2021
Checked: M Richardson
Date: 04/05/2021
Site Ref: 6070/VMF
Scale 1:25

GeoAssist Limited	Exploratory Hole Record Sheet	Ref: TP2
Consultant: Holborow& Ormesher Ltd	Project: Land to rear of 25 Ladybarn Road Location: Fallowfield, Manchester	Sheet: 1
Client: Airshack Projects Ltd	Equipment: Mini Excavator	Ground Level: m.AOD Co-ordinates: Easting: (m) Northing: (m) Dates: 04/05/2021 to 04/05/2021

Drilling Foreman: M Benson

STRATUM DESCRIPTION

Engineer/Geologist: M Benson

Stratum Description	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/grey sandy TOPSOIL	0.15							
Brown sand with brick and coal fragments - MADE GROUND	0.40			0.30	0.40	C1		
Orange/brown sandy silty CLAY	(0.50) 0.90			0.50	0.60	C2		04/05/2021: On completion of exploratory hole at 0.90m. Standing water Nil. Exploratory hole backfilled and reinstated.
1 Exploratory Hole complete at 0.90m								
2								
3								
4								
5								

Remarks:

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: 04/05/2021
Checked: M Richardson
Date: 04/05/2021
Site Ref: 6070/VMF
Scale 1:25

GeoAssist Limited	Exploratory Hole Record Sheet	Ref: TP3
Consultant: Holborow& Ormesher Ltd	Project: Land to rear of 25 Ladybarn Road Location: Fallowfield, Manchester	Sheet: 1
Client: Airshack Projects Ltd	Equipment: Mini Excavator	Ground Level: m.AOD Co-ordinates: Easting: (m) Northing: (m) Dates: 04/05/2021 to 04/05/2021

Drilling Foreman: M Benson

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 Dark grey/brown sand with brick pottery and coal fragments - MADE GROUND	(0.70) 0.70			0.30 0.60	0.40 0.70	C1 C2		
Dark brown sandy to very sandy silty CLAY 1	(0.40) 1.10			1.00	1.10	C3		04/05/2021: On completion of exploratory hole at 1.20m. Standing water Nil. Exploratory hole backfilled and reinstated.
Exploratory Hole complete at 1.10m 2 3 4 5								

Remarks:

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: 04/05/2021
Checked: M Richardson
Date: 04/05/2021
Site Ref: 6070/VMF
Scale 1:25

Appendix C

C1 i2 Analytical Laboratory Test Results

C2 Analysis of Results with Assessment Criteria

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WD18 8YS

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

Analytical Report Number : 21-72962

Project / Site name:	Land to rear of 25 Ladybarn Road, Fallowfeild	**Samples received on:**	05/05/2021
Your job number:	6070-VMF	**Samples instructed on/ Analysis started on:**	05/05/2021
Your order number:	2210504	**Analysis completed by:**	14/05/2021
Report Issue Number:	1	**Report issued on:**	14/05/2021
Samples Analysed:	7 soil samples		

Signed: Karolina Marek

Karolina Marek
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

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

Analytical Report Number: 21-72962
Project / Site name: Land to rear of 25 Ladybarn Road, Fallowfeild
Your Order No: 2210504

Lab Sample Number				1860214	1860215	1860216	1860217	1860218
Sample Reference				TP1-C1	TP1-C2	TP2-C1	TP2-C2	TP3-C1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.50	0.30	0.50	0.30
Date Sampled				04/05/2021	04/05/2021	04/05/2021	04/05/2021	04/05/2021
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	25	19	20	16	31
Total mass of sample received	kg	0.001	NONE	0.40	0.40	0.50	0.50	0.50

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.4	7.4	6.1	5.8	7.0
Total Cyanide	mg/kg	1	MCERTS	1.5	< 1.0	< 1.0	< 1.0	1.1
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 SO4	%	0.005	MCERTS	0.138	0.026	0.094	0.034	0.144
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	1.9
Total Sulphur	%	0.005	MCERTS	0.095	0.026	0.061	0.022	0.097
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	0.6	-	0.7	-

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.12	< 0.05	1.3
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.06	< 0.05	1.7
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.20	< 0.05	0.72
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.16	< 0.05	1.6
Phenanthrene	mg/kg	0.05	MCERTS	1.5	< 0.05	1.6	< 0.05	12
Anthracene	mg/kg	0.05	MCERTS	0.30	< 0.05	1.5	< 0.05	2.6
Fluoranthene	mg/kg	0.05	MCERTS	2.5	< 0.05	3.0	< 0.05	16
Pyrene	mg/kg	0.05	MCERTS	2.8	< 0.05	3.0	< 0.05	15
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.7	< 0.05	1.7	< 0.05	9.0
Chrysene	mg/kg	0.05	MCERTS	1.7	< 0.05	1.5	< 0.05	7.6
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.8	< 0.05	2.9	< 0.05	9.9
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.0	< 0.05	3.0	< 0.05	4.3
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.9	< 0.05	1.7	< 0.05	8.9
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.81	< 0.05	0.91	< 0.05	4.1
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.26	< 0.05	0.27	< 0.05	1.2
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.0	< 0.05	1.1	< 0.05	5.0

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	17.2	< 0.80	22.7	< 0.80	101

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Analytical Report Number: 21-72962
Project / Site name: Land to rear of 25 Ladybarn Road, Fallowfeild
Your Order No: 2210504

Lab Sample Number				1860214	1860215	1860216	1860217	1860218
Sample Reference				TP1-C1	TP1-C2	TP2-C1	TP2-C2	TP3-C1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.50	0.30	0.50	0.30
Date Sampled				04/05/2021	04/05/2021	04/05/2021	04/05/2021	04/05/2021
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	120	16	65	8.8	37
Barium (aqua regia extractable)	mg/kg	1	MCERTS	640	71	210	57	470
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	2.7	0.86	2.1	0.78	1.5
Boron (water soluble)	mg/kg	0.2	MCERTS	1.1	0.5	0.6	0.4	3.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	1.8
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	1.3	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	25	30	25	24	26
Copper (aqua regia extractable)	mg/kg	1	MCERTS	120	21	110	16	110
Lead (aqua regia extractable)	mg/kg	1	MCERTS	410	36	430	22	600
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	3.4	0.5	1.0	< 0.3	1.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	45	18	30	15	28
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	77	36	51	28	40
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	110	40	120	44	360

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

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Analytical Report Number: 21-72962
Project / Site name: Land to rear of 25 Ladybarn Road, Fallowfeild
Your Order No: 2210504

Lab Sample Number				1860219	1860220
Sample Reference				TP3-C2	TP3-C3
Sample Number				None Supplied	None Supplied
Depth (m)				0.60	1.00
Date Sampled				04/05/2021	04/05/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	16	21
Total mass of sample received	kg	0.001	NONE	0.50	0.50

Asbestos in Soil	Type	N/A	ISO 17025	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0
Total Sulphate as SO4	%	0.005	MCERTS	0.059	0.089
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0
Total Sulphur	%	0.005	MCERTS	0.041	0.067
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	1.3

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.48	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.73	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.74	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.51	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.41	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.59	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.21	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.54	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	4.21	< 0.80

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Analytical Report Number: 21-72962
Project / Site name: Land to rear of 25 Ladybarn Road, Fallowfeild
Your Order No: 2210504

Lab Sample Number				1860219	1860220
Sample Reference				TP3-C2	TP3-C3
Sample Number				None Supplied	None Supplied
Depth (m)				0.60	1.00
Date Sampled				04/05/2021	04/05/2021
Time Taken				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	20	11
Barium (aqua regia extractable)	mg/kg	1	MCERTS	150	76
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.3	0.98
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	1.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	31
Copper (aqua regia extractable)	mg/kg	1	MCERTS	42	16
Lead (aqua regia extractable)	mg/kg	1	MCERTS	150	42
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	22	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	34	41
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	84	53

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

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Analytical Report Number : 21-72962
Project / Site name: Land to rear of 25 Ladybarn Road, Fallowfeild

* 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 *
1860214	TP1-C1	None Supplied	0.3	Brown loam and clay with vegetation.
1860215	TP1-C2	None Supplied	0.5	Beige clay with vegetation.
1860216	TP2-C1	None Supplied	0.3	Brown loam and clay with gravel and vegetation.
1860217	TP2-C2	None Supplied	0.5	Light brown loam and clay.
1860218	TP3-C1	None Supplied	0.3	Black loam and clay with vegetation.
1860219	TP3-C2	None Supplied	0.6	Brown loam and clay with vegetation.
1860220	TP3-C3	None Supplied	1	Brown loam and clay with vegetation.

Analytical Report Number : 21-72962
Project / Site name: Land to rear of 25 Ladybarn Road, Fallowfeild

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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 disperion 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
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	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 oC)	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
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
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

Analytical Report Number : 21-72962
Project / Site name: Land to rear of 25 Ladybarn Road, Fallowfeild

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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:	6070 VMF
Project Site:	Land to rear of 25 Ladybarn Road
Project Location:	Fallowfield, Manchester
Client:	Airshack Projects Ltd

i2 Reference	#N/A	TP1-C1	TP2-C1	TP3-C1	TP3-C2	TP1-C2	TP2-C2	TP3-C3
Customer Sample Ref:	C4SL / S4UL	0.30	0.30	0.30	0.60	0.50	0.50	1.00
	SOM 1% GAC	04/05/2021	04/05/2021	04/05/2021	04/05/2021	04/05/2021	04/05/2021	04/05/2021
Determinand	LQM II	MG	MG	MG	MG	CL	CL	CL
Arsenic	27	120	65	37	20	16	8.8	11
Boron (water-soluble)	290	1.1	0.6	3.4	0.8	0.5	0.4	1.4
Cadmium	22	0.2	0.2	1.8	0.2	0.2	0.2	0.2
Chromium*	910	25	25	26	21	30	24	31
Chromium VI	21	1.2	1.3	1.2	1.2	1.2	1.2	1.2
Copper	2400	120	110	110	42	21	16	16
Cyanide(Total)	-	1.5	1	1.1	1	1	1	1
Cyanide(free)**	34	1	1	1	1	1	1	1
Lead	200	410	430	600	150	36	22	42
Mercury	1.2	3.4	1	1.4	0.3	0.5	0.3	0.3
Nickel	130	45	30	28	22	18	15	12
pH	-	7.4	6.1	7	7.5	7.4	5.8	7.7
Phenols(Mono)	1100	1	1	1	1	1	1	1
Selenium	250	1	1	1	1	1	1	1
SO4(Total)	-	0.138	0.094	0.144	0.059	0.026	0.034	0.089
Sulphide	-	1	1	1	1	1	1	1
Sulphur(Free)	-	0.095	0.061	0.097	0.041	0.026	0.022	0.067
Thiocyanate	-	5	5	5	5	5	5	5
Zinc	3700	110	120	360	84	40	44	53
Acenaphthene	1100	0.05	0.2	0.72	0.05	0.05	0.05	0.05
Acenaphthylene	920	0.05	0.06	1.7	0.05	0.05	0.05	0.05
Anthracene	11000	0.3	1.5	2.6	0.05	0.05	0.05	0.05
Benzo(a)Anthracene	-	1.7	1.7	9	0.51	0.05	0.05	0.05
Benzo(a)Pyrene SM	5	1.9	1.7	8.9	0.54	0.05	0.05	0.05
Benzo(b)Fluoranthene	-	1.8	2.9	9.9	0.59	0.05	0.05	0.05
Benzo(ghi)Perylene	-	1	1.1	5	0.05	0.05	0.05	0.05
Benzo(k)Fluoranthene	-	1	3	4.3	0.21	0.05	0.05	0.05
Chrysene	-	1.7	1.5	7.6	0.41	0.05	0.05	0.05
Dibenzo(ah)Anthracene	-	0.26	0.27	1.2	0.05	0.05	0.05	0.05
Fluoranthene	890	2.5	3	16	0.73	0.05	0.05	0.05
Fluorene	860	0.05	0.16	1.6	0.05	0.05	0.05	0.05
Indeno(123-cd)Pyrene	-	0.81	0.91	4.1	0.05	0.05	0.05	0.05
Naphthalene	13	0.05	0.12	1.3	0.05	0.05	0.05	0.05
Phenanthrene	440	1.5	1.6	12	0.48	0.05	0.05	0.05
Pyrene	2000	2.8	3	15	0.74	0.05	0.05	0.05
PAH(total)	500	17.2	22.7	101	4.21	0.8	0.8	0.8
Asbestos	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 derrived considering acute effects on 1-2yo Female Receptor ingesting a single dose of 3g of soil

**Criteria is derrived considering Total TPH (C10 to C35) is formed entirley 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

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