



Geo-Environmental Assessment

Ladybarn Park Road, Manchester, M40 4NR

Presented to Manchester City F.C. City in the Community Foundation

Issued: December 2019

Delta-Simons Project No. 18-1673.04



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Report Details

Client	Manchester City F.C. City in the Community Foundation
Report Title	Geo-Environmental Assessment
Site Address	Ladybarn Park Road, Burnage Lane, Withington, Manchester, M20 4NR
Project No.	18-1673.04
Report Date	December 2019
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Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
02	Final	5 th December 2019	Final issue, including asbestos quantification results.	<i>J. Roche</i>	<i>M. Booth</i>	<i>R. Lawless</i>
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About us

Delta-Simons is a trusted, multidisciplinary environmental consultancy, focused on delivering the best possible project outcomes for customers.

Specialising in Environment, Health & Safety and Sustainability, Delta-Simons provide support and advice within the property development, asset management, corporate and industrial markets. Operating from ten locations - Lincoln, Birmingham, Bristol, Dublin, Leeds, London, Manchester, Newcastle, Norwich and Nottingham - we employ over 100 environmental professionals, bringing experience from across the private consultancy and public sector markets.

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Executive Summary

Brief	Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Manchester City F.C. City in the Community Foundation (the "Client") to undertake a Geo-Environmental Assessment for Ladybarn Park, Burnage Lane, Withington, Manchester, M20 4XA (hereafter referred to as the "Site"). The proposed development of the Site comprises the construction of a new Multi Use Games Area (MUGA) and associated footpaths in the west of the Site within the existing park area. The purpose of this assessment is to identify the potential for land contamination issues to be present at the Site in the context of the proposed development, to support the planning application and to provide a geotechnical assessment.
Site Setting	The wider Site is currently in use as recreational grounds, with two small buildings present in the north eastern corner and north western corner of the Site, anticipated to be in use as storage and welfare facilities within the park. An electricity substation is present in the west of the Site. A wooded area of large trees and bushes with walkways throughout occupies the south. The Site is located within a predominantly residential area. Historically, the Site appears to have been a recreation ground since 1907, and prior to this appeared to have been of agricultural use. The subject Site for this investigation comprises an area in the north of the wider public park, and includes areas of well-maintained grass, limited areas of tarmacadam hardstanding in use as sports pitches, play areas and footpaths.
Ground Conditions	The current ground investigation recorded Topsoil underlain by a variable thickness of Made Ground.
Land Contamination Assessment	No elevated contaminant concentrations have been recorded. This is with the exception of asbestos, which has been identified on-Site within two Made Ground samples (out of 16 analysed). The Made Ground is considered suitable to be retained and re-used on Site, providing the material is beneath hardstanding or beneath a clean cover system within all soft landscaped areas. This material includes the current grassed areas and bowling green in the east of the Site, where the asbestos fibres were identified.
Recommendations	Based on the findings of this Report, the following recommendation for supplementary works is made: ▲ Preparation of a Remediation Strategy to mitigate risks to human health associated with the identified asbestos. Waste classification has not been undertaken as part of the scope of works. Should it be proposed to dispose of materials from the Site then specific additional investigations may be needed to classify the materials in accordance with current regulatory requirements.
This is intended as a summary only. Further detail and the limitations of the assessment are provided within the main body of the Report.	

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1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited (“Delta-Simons”) was instructed by Manchester City F.C. City in the Community Foundation (the “Client”) to prepare a Preliminary (Geo-Environmental) Risk Assessment for land at Ladybarn Park, Burnage Lane, Withington, Manchester, M20 4XA (the “Site”).

1.2 Context & Purpose

The aim of the investigation is to complete a geo-environmental assessment of the proposed development area, within the wider Site. The proposed development will only impact a small area in the north of the Site which is the subject Site for this report. The investigation will obtain information regarding ground conditions, from which risks to end-users, the environment and structures can be assessed, with mitigation measures outlined, if necessary.

It is understood from the drawing provided by the Client (included as Drawing 1) that the proposed development comprises the construction of a new Multi-Use Games Area (MUGA) and associated footpaths within the existing park.

1.3 Scope of Works

The scope of the investigation and layout of this report has been designed with consideration of ‘the Model Procedures for the Management of Land Contamination (CLR 11)’, the relevant requirements of the National Planning Policy Framework 2019 (NPPF) (paragraphs 170 & 178-180)¹ and the Planning Practice Guidance (Land Affected by Contamination)².

The project was carried out to an agreed brief as set out in Delta-Simons’ proposal dated 4 October 2019 (ref.18-1673.01). The scope of works is outlined in Section 3.2.1.

1.4 Existing Information

This report should be read in conjunction with the Delta-Simons Preliminary Geo-Environmental Risk Assessment Report, dated November 2019.

1.5 Limitations

The assessment is limited to the issues agreed within the proposal for the works. Notes on limitations associated with this assessment are provided in Appendix A. In addition, there are the following specific limitations that apply to this assessment:

- ▲ Hand pit positions were located in areas of soft landscaping. No positions were located beneath areas of hardstanding.

¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf

² <https://www.gov.uk/guidance/land-affected-by-contamination>

2.0 Site Details

2.1 Site Setting

A summary of the current Site status, environmental setting and key historical features is presented below. This has been summarised from the existing report(s) listed in Section 1.4 which should be consulted for further detail.

Co-ordinates	Centred approximately at National Grid Reference 385990, 392860	Elevation	41.0 m AOD
		Area	9.55 Ha
Site Location	The Site is located off the Kingsway (A34) within Withington 130 m south west of Mauldeth Road train station and approximately 5 km south of Manchester. A Site location map is provided as Figure 1. To the east of the Site is a Mauldeth Road Station and associated northern bound train line, a petrol filling station and commercial/light industrial use units. There are two primary schools surrounding the Site, one in the north and one in the south. Additionally, two vehicle repair shops are present to the north of the Site. The rest of the area surrounding the Site is predominately residential in all directions. The trainline, petrol filling station and vehicle repair shops are considered to represent potential off-Site sources of contamination.		
Current Site Use	The wider Site is currently in use as recreational grounds, with two small buildings present in the north eastern corner and north western corner of the Site, anticipated to be in use as storage and welfare facilities within the park. An electricity substation is present in the west of the Site. A wooded area of large trees and bushes with walkways throughout occupies the south. The subject Site for this investigation comprises an area in the north of the wider public park, and includes areas of well-maintained grass, limited areas of tarmac hardstanding in use as sports pitches, play areas and footpaths.		
Proposed Development	The proposed development of the Site comprises the construction of a new Multi-Use Games Area (MUGA) and associated footpaths in the north of the Site within the existing park and existing MUGA area. The proposed development plan is presented in Drawing 1. Identified human and built environment receptors (R) relevant to the proposed development comprise: ▲ Construction workers. ▲ Third parties during construction (adjacent Site users and adjacent residents). ▲ Future Site users and maintenance workers. ▲ The Built Environment (new buildings and infrastructure/utilities).		
Environmental Setting	The Site is indicated as being underlain by superficial deposits of Devensian Till (Clay) and subsequently underlain by bedrock of the Chester Formation (Sandstone). A fault is also noted to be present in the north east of the Site, trending from north to south. Given the current and former development, localised Made Ground is likely to be present overlying the Till. A shallow trial pit, dated 1988, located approximately 150 m to the south-west of the Site (ref. SJ89SE810) encountered Made Ground deposits to approximately 0.9 m, underlain by Clay to a maximum depth of 3.0 m bgl. A deeper borehole, dated 2003, approximately 400 m east of the Site (ref. SJ89SE796) encountered sandstone/ marl to a maximum depth of 80 m bgl.		

	The Environment Agency (EA) classify the superficial deposits (Devensian Till) as a Secondary Undifferentiated Aquifer and the underlying bedrock (Chester Formation) as a Principal Aquifer. The EA data indicates that the Site is not located within a designated groundwater Source Protection Zone. There are two licensed abstraction records from groundwater located within 1 km of the Site, neither of which are used as a potable water source. The closest is located approximately 560 m east of the Site for commercial use (laundry), registered to Cannon Hygiene Limited. The available BGS borehole information did not indicate the presence of any groundwater, however, groundwater is likely to be present within the underlying Chester Formation at depth. The nearest surface water feature is a drain located approximately 300 m to the north of the Site. According to the Envirocheck Report, there are no licensed abstraction records from surface water located within 500 m of the Site. The following controlled water/environmental receptors have been identified: ▲ A drain 300 m of the north of the Site; and ▲ The Principal bedrock Aquifer.
Key Historical Features	The Site appears to have been in agricultural use on the earliest reviewed mapping of 1848. From circa 1907 until the present, the majority of the wider Site has been in use as a recreational ground. From circa 1934, historical mapping indicates that the subject Site comprised a bowling green and tennis court, within the recreational ground. Key potential contamination sources would be: ▲ Made Ground, with the potential to contain Asbestos Containing Materials (ACMs). Potential sources of contamination within 250 m of the Site include: ▲ Electricity substation located to the west, within the wider Site area; ▲ Three Local Authority Pollution Prevention and Controls, regarding two waste oil burning controls for the garages approximately 80 m north of the Site and a Petrol Filling Station approximately 165 m to the north east; ▲ Seven entries for Potentially Infilled Land (water) regarding unknown filled ground between approximately 60 m and 250 m from the Site, to the south west, south east, north west and south; ▲ Twenty Contemporary Trade Directory Entries, including food distributors and processors, garage services, car dealerships, printers and petrol filling stations, between approximately 10 m and 225 m of the Site, to the north, east, north east and south east. The closest of which is regarding the food processors and distributors approximately 10 m to the north east; ▲ One Fuel Station Entry regarding a currently active petrol station approximately 165 m to the north east. ▲ Seven Commercial Services regarding vehicle repair and servicing, vehicle cleaning services and the petrol station, between approximately 60 m and 165 m to the north and east of the Site; ▲ One Manufacturing and Production regarding an unspecified works or factory approximately 95 m east of the Site; and

	▲ Five Public Infrastructure entries regarding railway stations and petrol stations between approximately 125 m and 170 m to the north east and north west of the Site.
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2.2 Preliminary Conceptual Site Model

A summary of the preliminary Conceptual Site Model is presented below.

Source(s)	Potential Contaminants of Concern (CoC)	Pathway(s)	Receptor(s)	Preliminary Risk Rating
Potential localised on-Site Made Ground Deposits	Asbestos, heavy metals, PAHs, hazardous ground gases.	P1, P2, P3, P4, P5	R1, R2, R3, R4, R5, R6	Low Risk
Electricity substation in wider Site	PCBs	P1	R1, R2, R3	Low Risk
Railway adjacent to wider Site	Heavy metals, PAHs, hazardous ground gases.	P1, P2, P3, P4	R1, R2, R3, R4, R5	Low Risk
Off-Site Petrol Filling Station	Petroleum hydrocarbons.	P1, P2, P3, P4	R1, R2, R3, R4, R5	Low Risk
Off-Site Infilled pond	Hazardous ground gases.	P1, P2, P3, P4	R1, R2, R3, R4, R5	Low Risk
Pathways: ▲ P1 - Direct contact, ingestion or inhalation of soil bound contaminants / dust during or following redevelopment. ▲ P2 - Inhalation of organic vapours associated with contamination. ▲ P3 - Migration of ground gas / vapours into on-site buildings causing asphyxiation or risk of explosion. ▲ P4 - Leaching of contamination into groundwater followed by migration of groundwater to the wider groundwater environment or discharge to surface waters. ▲ P5 - Direct contact between aggressive ground conditions and new infrastructure. Receptors: ▲ R1 - Construction workers. ▲ R2 - Third parties during construction (adjacent Site users and adjacent residents). ▲ R3 - Future Site users and maintenance workers. ▲ R4 - The small water courses approximately 300 m north of the Site. ▲ R5 - The underlying aquifers. ▲ R6 - The Built Environment (new buildings and infrastructure / utilities).				

Risk ratings are based on the classifications given in Appendix G.

3.0 Site Investigation

3.1 Intrusive Investigation

Delta-Simons carried out intrusive investigation work on 6th November 2019 to assess the potential linkages identified in the outline conceptual model (see Section 2.2 above).

3.1.1 Health & Safety Considerations

A utility survey was undertaken by a specialist contractor and the location of hand pits were placed at least 5 m away from any known services.

An initial assessment of the Site identified a Low risk in relation to Unexploded Ordnance (UXO) and therefore no specific precautionary measures were required for the works.

Future Contractors should undertake their own assessment of UXO risk in relation to their specific proposed scope of works.

3.2 Scope of Ground Investigation and Rationale

3.2.1 Scope

The ground investigation comprised the following items:

- ▲ One day of hand pitting by two Delta-Simons Geo-Environmental engineers for 8 hand pitting positions (HP1 – HP8). All intrusive locations were logged in accordance with BS5930:2015 Code of Practice for Site Investigations.
- ▲ Retrieval of 14 soil samples (approximately two per location where possible) within the top 600mm. Soil samples were obtained from areas of soft landscaping proposed to be retained within the development.
- ▲ Submission of approximately two samples per location for laboratory chemical analysis, comprising a range of common contaminants including metals, asbestos screen, asbestos quantification where required, PAHs and TPH.
- ▲ Provision of a short form factual and interpretative report (one draft and one final issue) incorporating a generic quantitative risk assessment.

3.2.2 Rationale

Location	Rationale	Key Contaminants of Concern
HP1-3 and HP7	Targeting across the subject Site	Asbestos, heavy metals, TPHs, PAHs.
HP 4 and 6	Targeting the area that is proposed to be a bedded area near the MUGA.	Asbestos, heavy metals, TPHs, PAHs.
HP 5	Targeting potential historic building footprint	Asbestos, heavy metals, TPHs, PAHs.
HP 8	Targeting potential historic building footprint	Asbestos, heavy metals, TPHs, PAHs.

3.3 Ground Investigation Factual Data

The exploratory holes were located using a handheld GPS unit with an accuracy of approximately +/- 5m.

Delta-Simons hand pit logs are presented as Appendix B.

3.4 In-Situ Sampling

Soil sampling comprised disturbed tub and jar samples as detailed on the borehole logs.

3.5 Environmental Sampling, In-Situ Testing and Laboratory Analysis

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite. Samples were stored in accordance with Delta-Simons' quality procedures to maintain sample integrity and preservation and to minimise the chance of cross contamination. Records of the samples taken as part of the site investigation works, including their depths and location, are included within the exploratory hole records in Appendix B.

Samples analysed for environmental purposes were placed in cool boxes on site and transported to the laboratory for analysis on completion of the site investigation works/groundwater sampling visit.

The rationale for chemical analysis is presented in the table below and the results of the chemical laboratory testing are included in Appendix C.

Analytes	No. of Soil Samples Tested	Rationale
Asbestos screen	16	Common potential contaminant – Analysed in all samples.
Asbestos quantification	2	Analysed in two samples where asbestos fibres were detected.
pH, As, Cd, Cu, Cr, Hg, Pb, Ni, Zn, speciated Polycyclic Aromatic Hydrocarbons (PAH)	16	Common potential contaminant - Analysed in all samples.
Total Petroleum Hydrocarbons, Criteria Working Group Method (TPHCWG), Benzene, Toluene, Ethylbenzene and Xylene (BTEX)	16	Common potential contaminant - Analysed in all samples.

4.0 Ground Summary

4.1 Introduction

The sections below summarise the ground and groundwater conditions encountered during the site investigation.

4.2 Ground Model

A summary of the observed ground conditions at the Site is provided below.

Summary of Observed Ground Conditions				
Strata	Typical Strata Description	Depth Range of Strata Base (m)	Maximum Proven Thickness (m)	Comments
Topsoil	Grass over brown clayey fine to medium SAND with abundant roots.	0.15-0.2	0.2	Identified in all exploratory holes.
Made Ground	Predominantly: Orangish brown fine to medium SAND; Dark brown very gravelly fine to medium SAND. Gravel is subangular to subrounded fine to coarse of brick, asphalt and natural lithologies; Soft brown to dark brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to coarse of brick, asphalt, sandstone, clinker, ceramic, glass and natural lithologies. Abundant to occasional rootlets.	0.6 (unproven)	0.45	Identified in all exploratory holes.

Topsoil and Made Ground, comprising gravel, sand and clay was encountered in all exploratory holes.

Topsoil was identified to a maximum depth of 0.2 m bgl in HP2 and HP7 in the east of the Site. The composition of the Topsoil was predominately grass over sand with abundant roots.

Made Ground was identified to a maximum depth of 0.6 m bgl in all exploratory hole locations on the Site. The composition of the Made Ground varied with a combination of cohesive and granular soil with brick, asphalt, sandstone, clinker, ceramic, glass, and natural lithologies.

4.3 Visual and Olfactory Evidence of Contamination - Soils

No visual or olfactory evidence of potential gross contamination was observed during the investigation.

4.4 Groundwater

4.4.1 Strikes During Investigations

Groundwater strikes recorded as excavation progressed during the site investigation range from 0.55 to 0.6 m bgl. The groundwater strikes during hand pitting are summarised below.

Exploratory Hole	Water strike during hand pitting (m bgl)	Stratum	Comment
HP1	0.55	Made Ground	Water strike encountered within clay horizon of Made Ground.
HP2	0.55	Made Ground	Water strike encountered within clay horizon of Made Ground.
HP5	0.60	Made Ground	Water strike encountered within clay horizon of Made Ground.

4.5 Visual and Olfactory Evidence of Contamination - Groundwater

No visual or olfactory evidence of potential / gross contamination was observed during the investigation.

5.0 Generic Quantitative Risk Assessment

5.1 Introduction

The presence of hazardous substances in or on a site is generally only of concern if an actual or potential unacceptable risk exists. Legislation and guidance on the assessment of contaminated sites, consistent with UK best practice, acknowledges the need for a tiered risk-based approach. A Preliminary Risk Assessment is presented in Section 2.2. This section represents a Generic Quantitative Risk Assessment (GQRA) being a comparison of site contaminant levels against Generic Assessment Criteria.

5.2 Human Health GQRA

The assessment of risks in relation to human health has been undertaken using Generic Assessment Criteria (GAC) as detailed within the appropriate tables. Risks from soil, groundwater and Non-Aqueous Phase Liquids (NAPL) have been considered. The GAC are predominantly based on long term (chronic) risk to health. However, in the limited circumstances where short-term (acute) risks are more pronounced, these Generic Assessment Criteria (GAC) have been utilised to ensure a thorough and conservative initial assessment is undertaken.

The end use scenario adopted for the assessment is a Public Open Space end use, considered appropriate based on the proposed recreational development.

5.2.1 Risks from Soil Sources

Based on the proposed use of the Site for recreational use, the soil chemical data has been compared against a public open space end use GAC for 1% soil organic matter (SOM) content.

Two Made Ground soil samples (out of 16 analysed in total) recorded the presence of asbestos. In HP1 between 0.25 m and 0.35 m the asbestos comprised loose fibres of chrysotile. In HP7 between 0.25 m and 0.4 m bgl loose fibres of chrysotile and amosite were detected.

The asbestos quantification determined that the total percentage of asbestos detected within HP1 (0.25-0.35 m bgl) was <0.001 (below limit of detection) and within HP7 (0.25- 0.40 m bgl) was 0.002%.

No further contaminant concentrations reported in soil exceeded the relevant GAC.

The primary exposure pathways considered in the risk assessment are as follows:

- ▲ Ingestion of soil and indoor dust and/or oral background exposure;
- ▲ Inhalation of dust (background and indoor); and
- ▲ Direct dermal contact.

The soil analysis results are considered further in the Conceptual Site Model (CSM) presented in Section 8.0 with regard to potential pollutant linkages.

5.2.2 Risks from Groundwater Sources

No groundwater samples were taken during the Site works. Given the proposed end use, groundwater is not considered to pose a risk to end uses.

5.2.3 Risks from Non-Aqueous Phase Liquids (NAPL)

No observations of NAPL were made within the soils observed during the hand pitting works. No exceedances of hydrocarbons were observed within the soil samples. On this basis, there is no evidence of NAPL being present on the Site.

5.3 Waste Classification

This investigation was not undertaken to classify materials in terms of waste disposal. Where waste disposal is required, then a specific and detailed investigation in accordance with Environment Agency Guidance WM3 would typically be required.

Should soils be required to be disposed of from Site, the results of the chemical analysis should be forwarded to the proposed receiving facility who will determine what criteria they will accept the waste from Site as. Further investigation in addition to specific waste acceptance criteria (WAC) analysis may be required.

Given that asbestos has been identified within the shallow Made Ground soil samples, this will have cost implications on waste disposal (material would not typically be accepted as Inert), if off-Site disposal is required.

6.0 Revised Conceptual Site Model

A revised CSM is presented in the table below, and has been formulated taking into account all of the available data from the Delta-Simons intrusive investigation, suitable for a Site with a proposed public open space end use.

Revised Conceptual Site Model				
Source	Pathways	Receptors	Confirmed Risk?	Mitigation
Asbestos in the shallow Made Ground	Direct contact Ingestion and/or inhalation of soil/dust	Human health – future residents	Yes	The Made Ground is considered suitable to be re-used on Site providing the pollutant linkage is broken, by using the material beneath hardstanding or beneath a clean cover system within all soft landscaped areas. This material includes the current grassed areas and bowling green, in the east of the Site, where the asbestos fibres were identified.
	Direct contact Ingestion and/or inhalation of soil/dust	Human health – construction workers	Yes	The short term risk to construction workers during development could be mitigated by use of Personal Protective Equipment (PPE) and provision of suitable welfare facilities.

7.0 Conclusions & Recommendations

7.1 Contamination Issues

The investigation has been carried out in order to provide information on the quality of the soil beneath the Site in the context of land contamination for a public open space end use. The assessment is being completed prior to the proposed redevelopment of the Site.

7.1.1 Human Health

Asbestos has been identified on-Site within two Made Ground samples out of the 16 analysed. The Made Ground identified, which includes the current grassed areas and bowling green in the east of the Site, is considered suitable to re-used on Site providing the source-pathway-receptor linkage is broken. This could be achieved by the following mitigation measures:

1. **Installation of an additional clean cover layer:** An additional layer of certified clean soil, surfaced with turf, could be installed over the existing Site surface to break the pathway. It is anticipated that an additional 300mm of material would suffice, however, the thickness required should be confirmed following consultation with a horticulturalist to ensure a sufficient growing medium thickness is provided.
2. **Retention within a landscaped bund and clean cover layer:** The Made Ground identified on Site could be scraped and retained on site within a landscaped bund, and surfaced with a certified clean cover layer to break the pathway. However, it should be noted that this would need to be agreed with the local council at planning stage, to ensure the certainty of use for the material within the bund, and the works would need to be completed under a Materials Management Plan.
3. **Cover with hardstanding:** The Made Ground identified on Site could be covered with hardstanding rather than with soft landscaping as part of the redevelopment. However, it is understood that a soft landscaped area is required as part of the redevelopment works.

If the source-pathway-receptor linkage cannot be broken while retaining the material on-Site, off-Site disposal may be required.

Groundworkers and sub-surface maintenance workers should be made aware of the possibility of encountering contaminated soils through toolbox talks and in particular the potential presence of asbestos and an appropriate protocol to mitigate exposure of the workforce and general public should be in place. The Contractor will need to prepare a risk assessment which identifies a safe system of work to handle the asbestos containing soils which is likely to include asbestos awareness training, a protocol for unexpected finds (should gross asbestos material be identified) as well as safe working procedures such as damping down of excavations and stockpiles in line with general dust generation mitigation. The risk assessment will need to identify the appropriate levels of PPE and/or respiratory protective equipment (RPE) required. This recommendation should be captured in Site health and safety documentation and in maintenance plans.

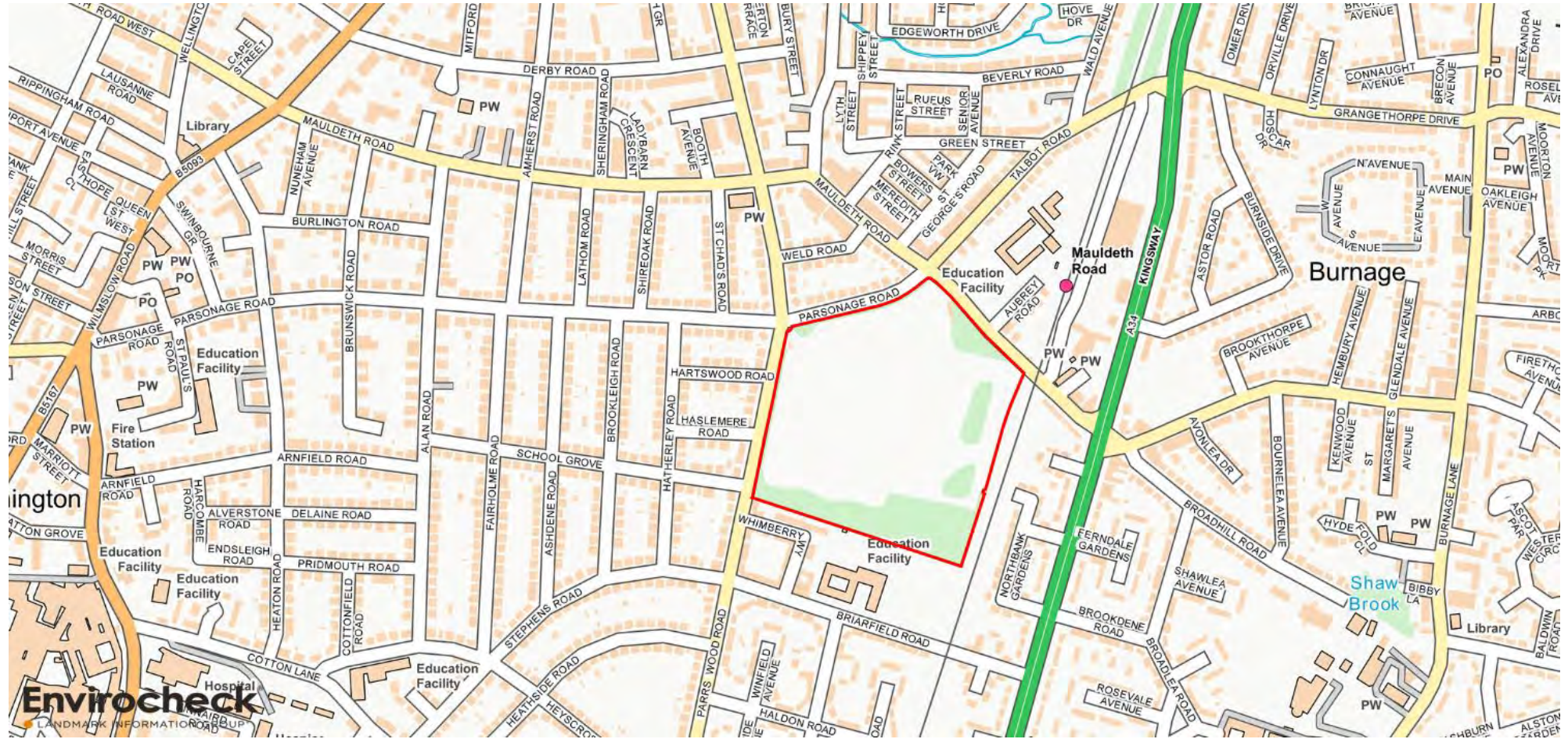
7.2 Recommendations for Supplementary Work

Based on the findings of this Report, the following recommendation for supplementary works is made;

- ▲ Preparation of a Remediation Strategy to mitigate risks to human health from the identified asbestos.

Waste classification has not been undertaken as part of the scope of works; should it be proposed to dispose of materials from the Site then specific additional investigations may be needed to classify the materials in accordance with current regulatory requirements.

Figure 1 – Site Location Plan



TITLE:

Site Location Plan

Ladybarn Park, Burnage Lane, Withington, Manchester,
M20 4XA

DRAWN BY:
MB

SCALE:
NTS

PROJECT NO.:
18-1673.04

CHECKED BY:
MB

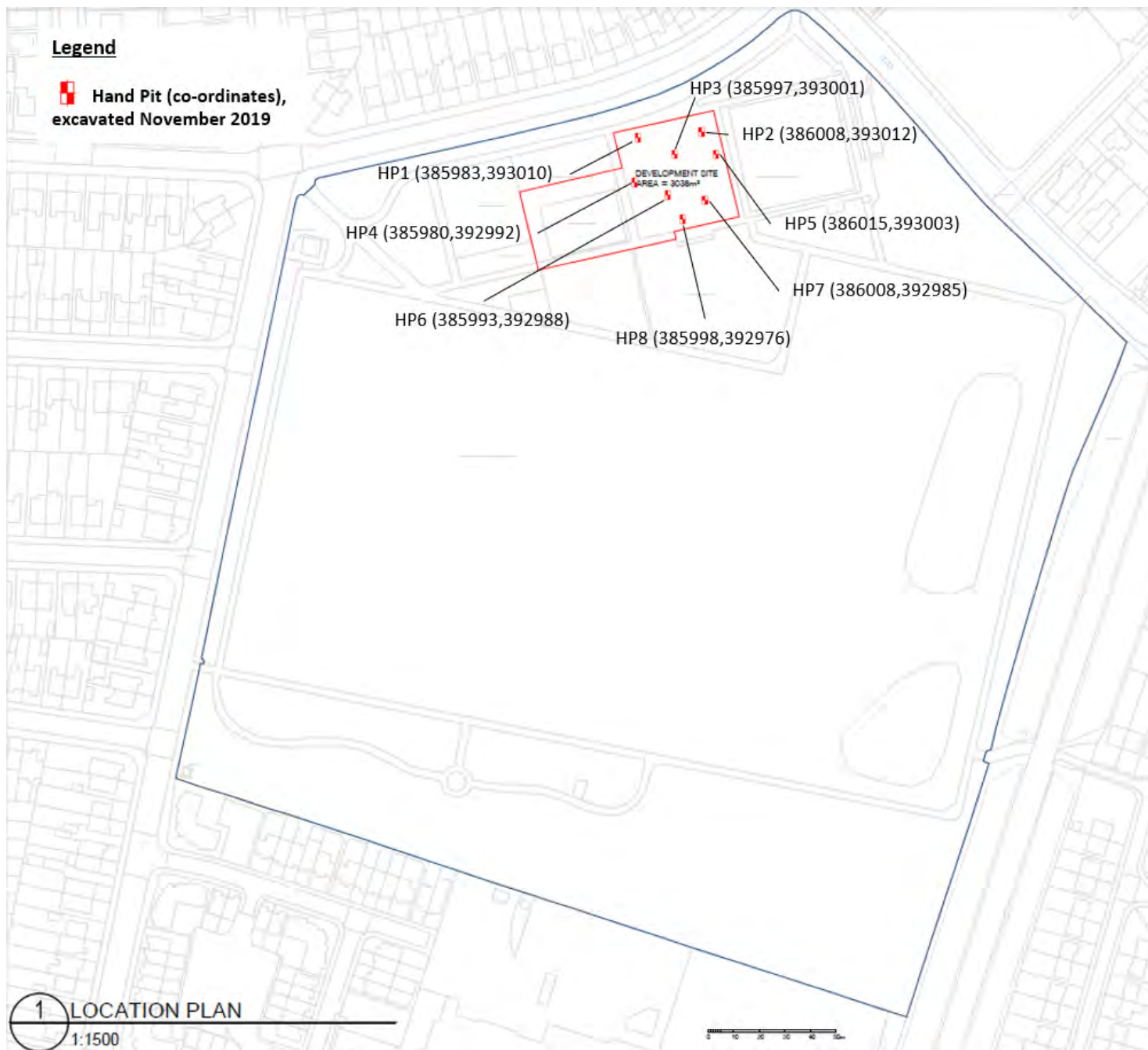
REVISION:
01

FIGURE NO.:

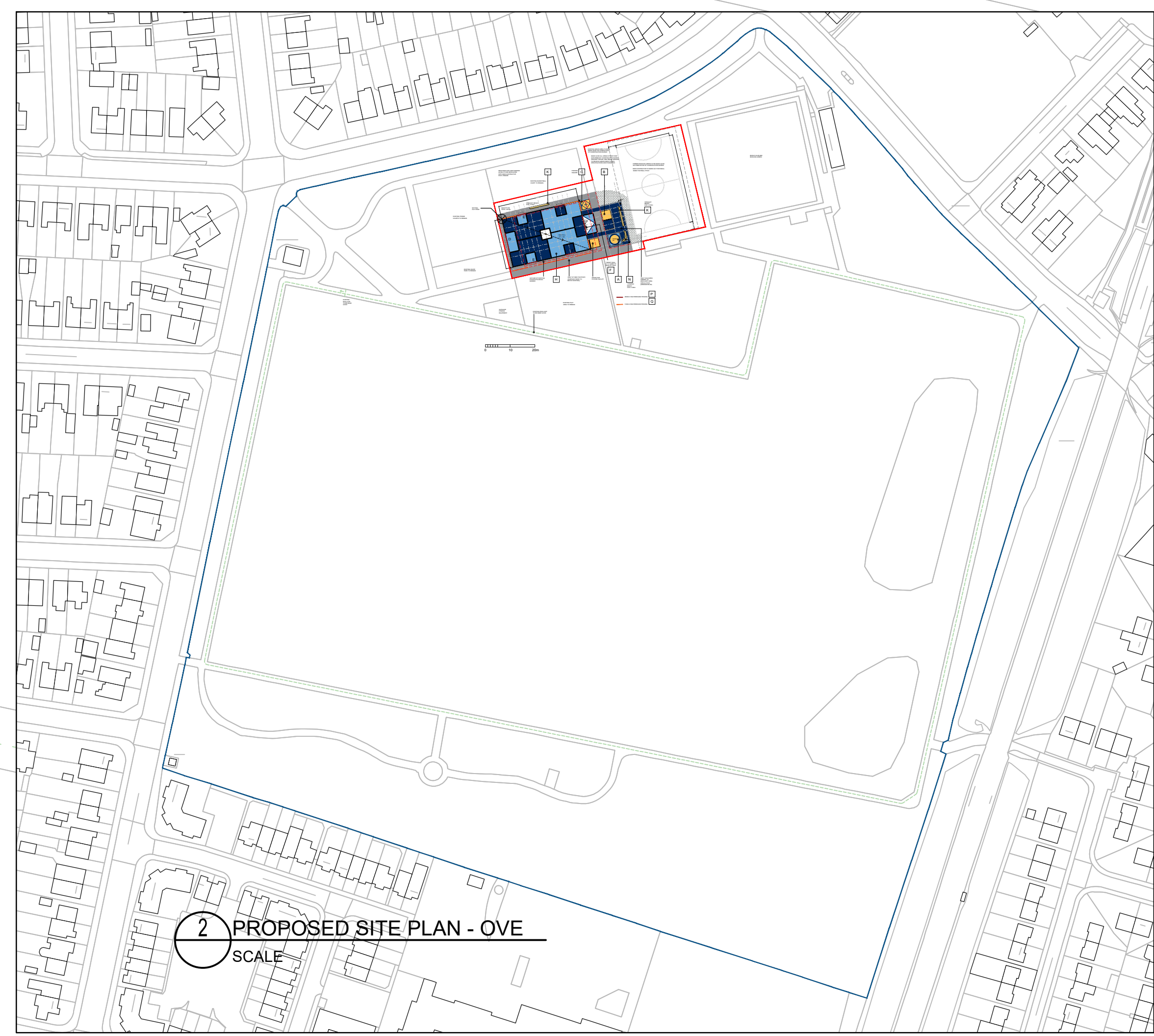
DATE:
20/11/2019

1

Figure 2 – Exploratory Hole Location Plan



Drawing 1 – Proposed Development Plan



EQUIPMENT KEY		(DRAWING REFERENCE)
A.	4m PANNA	(13034-DB3-BOX-XX-DR-A-90201)
B.	FOOTBALL TENNIS	(13034-DB3-BOX-XX-DR-A-90202)
C.	PASSING SQUARE	(13034-DB3-BOX-XX-DR-A-90203)
D.	STD LARGE GOAL	(13034-DB3-BOX-XX-DR-A-90204)
E.	STD CROSS-PLAY GOAL	(13034-DB3-BOX-XX-DR-A-90205)
F.	LARGE GOAL + 1v1	(13034-DB3-BOX-XX-DR-A-90206)
G.	MAIN PITCH S/O (B01)	(13034-DB3-BOX-XX-DR-A-90207)
H.	MAIN PITCH S/O (B02)	(13034-DB3-BOX-XX-DR-A-90208)
I.	LARGE GOAL + 1v1 + BASKETBALL	(13034-DB3-BOX-XX-DR-A-90214)
J.	RUN-LOOP MARKERS	(13034-DB3-BOX-XX-DR-A-90209)
K.	LINEAR BENCH	(13034-DB3-BOX-XX-DR-A-90210)
L.	CURVED BENCH	(13034-DB3-BOX-XX-DR-A-90211)
M.	1v1 + BASKETBALL	(13034-DB3-BOX-XX-DR-A-90212)
N.	J-SHAPED BENCH	(13034-DB3-BOX-XX-DR-A-90213)
O.	TYPICAL-DETAILS SHEET	(13034-DB3-BOX-XX-DR-A-90217)
P.	FULL HEIGHT FENCE DETAIL	(13034-DB3-BOX-XX-DR-A-90215)
Q.	MINI FENCE DETAIL	(13034-DB3-BOX-XX-DR-A-90216)

NOTE
STRIKE-THROUGH REPRESENTS A DRAWING THAT IS NOT BEING INCLUDED AS PART OF THE INITIAL TENDER PACKAGE

SPECIFICATION
FOR PERFORMANCE SPECIFICATION PLEASE REFER TO DOCUMENT:
13034-DB3-BOX-XX-SP-A-00002

1 PROPOSED SITE PLAN
1:200

2 PROPOSED SITE PLAN - OVE
SCALE

P3	10/10/19	ISSUED FOR TENDER	TL	TL
P2	27/08/19	AMENDED LAYOUT TO SUIT CLIENT COMMENTS	TL	TL
P1	20/08/19	AMENDED PROPOSED SITE LAYOUT IN LINE WITH RECENT COMMUNICATIONS	TL	TL
REV	DATE	DESCRIPTION	DR	CH

TENDER

darnton₃
ARCHITECTURE
LEEDS

The Coach House, Monk Fryston Hall, Monk Fryston, LS25 5DU.
T: 01977 681 001 www.darntonb3.com

CLIENT CITY IN THE COMMUNITY	
PROJECT PLAY ZONE PILOTS LADYBARN PARK	
TITLE PROPOSED SITE PLAN	
CREATION DATE 20/08/19	SCALE @ A1 1:200
SHEET NO. 13034-DB3-B02-XX-DR-A-90103	DRN TL
PROJECT NO/ORG/NATOR/ZONE/LEVEL/TYP/ROLE/NUMBER	CHK TL
© COPYRIGHT. ALL RIGHTS RESERVED. USED DRAWING MUST BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND ANY DISCREPANCIES MUST BE REPORTED TO DARNTONB3 IMMEDIATELY. THE DRAWING OR INFORMATION MUST NOT BE USED FOR CONSTRUCTION UNLESS EXPRESSLY ISSUED. DO NOT SCALE FROM THIS DRAWING. WORK ONLY TO THE PRINTED DIMENSIONS.	STATUS S4
REVISION	REVISION
P3	P3

Appendix A – Limitations

Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Due to the evolving regulatory climate specific to Per Fluoro Alkyl Substances (PFAS), the scope of works is not intended to be conclusive as it relates to the identification of any PFAS related issues. While Delta-Simons may advise its Client if Delta-Simons becomes aware of the use of PFAS at the subject property, Delta-Simons makes no representation nor accepts any liability that any or all PFAS issues have been identified and/or revealed to its client through its scope of work, as presented herein.

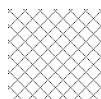
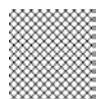
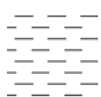
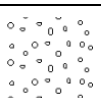
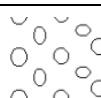
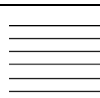
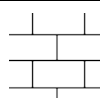
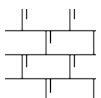
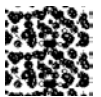
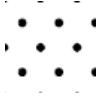
Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

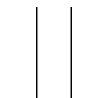
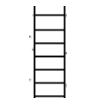
Appendix B – Borehole Logs

KEY TO BOREHOLE AND TRIAL PIT LOGS

MATERIAL LEGENDS

	Topsoil		Made Ground		Bituminous Material
	Concrete		Clay		Silt
	Sand		Gravel		Peat
	Cobbles		Boulders		Mudstone
	Siltstone		Sandstone		Limestone
	Chalk		Coal		Breccia
	Conglomerate		Igneous		Metamorphic
	Pyroclastic (volcanic ash)		Gypsum		Shale
	Ironstone		Bedrock (Unidentified)		Void

INSTALLATION/BACKFILL LEGENDS

	Sand		Gravel		Bentonite/Grout
	Arisings		Concrete		Plain Pipe
	Slotted Pipe				

Legend symbols in general accordance with BS 5930:1999+A2:2010 and standard industry practice.

KEY TO BOREHOLE AND TRIAL PIT LOGS

SAMPLE TYPES

ACM	Asbestos Containing Material Sample
B	Bulk Disturbed Sample
BLK	Block Sample
C	Core Sample
CBR	Undisturbed Sample for California Bearing Ratio Test – 154mm diameter
D	Disturbed Sample - Tub
ES	Soil Sample for Environmental Testing
EW	Water Sample for Environmental Testing
G	Gas Sample
U	Undisturbed Driven Tube Sample – 70/102mm diameter, 450mm long
W	Water Sample

TEST TYPES

CPT	Cone Penetrometer Test (kN/m ²)
FID	Flame Ionisation Detector Test (ppm)
HV	In-Situ Hand Sheer Vane Test (kN/m ²)
PID	Photoionisation Detector Test (ppm)
SPT (S)	Standard Penetration Test – Split Spoon Sampler
SPT (C)	Standard Penetration Test – Solid 60 Degree Cone

CORE DETAILS

If	Fracture Spacing (mm) – Minimum, Average, Maximum
NI	Non-Intact where >25 fracture spacings per metre
TCR	Total Core Recovery (%)
SCR	Solid Core Recovery (%)
RQD	Rock Quality Designation (%)
AF	Air Flush Return (%)
WF	Water Flush Return (%)

WATER COLUMN DETAILS

	Water Strike
	Water Level

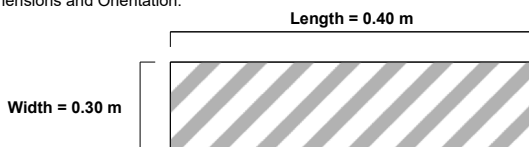
 Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com		Project No: 18-1673.04a		Hole ID: HP1		Page: 1 of 1		
Hand Dug Trial Pit Log		Date: 06/11/2019		Project: Ladybarn Park, Manchester				
				Client: Manchester City F.C. City in the Community Foundation				
Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details		Test Details	
					Depth (m)	Type Ref	Depth (m)	Results
MADE GROUND: Grass over brown slightly clayey fine to medium SAND with abundant roots. [TOPSOIL].		0.05	37.95	0.55	0.05 - 0.15	ES	0.10	PID=0ppmv
		0.19	37.81		0.20 - 0.40	ES	0.30	PID=0ppmv
MADE GROUND: Brown slightly clayey slightly gravelly fine to medium SAND. Gravel is subangular to subrounded fine to medium of asphalt, brick and natural lithologies with abundant rootlets. [TOPSOIL].		0.21	37.79		0.40 - 0.60	ES	0.50	PID=0ppmv
		0.40	37.60					
MADE GROUND: Orangish brown fine to medium SAND.		0.60	37.40					
MADE GROUND: Dark brown very gravelly fine to medium SAND. Gravel is subangular to subrounded fine to coarse of brick, clinker, asphalt, sandstone and natural lithologies								
MADE GROUND: Dark brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to coarse of brick, asphalt, sandstone, clinker and ceramic. Occasional rootlets.								
Hand pit complete at 0.60 m bgl.								
Dimensions and Orientation: Length = 0.40 m Width = 0.30 m  Bearing: 0° Inclination: 0								
Remarks: 1. Logged in general accordance with BS 5930:2015. 2. Hand excavated between ground level and 0.6 m bgl. Hole terminated in MADE GROUND. 3. Perched groundwater was encountered at 0.55 m bgl during hand pitting. 4. No visual or olfactory evidence of contamination was encountered. 5. Hand pit backfilled with arisings in reverse order of excavation. 6. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002.								
Coordinates: E385983.00 N393010.00		Elevation (mAOD): 38.00		Excavated By: Delta Simons		Plant Used: Hand Tools		Logged: JR
						Checked: LM		Approved:
								Scale: 1:30

Hand Dug Trial Pit Log

Date: **06/11/2019** Client: **Manchester City F.C. City in the Community Foundation**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details		Test Details	
					Depth (m)	Type Ref	Depth (m)	Results
MADE GROUND: Grass over brown clayey fine to medium SAND with abundant roots. [TOPSOIL].		0.05	38.95		0.25 - 0.40 0.40 - 0.60	ES ES	0.42 0.50	PID=0ppmv PID=0ppmv
		0.20	38.80					
MADE GROUND: Brown slightly clayey fine to medium SAND with frequent rootlets. [TOPSOIL].		0.25	38.75					
		0.40	38.60					
MADE GROUND: Orangish brown fine to medium SAND.		0.60	38.40					
MADE GROUND: Dark brown slightly clayey very gravelly fine to medium SAND. Gravel is subangular to subrounded fine to medium of asphalt, sandstone, brick and natural lithologies. Occasional sandstone cobbles. Frequent rootlets.								
MADE GROUND: Soft dark brown slightly sandy gravelly CLAY. Sand is fine. Gravel is subangular to subrounded fine to medium of sandstone, glass, brick, asphalt and natural lithologies. Frequent rootlets.								
Hand pit complete at 0.60 m bgl.								

Dimensions and Orientation:



Bearing:

0°

Inclination:

0

Remarks:

1. Logged in general accordance with BS 5930:2015.
2. Hand excavated between ground level and 0.6 m bgl. Hole terminated in MADE GROUND.
3. Perched groundwater was encountered at 0.55 m bgl during hand pitting.
4. No visual or olfactory evidence of contamination was encountered.
5. Hand pit backfilled with arisings in reverse order of excavation.
6. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002.

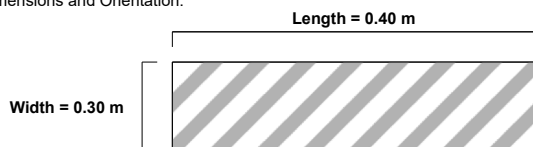
Hand Dug Trial Pit Log

Date: **06/11/2019** Client: **Manchester City F.C. City in the Community Foundation**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details		Test Details	
					Depth (m)	Type Ref	Depth (m)	Results
MADE GROUND: Grass over brown clayey fine to medium SAND with abundant roots. [TOPSOIL].		0.05	36.95		0.05 - 0.15	ES	0.08	PID=0ppmv
MADE GROUND: Brown slightly clayey fine to medium SAND with abundant rootlets. [TOPSOIL].		0.15	36.85		0.20 - 0.40	ES	0.30	PID=0ppmv
MADE GROUND: Orangish brown fine to medium SAND.		0.20	36.80		0.40 - 0.60	ES	0.50	PID=0ppmv
MADE GROUND: Dark brown very gravelly fine to medium SAND. Gravel is subangular to subrounded fine to coarse of brick, asphalt and natural lithologies. Frequent rootlets.		0.40	36.60					
MADE GROUND: Soft brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of brick, asphalt, clinker, sandstone and natural lithologies. Occasional rootlets.		0.60	36.40					

Hand pit complete at 0.60 m bgl.

Dimensions and Orientation:



Bearing:

0°

Inclination:

0

Remarks:

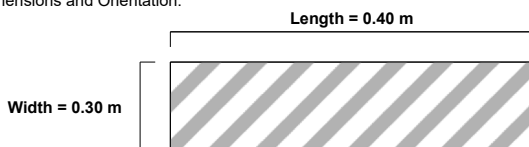
1. Logged in general accordance with BS 5930:2015.
2. Hand excavated between ground level and 0.6 m bgl. Hole terminated in MADE GROUND.
3. Groundwater was not encountered during hand pitting.
4. No visual or olfactory evidence of contamination was encountered.
5. Hand pit backfilled with arisings in reverse order of excavation.
6. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002.

Hand Dug Trial Pit Log

Date: **06/11/2019** Client: **Manchester City F.C. City in the Community Foundation**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details			Test Details	
					Depth (m)	Type	Ref	Depth (m)	Results
MADE GROUND: Grass over brown slightly clayey fine to medium SAND with abundant roots. [TOPSOIL].		0.05	36.95						
		0.19	36.81						
MADE GROUND: Brown slightly clayey slightly gravelly fine to medium SAND. Gravel is subangular to subrounded fine to medium of asphalt, brick and natural lithologies with abundant rootlets. [TOPSOIL].		0.21	36.79		0.21 - 0.40	ES		0.30	PID=0ppmv
		0.40	36.60		0.40 - 0.60	ES		0.50	PID=0ppmv
MADE GROUND: Orangish brown fine to medium SAND.		0.60	36.40						
MADE GROUND: Dark brown very gravelly fine to medium SAND. Gravel is subangular to subrounded fine to coarse of brick, clinker, asphalt, sandstone and natural lithologies. Frequent rootlets.									
MADE GROUND: Dark brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subrounded fine to coarse of brick, asphalt, sandstone, clinker and ceramic. Occasional rootlets.									
Hand pit complete at 0.60 m bgl.									

Dimensions and Orientation:



Bearing:

0°

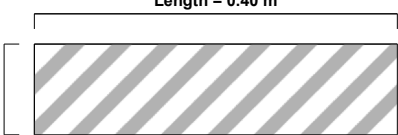
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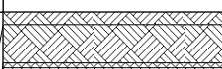
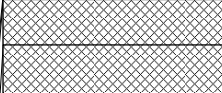
1. Logged in general accordance with BS 5930:2015.
2. Hand excavated between ground level and 0.6 m bgl. Hole terminated in MADE GROUND.
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4. No visual or olfactory evidence of contamination was encountered.
5. Hand pit backfilled with arisings in reverse order of excavation.
6. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002.



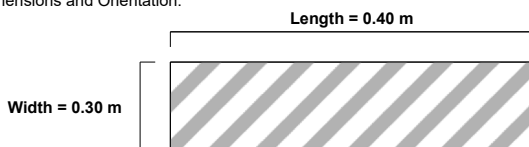
 Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com		Project No: 18-1673.04a		Hole ID: HP6		Page: 1 of 1		
Hand Dug Trial Pit Log		Date: 06/11/2019		Project: Ladybarn Park, Manchester				
				Client: Manchester City F.C. City in the Community Foundation				
Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details		Test Details	
					Depth (m)	Type Ref	Depth (m)	Results
MADE GROUND: Grass over brown clayey fine to medium SAND with abundant roots. [TOPSOIL].		0.05	37.95					
		0.15	37.85					
MADE GROUND: Brown slightly gravelly clayey fine to medium of natural lithologies and asphalt. Frequent rootlets. [TOPSOIL].		0.20	37.80		0.20 - 0.40	ES		PID=0ppmv
MADE GROUND: Orangish brown fine to medium SAND.		0.40	37.60		0.40 - 0.60	ES	0.30	PID=0ppmv
MADE GROUND: Dark brown very gravelly fine to medium SAND. Gravel is subangular to subrounded fine to coarse of brick, sandstone, clinker and natural lithologies. Frequent rootlets.		0.60	37.40				0.50	PID=0ppmv
MADE GROUND: Soft brown mottled orange slightly sandy gravelly CLAY. Sand is fine. Gravel is subangular to subrounded fine to medium of clinker, sandstone, asphalt and brick. Occasional rootlets.								
Hand pit complete at 0.60 m bgl.								
Dimensions and Orientation: 		Bearing: 0° Inclination: 0		Remarks: 1. Logged in general accordance with BS 5930:2015. 2. Hand excavated between ground level and 0.6 m bgl. Hole terminated in MADE GROUND. 3. Groundwater was not encountered during hand pitting. 4. No visual or olfactory evidence of contamination was encountered. 5. Hand pit backfilled with arisings in reverse order of excavation. 6. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002.				
Coordinates: E385993.00 N392988.00	Elevation (mAOD): 38.00	Excavated By: Delta Simons		Plant Used: Hand Tools	Logged: JR	Checked: LM	Approved:	Scale: 1:30

Hand Dug Trial Pit Log

Date: **06/11/2019** Client: **Manchester City F.C. City in the Community Foundation**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details			Test Details	
					Depth (m)	Type	Ref	Depth (m)	Results
MADE GROUND: Grass over brown to dark brown very clayey fine sand with fine rootlets. [TOPSOIL].		0.05	37.95		0.22 - 0.40 0.40 - 0.60	ES		0.31	PID=0ppmv
MADE GROUND: Brown clayey slightly gravelly fine to medium SAND. Gravel is angular to subrounded fine of natural lithologies and rare clinker. [TOPSOIL].		0.20	37.80						
MADE GROUND: Brown to light brown fine to medium SAND.		0.22	37.78						
MADE GROUND: Dark brown to black slightly clayey gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of natural lithologies, clinker and rare red brick fragments. Occasional cobbles of clinker.		0.40	37.60						
MADE GROUND: Soft brown to dark brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to rounded fine to coarse of sandstone, clinker and rare brick fragments.		0.60	37.40					0.50	PID=0ppmv
Hand pit complete at 0.60 m bgl.									

Dimensions and Orientation:



Bearing:

0°

Inclination:

0

Remarks:

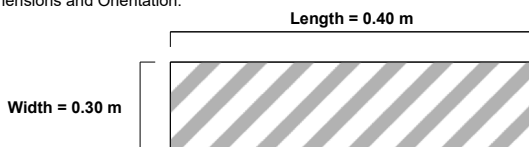
1. Logged in general accordance with BS 5930:2015.
2. Hand excavated between ground level and 0.6 m bgl. Hole terminated in MADE GROUND.
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4. No visual or olfactory evidence of contamination was encountered.
5. Hand pit backfilled with arisings in reverse order of excavation.
6. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002.

Hand Dug Trial Pit Log

Date: **06/11/2019** Client: **Manchester City F.C. City in the Community Foundation**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details			Test Details	
					Depth (m)	Type	Ref	Depth (m)	Results
MADE GROUND: Grass over brown clayey fine SAND with abundant roots. [TOPSOIL].		0.05	37.95		0.30 - 0.40 0.40 - 0.60	ES		0.35	PID=0ppmv
MADE GROUND: Brown slightly clayey fine to medium SAND with abundant rootlets. [TOPSOIL].		0.19	37.81						
MADE GROUND: Orangish brown fine to medium SAND.		0.23	37.77						
MADE GROUND: Dark brown very gravelly fine to medium SAND. Gravel is angular to subrounded fine to coarse of brick, sandstone, clinker and asphalt. Frequent rootlets.		0.38	37.62						
MADE GROUND: Soft brown mottled orange slightly sandy gravelly CLAY. Sand is fine. Gravel is subangular to subrounded fine to medium of clinker, sandstone, asphalt and brick. Occasional rootlets.		0.60	37.40			ES		0.50	PID=0ppmv
Hand pit complete at 0.60 m bgl.									

Dimensions and Orientation:



Bearing:

0°

Inclination:

0

Remarks:

1. Logged in general accordance with BS 5930:2015.
2. Hand excavated between ground level and 0.6 m bgl. Hole terminated in MADE GROUND.
3. Groundwater was not encountered during hand pitting.
4. No visual or olfactory evidence of contamination was encountered.
5. Hand pit backfilled with arisings in reverse order of excavation.
6. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002.

Appendix C – Soil Chemical Analysis Results

**Mike Ohalloran**

Delta-Simons
Suite C1
Joseph's Well
Hanover Walk
Leeds
LS3 1AB

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

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

e: mike.ohalloran@deltasimons.com

Analytical Report Number : 19-71390

Replaces Analytical Report Number : 19-71390, issue no. 1

Project / Site name:	Ladybarn Park	Samples received on:	08/11/2019
Your job number:	18-1673.07	Samples instructed on:	12/11/2019
Your order number:	DS50944	Analysis completed by:	27/11/2019
Report Issue Number:	2	Report issued on:	27/11/2019
Samples Analysed:	16 soil samples		

Signed: Karolina Marek

Karolina Marek
Technical Reviewer (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.

Iss No 19-71390-2 Ladybarn Park 18-1673.07

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

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

Page 1 of 28



Analytical Report Number: 19-71390

Project / Site name: Ladybarn Park

Your Order No: DS50944

Lab Sample Number				1359470	1359471	1359472	1359473	1359474
Sample Reference				HP1	HP1	HP2	HP2	HP3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.05-0.15	0.25-0.35	0.25-0.40	0.40-0.60	0.20-0.40
Date Sampled				06/11/2019	06/11/2019	06/11/2019	06/11/2019	06/11/2019
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	%	N/A	NONE	13	14	15	22	15
Total mass of sample received	kg	0.001	NONE	0.88	0.77	0.76	1.0	0.86

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	5.3	5.6	5.8	6.3	6.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	31	75	89	41	130
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.016	0.037	0.045	0.021	0.065
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	15.5	37.4	44.7	20.5	65.4

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.21	0.27	0.22	0.77	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.37	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.32	< 0.05	0.39	0.75	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.55	< 0.05	0.25	0.59	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	4.2	1.1	2.7	6.9	1.4
Anthracene	mg/kg	0.05	MCERTS	0.76	0.17	0.34	1.2	0.21
Fluoranthene	mg/kg	0.05	MCERTS	4.7	1.5	3.6	8.1	1.5
Pyrene	mg/kg	0.05	MCERTS	4.4	1.4	3.7	8.2	1.5
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.1	0.69	1.5	4.6	0.85
Chrysene	mg/kg	0.05	MCERTS	2.7	1.3	2.3	4.4	0.83
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.6	0.76	1.6	3.0	0.69
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.2	0.30	0.63	2.3	0.20
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.7	0.63	1.4	2.7	0.50
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.64	0.28	0.55	1.1	0.19
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.0	0.39	0.84	1.6	0.31

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	26.4	8.75	20.1	46.1	8.27
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	33	68	36	48	37
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	23	21	25	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	66	110	79	130	120
Lead (aqua regia extractable)	mg/kg	1	MCERTS	200	150	130	270	140
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	4.6	1.5	< 0.3	< 0.3	0.9
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	42	46	41	50
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	130	120	91	140	95



Analytical Report Number: 19-71390

Project / Site name: Ladybarn Park

Your Order No: DS50944

Lab Sample Number				1359470	1359471	1359472	1359473	1359474
Sample Reference				HP1	HP1	HP2	HP2	HP3
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.05-0.15	0.25-0.35	0.25-0.40	0.40-0.60	0.20-0.40
Date Sampled				06/11/2019	06/11/2019	06/11/2019	06/11/2019	06/11/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics & Oxygenates

Benzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
o-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	2.7	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	7.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	12	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	28	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	4.1	< 1.0	2.3	< 1.0	2.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	18	3.7	12	11	9.9
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	66	25	54	64	32
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	85	56	88	56	53
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	170	85	160	130	97

TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
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Analytical Report Number: 19-71390

Project / Site name: Ladybarn Park

Your Order No: DS50944

Lab Sample Number				1359475	1359476	1359477	1359478	1359479
Sample Reference				HP3	HP4	HP4	HP5	HP5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.60	0.21-0.40	0.40-0.60	0.05-0.19	0.37-0.60
Date Sampled				06/11/2019	06/11/2019	06/11/2019	06/11/2019	06/11/2019
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	%	N/A	NONE	20	18	21	14	21
Total mass of sample received	kg	0.001	NONE	1.1	0.82	0.95	0.87	0.95

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.4	6.3	6.6	6.0	6.3
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	42	120	34	18	47
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.021	0.061	0.017	0.0089	0.023
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	21.1	60.5	17.2	8.9	23.4

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.20	0.42	2.8	5.8	0.76
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.21
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.25	0.90	1.4	1.1
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.16	0.61	0.94	0.82
Phenanthrene	mg/kg	0.05	MCERTS	0.91	2.1	6.3	11	8.6
Anthracene	mg/kg	0.05	MCERTS	0.12	0.30	0.84	1.5	1.3
Fluoranthene	mg/kg	0.05	MCERTS	0.91	2.5	8.0	14	11
Pyrene	mg/kg	0.05	MCERTS	0.92	2.6	8.0	14	11
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.43	1.3	3.6	6.2	4.7
Chrysene	mg/kg	0.05	MCERTS	0.85	2.3	4.9	7.7	5.9
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.30	1.2	3.4	6.2	4.5
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.21	0.87	1.8	2.8	1.9
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.24	1.0	3.2	5.8	4.0
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.22	0.61	1.2	2.3	1.7
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.55	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.24	0.76	2.0	3.0	2.1

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	5.55	16.3	47.5	83.1	59.1
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	30	27	24	28	33
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	19	24	17	18
Copper (aqua regia extractable)	mg/kg	1	MCERTS	88	100	83	76	120
Lead (aqua regia extractable)	mg/kg	1	MCERTS	240	91	140	120	220
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	1.5	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	36	41	30	22	31
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	120	84	110	100	130



Analytical Report Number: 19-71390

Project / Site name: Ladybarn Park

Your Order No: DS50944

Lab Sample Number				1359475	1359476	1359477	1359478	1359479
Sample Reference				HP3	HP4	HP4	HP5	HP5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40-0.60	0.21-0.40	0.40-0.60	0.05-0.19	0.37-0.60
Date Sampled				06/11/2019	06/11/2019	06/11/2019	06/11/2019	06/11/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
o-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.8	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	3.4	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	8.5	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	20	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	3.2	7.0	2.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	6.2	14	14	14
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	16	42	71	57
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	16	48	110	62
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	16	38	110	200	140

TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
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Analytical Report Number: 19-71390

Project / Site name: Ladybarn Park

Your Order No: DS50944

Lab Sample Number				1359480	1359481	1359482	1359483	1359484
Sample Reference				HP6	HP6	HP7	HP7	HP8
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.40	0.40-0.60	0.25-0.40	0.40-0.60	0.30-0.40
Date Sampled				06/11/2019	06/11/2019	06/11/2019	06/11/2019	06/11/2019
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	%	N/A	NONE	17	15	16	23	17
Total mass of sample received	kg	0.001	NONE	0.95	1.4	0.78	1.0	0.82

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Chrysotile & Amosite	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	0.002	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	0.002	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.2	6.6	6.0	6.3	6.1
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	130	23	120	39	110
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.067	0.012	0.060	0.020	0.057
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	67.0	11.7	60.4	19.7	56.5

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.54	< 0.05	0.25	0.46	0.25
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.42	< 0.05	< 0.05	0.37	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.25	< 0.05	< 0.05	0.31	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	3.3	0.87	2.0	3.6	0.69
Anthracene	mg/kg	0.05	MCERTS	0.35	0.13	0.27	0.55	0.10
Fluoranthene	mg/kg	0.05	MCERTS	3.1	0.88	2.6	4.1	0.94
Pyrene	mg/kg	0.05	MCERTS	2.9	0.89	2.7	4.1	0.88
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.5	0.45	1.3	2.0	0.44
Chrysene	mg/kg	0.05	MCERTS	1.8	0.67	1.6	2.5	0.90
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.89	0.29	0.97	1.4	0.38
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.53	0.17	0.68	0.99	0.20
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.79	0.25	0.84	1.3	0.28
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.38	0.17	0.44	0.57	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.47	0.24	0.67	0.87	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	17.1	5.01	14.3	23.0	5.06
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	86	19	67	42	25
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	33	22	25	21	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	180	29	120	130	120
Lead (aqua regia extractable)	mg/kg	1	MCERTS	360	100	130	330	64
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	74	30	56	38	46
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	160	85	100	150	90



Analytical Report Number: 19-71390

Project / Site name: Ladybarn Park

Your Order No: DS50944

Lab Sample Number				1359480	1359481	1359482	1359483	1359484
Sample Reference				HP6	HP6	HP7	HP7	HP8
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.40	0.40-0.60	0.25-0.40	0.40-0.60	0.30-0.40
Date Sampled				06/11/2019	06/11/2019	06/11/2019	06/11/2019	06/11/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
o-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	11	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	2.1	< 1.0	2.4	2.1	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	7.5	< 2.0	4.5	4.7	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	11	11	15	23	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	11	10	18	20	< 10
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	31	22	39	49	< 10

TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
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Analytical Report Number: 19-71390

Project / Site name: Ladybarn Park

Your Order No: DS50944

Lab Sample Number				1359485				
Sample Reference				HP8				
Sample Number				None Supplied				
Depth (m)				0.40-0.60				
Date Sampled				06/11/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	18				
Total mass of sample received	kg	0.001	NONE	1.2				

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5				
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	36				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.018				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	18.2				

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	0.48				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	0.55				
Pyrene	mg/kg	0.05	MCERTS	0.54				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.30				
Chrysene	mg/kg	0.05	MCERTS	0.48				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.20				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.10				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.16				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	2.81				
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2				
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	26				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	31				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	95				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	33				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	69				



Analytical Report Number: 19-71390

Project / Site name: Ladybarn Park

Your Order No: DS50944

Lab Sample Number				1359485				
Sample Reference				HP8				
Sample Number				None Supplied				
Depth (m)				0.40-0.60				
Date Sampled				06/11/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	mg/kg	0.001	MCERTS	< 0.001				
Toluene	mg/kg	0.001	MCERTS	< 0.001				
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001				
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001				
o-xylene	mg/kg	0.001	MCERTS	< 0.001				
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	< 10				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10				
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10				



Analytical Report Number: 19-71390
Project / Site name: Ladybarn Park
Your Order No: DS50944

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1359471	HP1	0.25-0.35	117	Loose Fibres	Chrysotile	< 0.001	< 0.001
1359482	HP7	0.25-0.40	130	Loose Fibres	Chrysotile & Amosite	0.002	0.002

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



Analytical Report Number : 19-71390

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* 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 *
1359470	HP1	None Supplied	0.05-0.15	Brown loam and sand with vegetation and gravel.
1359471	HP1	None Supplied	0.25-0.35	Brown loam and sand with vegetation and gravel.
1359472	HP2	None Supplied	0.25-0.40	Brown loam and sand with vegetation and gravel.
1359473	HP2	None Supplied	0.40-0.60	Brown clay and sand with gravel.
1359474	HP3	None Supplied	0.20-0.40	Brown sandy loam with gravel.
1359475	HP3	None Supplied	0.40-0.60	Brown clay and sand with gravel and clinker.
1359476	HP4	None Supplied	0.21-0.40	Brown sandy loam with gravel and clinker
1359477	HP4	None Supplied	0.40-0.60	Brown clay and sand with vegetation.
1359478	HP5	None Supplied	0.05-0.19	Brown loam and sand with vegetation and gravel.
1359479	HP5	None Supplied	0.37-0.60	Brown clay and sand with gravel.
1359480	HP6	None Supplied	0.20-0.40	Brown sandy loam with gravel and clinker
1359481	HP6	None Supplied	0.40-0.60	Brown clay and sand with vegetation.
1359482	HP7	None Supplied	0.25-0.40	Brown sandy loam with vegetation and gravel
1359483	HP7	None Supplied	0.40-0.60	Brown clay and sand with gravel.
1359484	HP8	None Supplied	0.30-0.40	Brown sand with gravel and vegetation.
1359485	HP8	None Supplied	0.40-0.60	Brown clay and sand with gravel.

Analytical Report Number : 19-71390

Project / Site name: Ladybarn Park

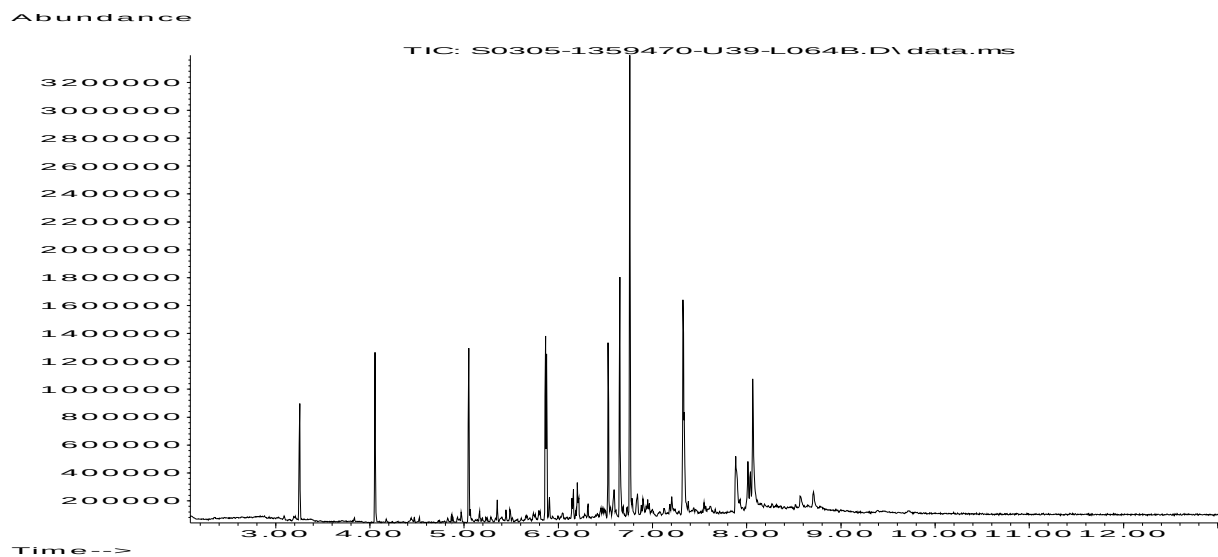
Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
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
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In-house method based on BS1377 Part 2, 1990, Classification tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/cleanup.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

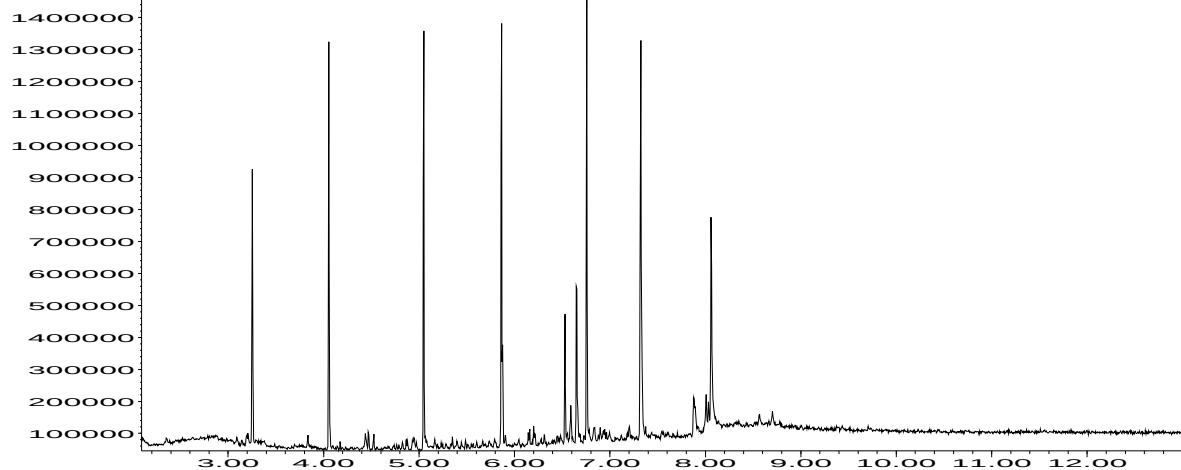
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



Abundance

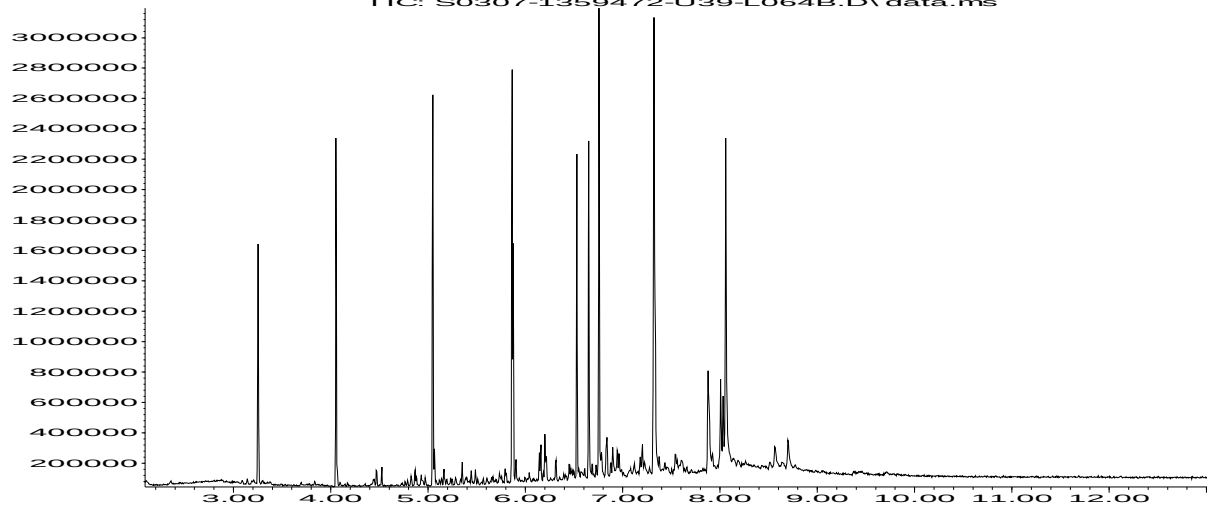
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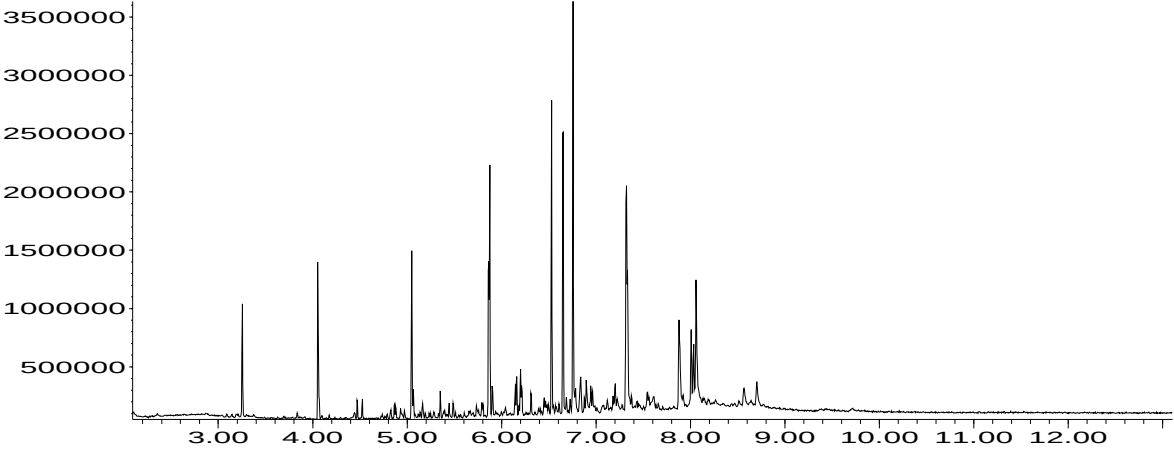
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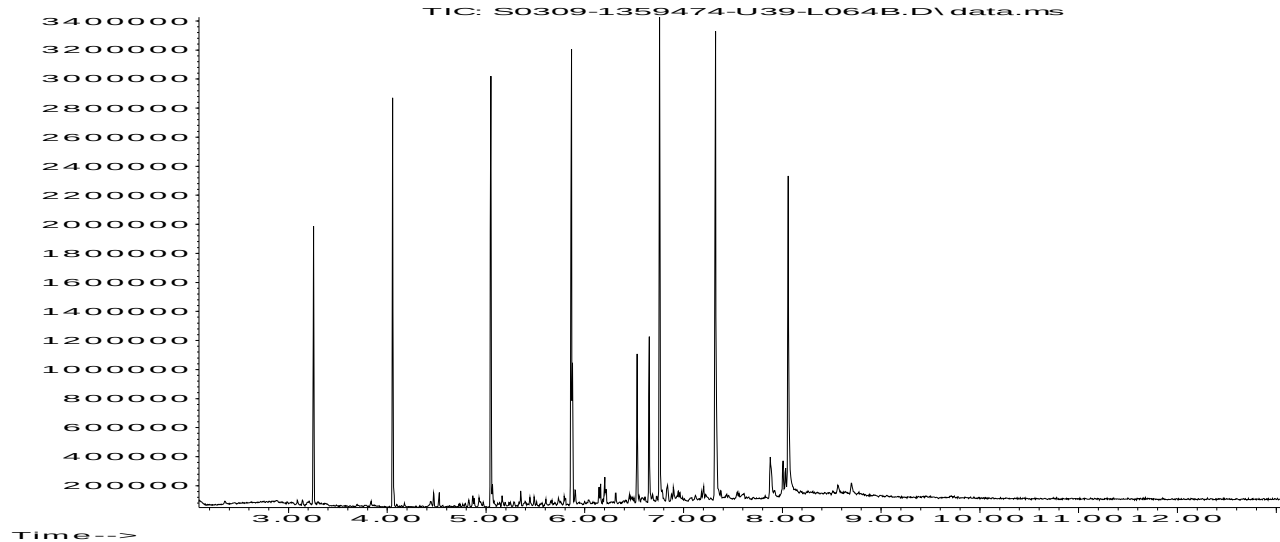
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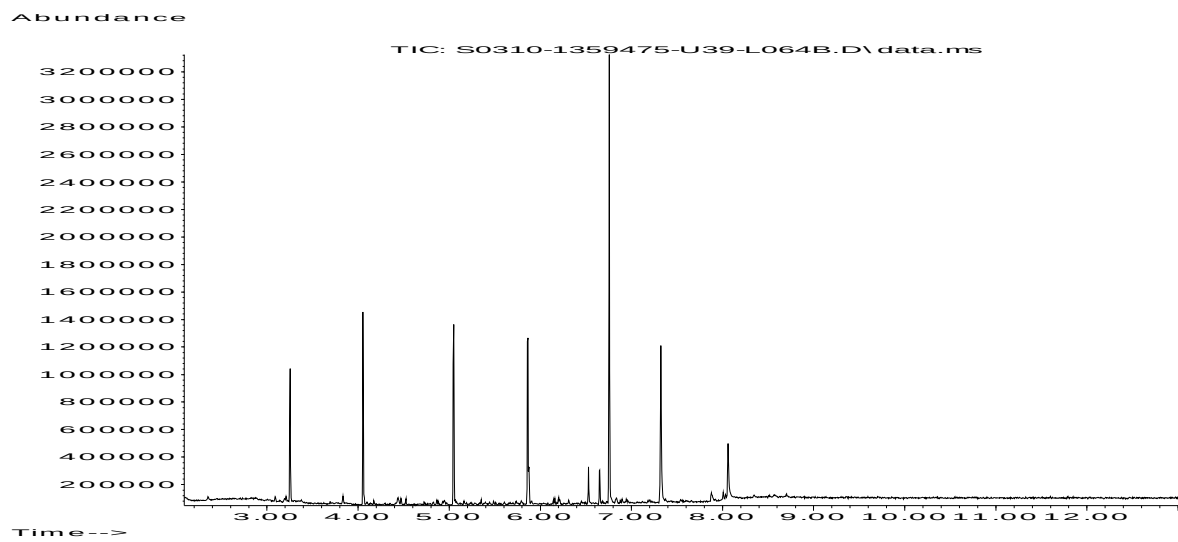
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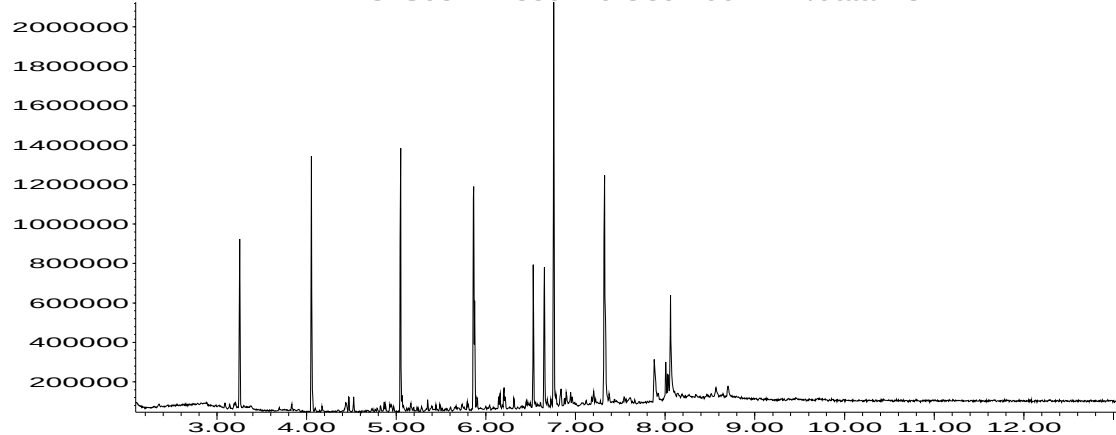


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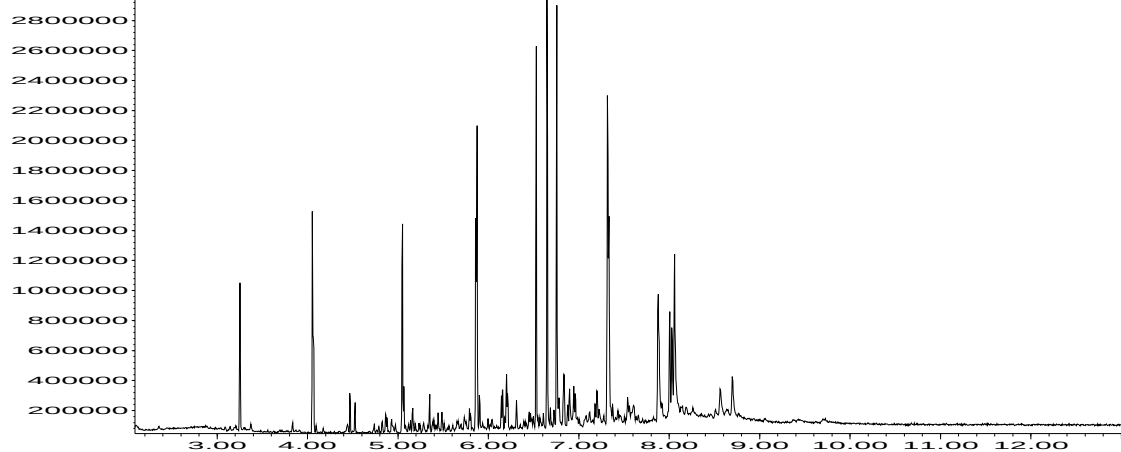
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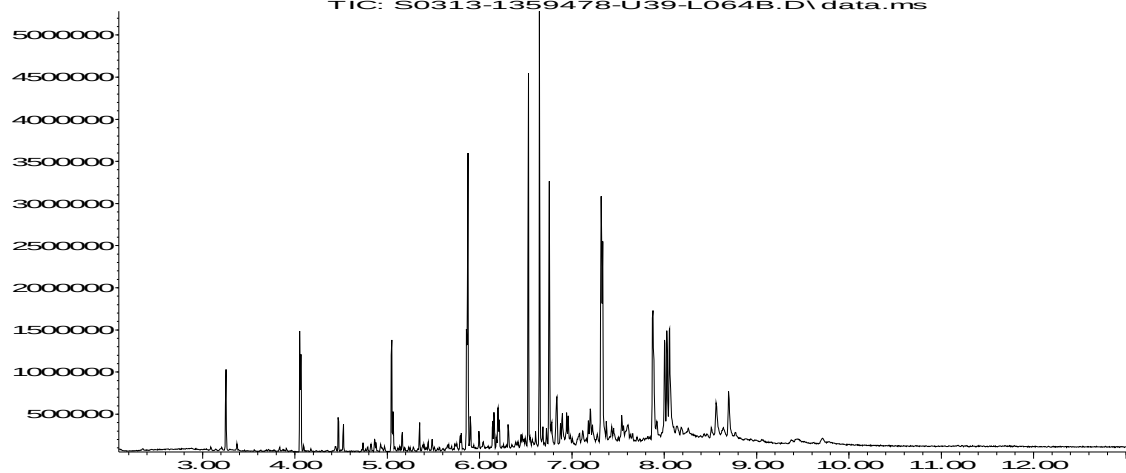
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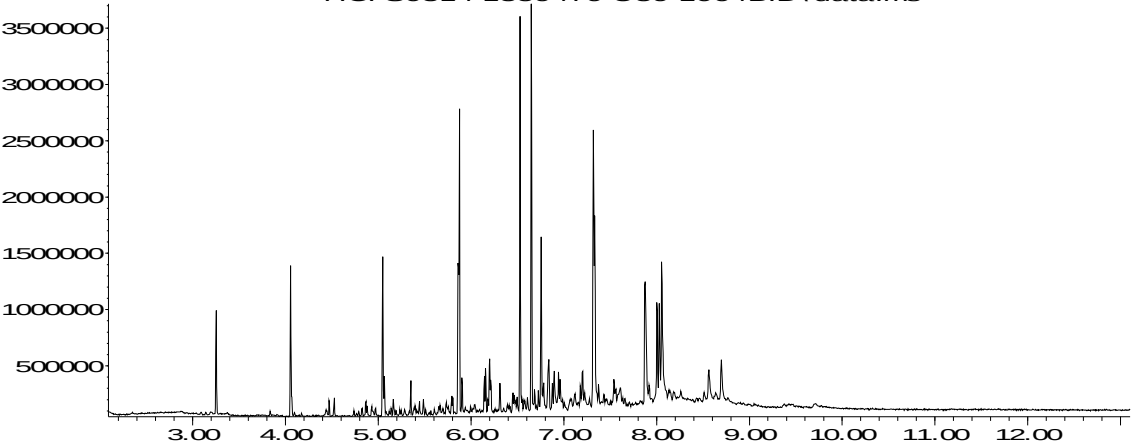
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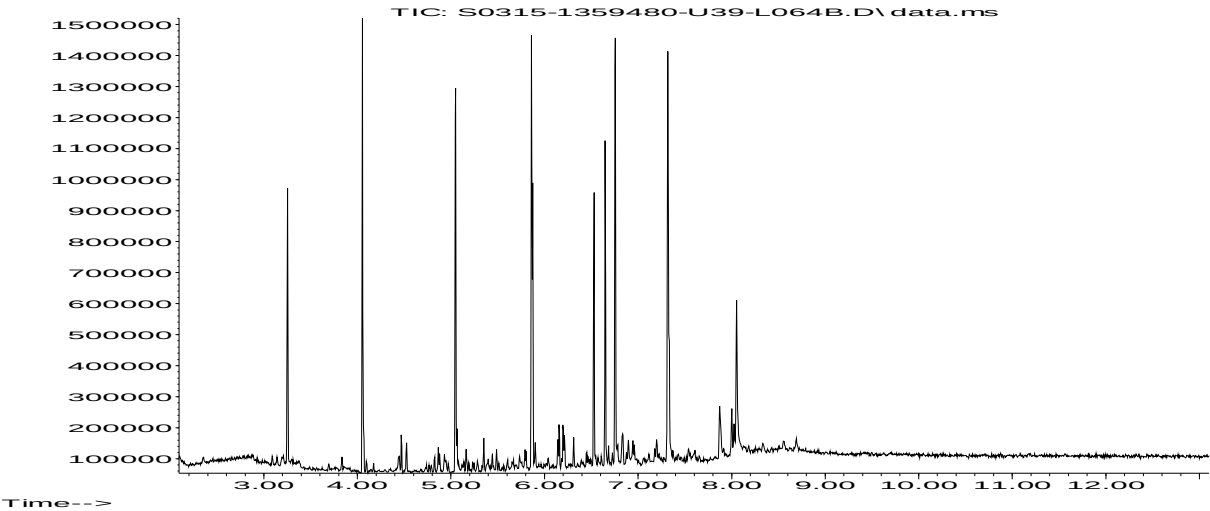
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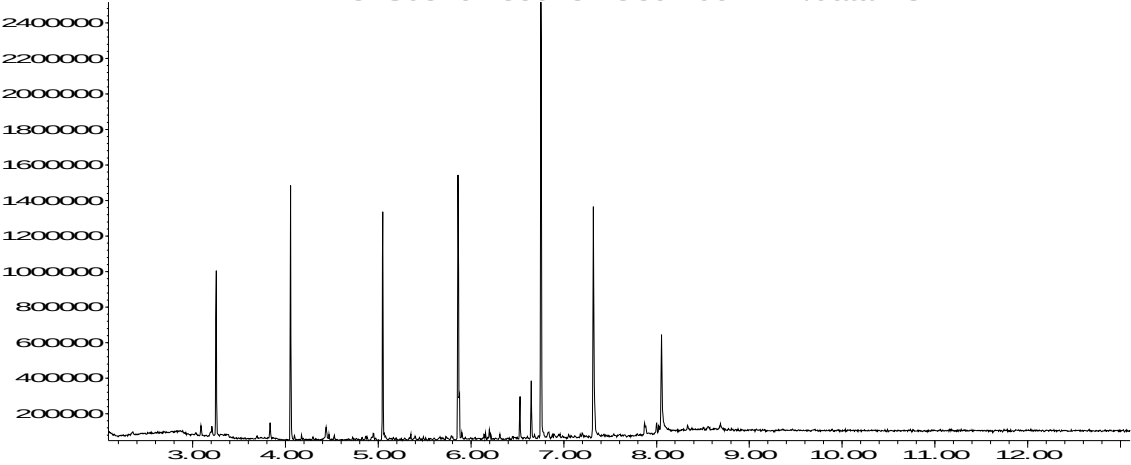
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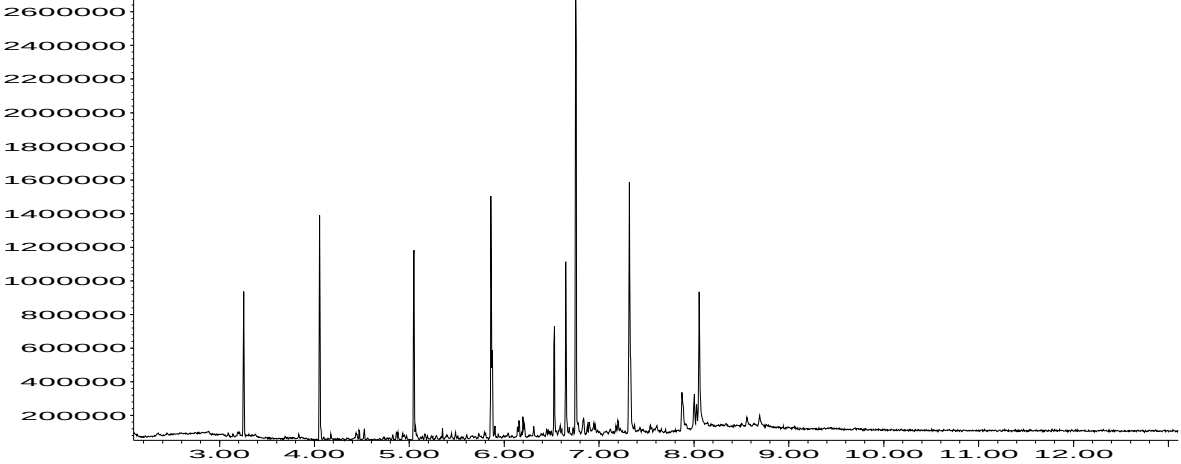
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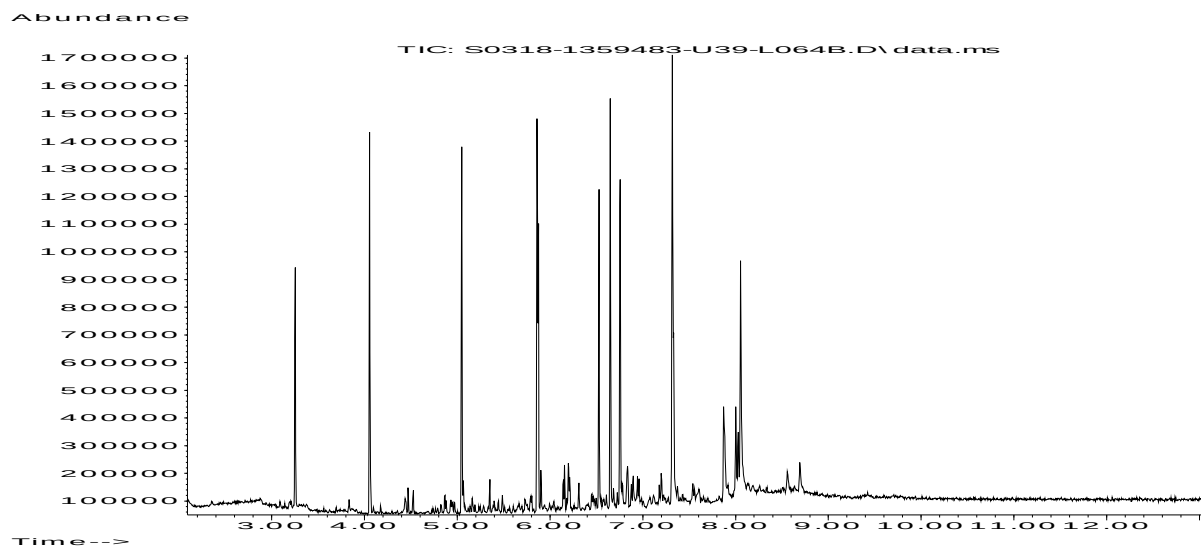
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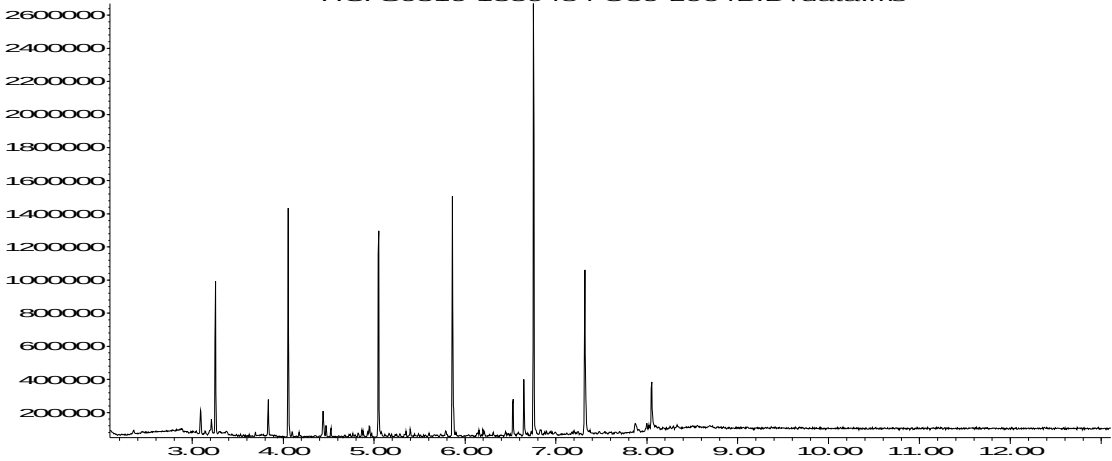


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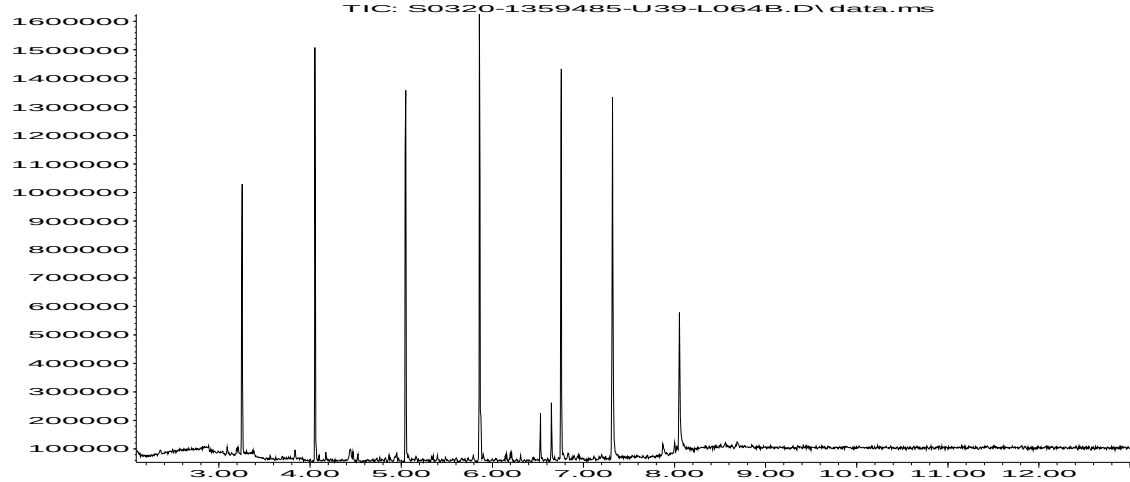
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Appendix D – Risk Definitions

Contaminated Land Risk Definitions

The following methodology is based on the methodology presented in CIRIA C552 Contaminated Land Risk Assessment: A Guide to Good Practice 2001. It requires the classification of the:

- ▲ Magnitude of the potential consequence (severity) of the Risk occurring: and
- ▲ Magnitude of the Probability (likelihood) of the Risk occurring.

The classifications are then compared to indicate the risk presented by each pollutant linkage.

Consequence to Receptor Definition Matrix

	Human Health	Controlled Waters	Buildings/Services
Severe Consequence	Acute or chronic permanent impact on human health.	Sensitive controlled water pollution ongoing, or just about to occur.	Catastrophic collapse
Medium Consequence	Chronic permanent impact on human health	Gradual pollution of sensitive controlled water	Degradation of materials
Mild Consequence	Chronic temporary impact on human health	Gradual pollution of non-sensitive controlled water	Damage to building rendering it unsafe to occupy (eg foundation damage resulting in instability).
Minor Consequence	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc).	Slight discoloration of water	Easily repairable effects of damage to buildings, structures and services, i.e discoloration of concrete

Probability Definitions

Probability	Definition in Context
Higher	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution. Positive evidence of source, pathway and receptor.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term. Suspect source, pathway, and receptor
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term No evidence of hazard, pathway, and receptor

Standard Risk Matrix

		Consequence/Magnitude of impact			
		Severe	Medium	Mild	Minor
Probability	High	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/low	Low
	Low Likelihood	Moderate	Moderate/low	Low	Very Low
	Unlikely	Moderate/low	Low	Very Low	Very Low

Classified risks and likely action

Significance Level	Definition/Comments
Very High Risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required. Demonstrable contaminated land situation, highest threat & liability level, urgent action recommended.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term. Likely contaminated land situation, risk assessment and action recommended.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, if it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term. Plausible contaminated land situation, risk assessment and possible action recommended.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild. Unlikely contaminated land situation, possible risk assessment and possible action.
Very Low Risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe. Negligible risk, no action recommended except vigilance for changes in conditions.

Geotechnical Risk Classification

The geohazards listed in the report within Section 4 follow guidance presented in Clayton, C.R.I. (2001) *Managing Geotechnical Risk*, Thomas Telford and the Highways Agency document HD22/08 '*Managing Geotechnical Risk*' (2008) which aims to identify and manage the geotechnical risks associated with a scheme throughout its lifespan, from planning to construction to maintenance.

For each geohazard the probability of the hazard occurring (P) has been considered together with the impact it would have (I) if it were to happen to calculate the risk rating between 1 and 25.

Risks that fall within Moderate, Significant and Severe categories below are considered to be **substantial** and are therefore listed within the report.

Probability	(P)		Impact	(I)		(R)	Risk
Very Likely (VLk)	5	X	Very High (VH)	5	=	20 – 25	Severe
Likely (Lk)	4		High (H)	4		15 – 19	Substantial
Plausible (P)	3		Medium (M)	3		10 – 14	Moderate
Unlikely (U)	2		Low (L)	2		5 – 9	Minor
Very Unlikely (VU)	1		Very Low (VL)	1		1 – 4	Negligible