

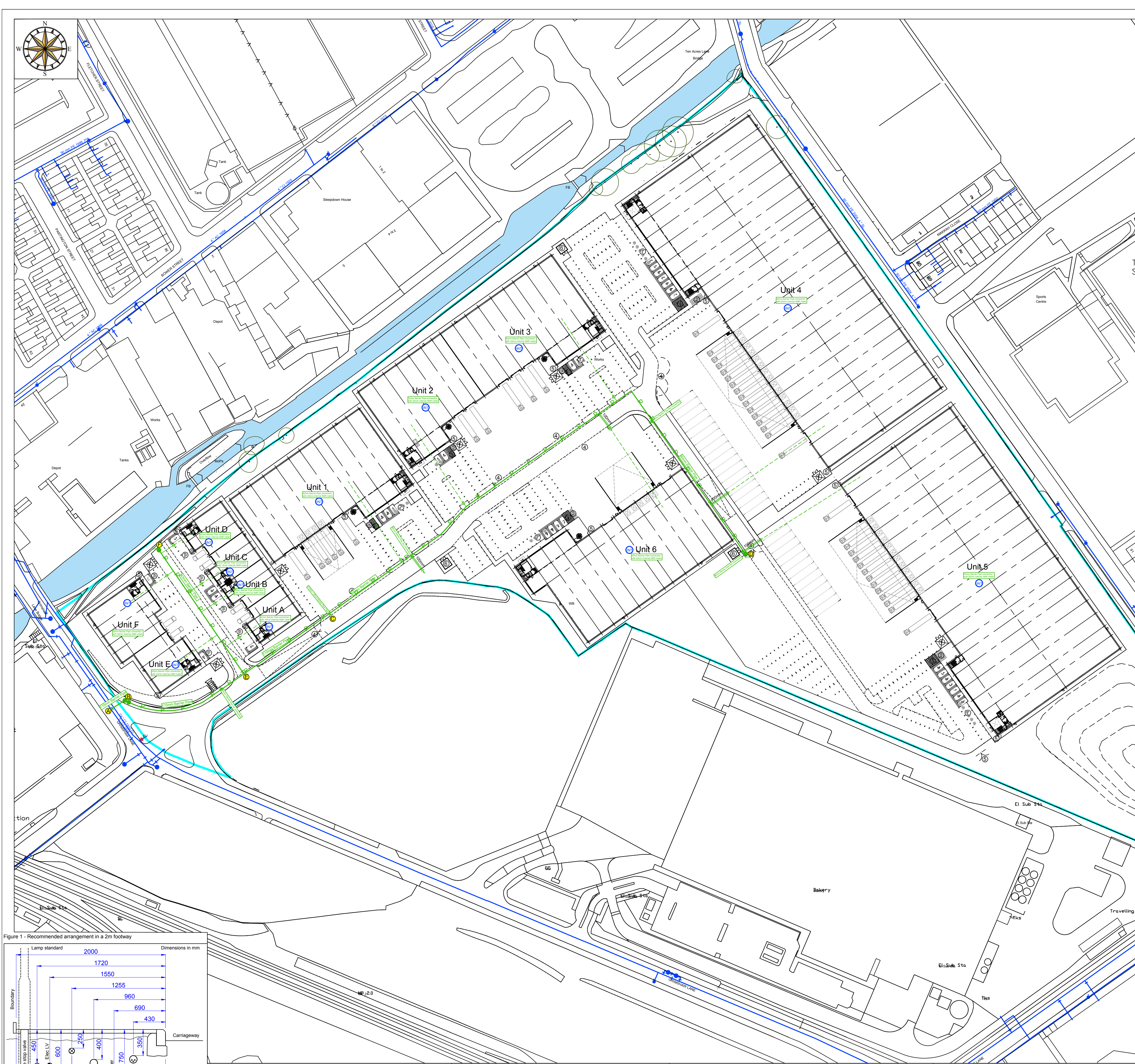
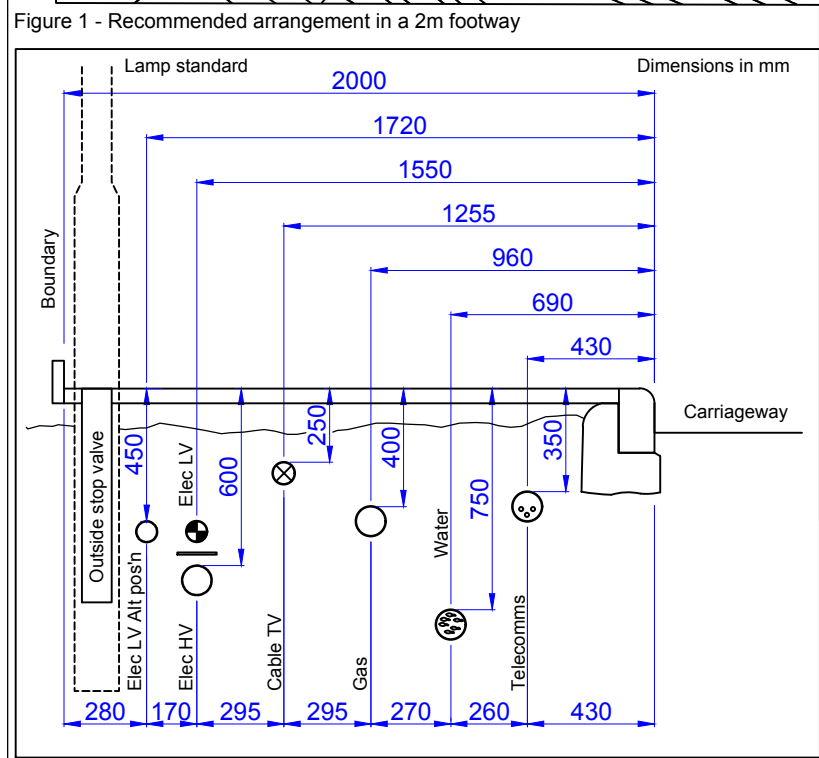


Table 1 - Excavation widths and pipe bed & surround thickness						
Diameter of main	63mm	90mm	110mm	160mm	225mm	315mm
Nominal excavation width	350mm	400mm	400mm	500mm	600mm	600mm
Pipe bed and surround (compacted)	50mm	75mm	75mm	100mm	150mm	150mm

Extent of Land Ownership

DEVELOPER LAND EDGED IN BLUE

THIRD PARTY LAND EDGED IN BROWN

COPYRIGHT ACKNOWLEDGEMENT

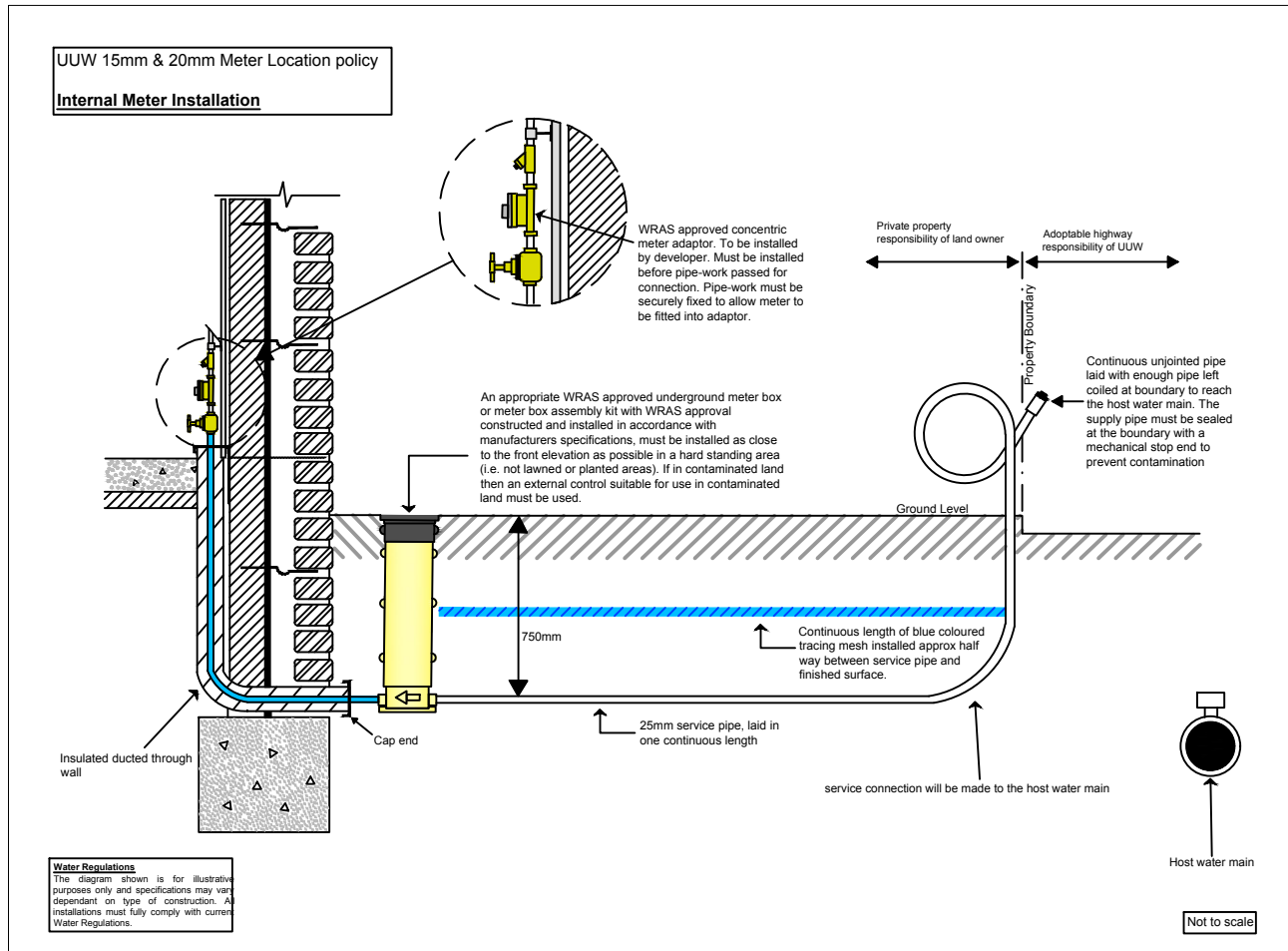
THIS PLAN IS BASED UPON THE ORDNANCE SURVEY MAP BY U.U WITH THE SANCTION OF THE CONTROLLER OF H.M STATIONERY OFFICE.

CROWN COPYRIGHT RESERVED. UNAUTHORISED REPRODUCTION INFRINGED CROWN COPYRIGHT.

Mains Records Disclaimer

The position of underground apparatus shown on the plan provided is approximate only and is given in accordance with the best information currently available.

The actual positions may be different from those shown on the plan and private service pipes may be shown by a blue broken line. United Utilities will not accept any liability for any damage caused by the actual positions being different from those shown.



NETWORK ASSEMBLIES

Point	Description
A	U/P 110mm PE BP branch connection (1 valve) off existing 5"CI 1934 main on Grimshaw Lane.
B	110mm PE BP Piece-up connection.
C	110mm PE BP x 90mm PE BP taper.
D	End hydrant on proposed 90mm PE BP main.
E	63mm PE BP branch connection (1 valve) off proposed 90mm PE BP Main.
F	End washout on proposed 63mm PE BP main.
Service connections: Units: A - D = 32mm PE BP connections + 15mm int. meters Units: E, F & 1-6 = 32mm PE BP conections + 20mm int. meters. 4 x 90mm PE BP fire connections Lay Approx: A - B: 110mm PE BP (Surfaced) x 15mtrs. B - C: 110mm PE BP (lay only) x 141mtrs. C - D: 90mm PE BP (lay only) x 274mtrs. E - F: 63mm PE BP (lay only) x 76mtrs.	
TMA:	Grimshaw Lane, Newton Heath, Manchester

LEGEND

MAIN EXISTING	
MAINS TO BE ABANDONED	AAA
MAINS PROPOSED	BBB
PROPOSED COMMUNICATION PIPE	CCC
PROPOSED SUPPLY PIPE	DDD
DUCT PROPOSED	EEE
VALVE	FFF
FIRE HYDRANT/WASHOUT	GGG FHWO
DIAMETER CHANGE	HHH
POINT OF DELIVERY FOR SERVICE - BOUNDARY METER	III
POINT OF DELIVERY FOR SERVICE - AMR METER	JJJ
AMR Internal Meters in Multi occupancy premise	KKK INT
AMR Internal meter	LLL INT
AMR Wall mounted meter box	MMM WM
AMR In wall meter box	NNN IW
ABANDONED MAINS	OOO

Break Tank and Pumped System/Storage

If your development is above 2 storeys high we suggest that, in order to provide a suitable water supply to this development you should include a break tank and pumped system. You are also recommended to install storage facilities equivalent to half day's normal usage.

Foul Sewerage Details.

Please note that **ALL** plots are to be connected to a United Utilities sewer for foul sewerage.

Surface Water Details.

Please note that **ALL** plots are to be connected to a United Utilities sewer for surface water.

Zone of Interest

Please be aware. This work may be in a 'Zone of Interest'. United Utilities may need to obtain information from the National Grid on things such as: other utilities in the area, possible underground cables and gas lines. It may result in delays with the work, however you will be advised if this is the case from our field operatives once they receive the work pack from our office team.

Abortive visit charges:

If we are unable to start/complete work due to site not being ready due to obstruction preventing work i.e. scaffolding, skips etc or we are asked to re-attend we will apply an abortive visit charge as per our current charges.

Backflow Protection

Please note it is the responsibility of the installer, user, owner, or occupier, to ensure the plumbing system complies with The Water Supply (Water Fittings) Regulations 1999. This will usually involve the installation of backflow protection at various points within the premises. In addition, for non-domestic water use or where the use of the building is unclear at the time of application extra backflow protection is required. Typically, a double check valve is required in a suitable chamber at the boundary, or immediately after the main stop valve inside the premises (risk assessment required). Higher Level protection than that mentioned here may be required if the ultimate use of any premises presents a higher risk. This also applies to domestic premises with high risk systems such as rain water harvesting. Again, a double check valve should be installed immediately after the incoming stop tap in addition to the other associated requirements for those systems. Additional servicing valves and drain off points should be installed within the property where applicable and as required by the Water Supply (Water Fittings) Regulations 1999. Please Note: was approved or equivalent as a backflow prevention device.

Project Code:

Site Contact :	Darren Vaz: 01604 781107
Developer :	High Voltage Systems & Services
Development :	Grimshaw Lane, Newton Heath, Manchester, M40 2BA
CASE NO:	04196014 (54-437681)
Designer :	Jillian Doney/Aisling Marsland
Drawn By :	Steve Blackburn
Date :	24/06/2021
Scales :	1:1000 @ A1
O.S. Grid Ref :	386861, 399876. (SJ86861 99876)

UNITED UTILITIES WATER LTD DEVELOPER SERVICES
2nd Floor Grasmere House,
Lingley Mere Business Park,
Lingley Green Avenue,
Great Sankey,
Warrington,
WA5 3LP.

Water for the North West

Annex C: Soil and Groundwater Remediation Report



**BROWNFIELD
SOLUTIONS LTD**

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

A&H CONSTRUCTION & DEVELOPMENT PLC.

Lowry Park, Manchester

Remediation Validation Report

PH/C5470/12572

November 2023

PROJECT QUALITY CONTROL DATA SHEET

Site Name:	Lowry Park, Manchester		
Document Name:	Remediation Validation Report		
Reference:	PH/C5470/12572		
Status:	-	24/11/2023	Final.

Issued By:	Client:	Engineer:
Brownfield Solutions Ltd William Smith House 173 – 183 Witton Street Northwich Cheshire CW9 5LP Tel: 01606 334 844 brownfield-solutions.com	A & H Construction & Development Plc. Western Business Park Festival Buildings/Coombs Road Coombs Road Halesowen B62 8AE	Brownfield Solutions Ltd William Smith House 173 – 183 Witton Street Northwich Cheshire CW9 5LP Tel: 01606 334 844 brownfield-solutions.com
Contact: Adele Ashton		

Written by:



P Holland
BSc (Hons)
Project Engineer

Checked by:



D M Gates
MGeoscience FGS
Principal Project Engineer

Approved by:



D M Gates
MGeoscience FGS
Principal Project Engineer



CONTENTS

1.0	INTRODUCTION	1
1.1	CONTEXT	1
1.2	OBJECTIVES	1
1.3	PROPOSED DEVELOPMENT	1
1.4	PREVIOUS REPORTS AND CORRESPONDENCE	1
1.5	LIMITATIONS	1
2.0	GROUND MODEL SUMMARY	3
2.1	DESCRIPTION OF SITE	3
2.2	ENVIRONMENTAL SETTING	3
2.3	GROUND CONDITIONS	5
2.4	GROUNDWATER	5
2.5	ADDITIONAL PRE-REMEDATION SITE INVESTIGATION	6
2.6	EVIDENCE OF CONTAMINATION	7
3.0	SUMMARY OF RISK ASSESSMENTS	9
3.1	GENERAL	9
3.2	ON SITE TANKS	9
3.3	HUMAN HEALTH RISKS	9
3.4	RISKS TO CONTROLLED WATERS	9
3.5	SUMMARY	10
4.0	REMEDATION STRATEGY	11
4.1	OUTLINE	11
4.2	SITE REMEDIATION REQUIREMENTS	11
5.0	SITE REMEDIATION AND VALIDATION	12
5.1	GENERAL	12
5.2	SOURCE 1: HYDROCARBON IMPACTED GROUNDWATER	12
6.0	CONCLUSIONS	16
6.1	GENERAL	16
6.2	HYDROCARBON IMPACTED GROUNDWATER	16
6.3	WATCHING BRIEF	16
6.4	LONG TERM MONITORING AND OTHER REQUIREMENTS	16

DRAWINGS

Drawing Number	Re	Title
PL1003O	-	Proposed Site Plan
C5470/01	-	Site Location Plan
C5470/04	-	Site Investigation Plan

APPENDICES

Appendix	Title
Appendix A	Chemical Testing Results
Appendix B	Exploratory Hole Logs
Appendix C	PID Calibration Certificates
Appendix D	Waste Transfer Notes

1.0 INTRODUCTION

1.1 Context

This Remediation Validation Report has been produced by Brownfield Solutions Limited (BSL) on behalf of A&H Construction & Development PLC for a site off Grimshaw Lane, Manchester.

The remedial works described during this report were completed between September 2023 and October 2023.

1.2 Objectives

The objective of the validation works is to provide evidence demonstrating implementation of appropriate remediation measures. The remedial works were carried out in order to make the site suitable for the proposed commercial end use, as per the TRC Remedial Strategy, reference 423207.0001.0000, dated July 2022, which is understood to have been accepted by the Local Planning Authority (Manchester City Council).

1.3 Proposed Development

The proposed development is for a commercial end use comprising the redevelopment of three plots of land into commercial light industrial type units, with associated car parking and infrastructure as shown on the proposed site plan, Drawing No. PL-1003 provided to BSL by the client.

1.4 Previous Reports and Correspondence

The following reports and correspondence with regulators are applicable to the site and should be read in conjunction with this validation report:

- WYG, Plot 3, Newton Heath, Manchester Geo-Environmental Desk Study and Ground Investigation Report, report ref. A083215, dated January 2014.
- WYG, Plot 2, Newton Heath, Manchester Geo-Environmental Desk Study and Ground Investigation Report, report ref. A083215, dated May 2014.
- Curtins, Mathers Foundry, Park Works, Newton Heath Due Diligence Geo-Environmental Site Assessment, report ref. 070588-CUR-00-XX-RP-GE-001, dated February 2020.
- TRC Companies Limited, Phase II Geo-environmental Site Assessment for Mathers Foundry, report ref. 385367.0000.0000, dated September 2020.
- TRC Companies Limited, Coal Mining Risk Assessment for Mathers Foundry and Grimshaw Lane Plots 1 & 2, report ref. 423207.0000.0000, dated January 2021.
- TRC Companies Limited, Phase I Environmental Site Assessment for Plots 1 & 2 Grimshaw Lane, report ref. 423207.0000.0000, dated April 2021.
- TRC Companies Limited, Phase II Geo-environmental Site Assessment for Plots 1 & 2 Grimshaw Lane, report ref. 423207.0000.0001, dated April 2021.

It is assumed that the Local Planning Authority will have provided the above reports to the appropriate statutory consultees and the recommendations therein have been accepted.

1.5 Limitations

This report has been carried out based on information obtained from a number of areas, BSL have assumed that this information is correct.

There may be other conditions prevailing on the site which are outside the scope of work and have not been highlighted by this report and therefore not been taken into account by this report. Responsibility cannot be accepted for such site conditions not revealed by the assessment.

This report has been prepared for the sole use and reliance of the Client, A & H Construction & Development Plc.. No other third parties may rely upon or reproduce the contents of this report without the written permission of Brownfield Solutions Ltd (BSL). If any unauthorised third party comes into possession of this report, they rely on it at their own risk and BSL do not owe them any Duty of Care.

This report has been based on the proposed planning layouts provided. Any subsequent change to the planning layout may have an impact on the validity of recommendations made within this report. Furthermore, new information, changed practices or new legislation may necessitate revised interpretation of the report after the date of its submission.

The site plans enclosed in this report should not be scaled off. Any site boundary line depicted on plans does not imply legal ownership of land.

Any recommendations made in this report should be confirmed with the Regulatory Authorities to ensure compliance.

2.0 GROUND MODEL SUMMARY

2.1 Description of Site

The site is located off Grimshaw Lane, Manchester, M40 2BA. It is situated approximately 3.60km north-east of Manchester City Centre, centred on National Grid Reference 387082, 400076 as shown on the Site Location Plan, Drawing No. C5470/01.

Feature	Description
Site Area	The site covers approximately 10 hectares.
Site Access	Access to the site is gained off Grimshaw Lane to the west.
Current Land Use and Site Features	The site currently comprises an active construction site, within the area of the now demolished Mather's Foundry and associated surrounding land.
Potential Sources of Gross Contamination	During previous site investigations, free-phase hydrocarbons have been observed within the groundwater, although no specific source has been noted onsite from site visits undertaken by BSL. As described in more detail in section 3.2 USTs were indicated to be historically present on site.
Vegetation	No vegetation is present onsite.
Topography	The site generally rises from Grimshaw lane towards the north-east. The site then generally slopes down from the north-east section to the south-east corner. It should be noted that earthworks are currently ongoing onsite and there are numerous temporary raised areas in the north-west section of the site.
Site Boundaries	The site is bound by black fencing to the west of the site, green steel palisade fencing to the south and east and heras fencing to the north.
Surrounding Area	The Site is bound to the north by a canal with a manufacturer, steel stockholder and supplier, and undeveloped land beyond. The Site is bound to the west by Grimshaw Lane with commercial properties further east. To the south of the site are commercial properties (Fine Lady Bakery). To the east of the site is Ten Acres Lane beyond which are residential properties and open scrubland.

2.2 Environmental Setting

Site History

The Mathers Foundry part of site appeared undeveloped until the 1890s when a football ground/pitches were recorded on the northern portion of this area. The football ground no longer appeared on maps by the early 1900s. A large excavation was present on the west of the site and a mineral railway on the south associated with 'Park Engineering Works' which extended onto the south of the site. The excavation on the west was no longer recorded by the 1930s and Park Engineering Works/Mathers Foundry expanded across the site throughout the 20th century. The works and foundry became disused in 2017. Numerous slopes are indicated to be present suggesting that significant reprofiling of the site had occurred to produce level building platforms.

Earliest available mapping (1893) shows that Grimshaw Lane Plot 1 (located to the south-east of the Mathers Foundry plot) was undeveloped while Plot 2 (to the west of the foundry plot) was part of the wider Bricks Works centred further north. By 1908 Plot 1 contained markings seeming to indicate it too was now part of the Brick Works while Plot 2 had been converted into Park Engineering Works which included several buildings on the plot. Between 1923 and 1992 there was no significant change on Plot 1 with the exception of becoming a Sports Ground. Park Engineering Works on Plot 2 continued to grow and develop and by 1999 was demolished leaving both plots vacant. Historically, the surrounding area

has largely comprised industrial land use with several different works and factories in the area. The extensive Brick Works to the north gradually shrunk throughout the 20th century while residential developments to the east grew. To the south of the Site were many railway tracks which connected Manchester to further afield as well as connecting Plot 2 with a mineral railway loop.

Published Geology

From the Phase I Desk Study Assessment and published geology, it was anticipated that ground conditions would comprise the following sequence of strata (top down):

-
- Made Ground; over
 - Till (Devensian), Diamicton; over
 - Pennine Middle Coal Measures Formation (mudstone, siltstone and sandstone), Newton Heath Sandstone and Chester Formation (Sandstone).
-

Hydrogeology

The superficial Till is classified by the Environment Agency (EA) as Unproductive Strata. The bedrock geology of the Chester Formation and Newton Heath Sandstone are classified by the EA as Principal Aquifers. The Pennine Middle Coal Measures is classified by the EA as a Secondary A Aquifer. The aquifers within the bedrock are overlain by low permeability Till which is expected to act as an aquiclude.

The site is not located within a Source Protection Zone.

The database indicates that there is one surface water abstraction within a 500m radius of the Site. Water is abstracted from the canal for boiler feed and manufacturing and is located 12m northwest of the Site.

Hydrology

The nearest surface water receptor is the Rochdale Canal which lies directly north of the site. Flow direction is indicated to be from east to west.

Potential Environmental Constraints

There is a historic landfill site located approximately 178m north-east of the site.

Radon

Information from the Phase I Desk Study Report indicates the property is in a Radon Affected Area, as between 1 and 3% of properties are above the action level. Which means no radon protective measures are necessary in accordance with BRE Report 211 'Radon – Guidance on protective measures for new dwellings' 2015 Edition.

Upon further investigation by consulting 'ukradon.org', it shows that the western section of the site is shown to be within an area where the maximum radon potential is 3-5%. This means that the site may require basic radon protection measures.

UXO Risk

Plot 1, which covers the areas addressed in this report, is in an area affected by historical UXO risk, 1st Line Defence has assessed that there is an overall Low Risk from German and anti-aircraft unexploded ordnance in Plot 1. There is also an assessed Low-Medium Risk from Allied ordnance. In summary, the site is not considered to be at significant risk of German air-delivered UXO contamination. Whilst the risk of indicators of UXO going unnoticed within the open area of Plot 1 cannot be entirely discounted, evidence suggests the recorded strikes and damage were too far removed to have affected the Site area, whilst there is also no obvious evidence of bomb damage within or in proximity to the Site boundary. A

UXO Risk Management Plan was recommended and a site Specific UXO Awareness Briefings to all personnel conducting intrusive works.

2.3 Ground Conditions

Observed Geology

From the previous investigations, made ground was encountered across the entire Site between ground level and 8.00mbgl. Refusals occurred in the made ground due to obstructions, refusals occurred in WS201 (0.6mbgl), WS212 (0.6mbgl) and WS212A (0.6mbgl). The surface covering comprised concrete, timber, asphalt or topsoil depending on location. Beneath the surface covering, made ground was found to be variable. Upper made ground soils were typically granular with some cohesive soils, typically found beneath granular made ground or between granular layers. Anthropogenic constituents within the made ground included clinker, ash, brick, concrete, glass, metal, plastics and timber. The deepest made ground was recorded at the west of the site, in an area that is suspected to have been quarried.

Superficial deposits comprising Till were encountered between 0.3m and 12.00mbgl, recording a maximum unproven thickness of 11.0mbgl. Ice contact deposits (granular layers) were also encountered in localised areas of the site, recording a maximum unproven thickness of 2.0m. The glacial Till was typically cohesive with interbedded sand bands of variable thickness. Cohesive glacial Till typically comprised firm becoming stiff with depth, brown, with some grey and orange brown mottling, slightly gravelly slightly sandy clay. The Ice Contact Deposits typically comprised brown medium dense to very dense brown fine to medium sand.

The site is expected to be underlain by bedrock geology of the Chester Formation across much of the site, Newton Heath Sandstone across the centre and Pennine Lower Coal Measures across the southwest. The deep boreholes drilled at the southwest of the site identified that the superficial deposits extend to depths of between 36.0m and 39.5mbgl, beneath which the Pennine Middle Coal Measures Formation was encountered. The Pennine Middle Coal Measures were found to comprise a weak weathered mudstone.

2.4 Groundwater

Groundwater was encountered on the Mathers Foundry plot between 0.93m and 2.2mbgl. Groundwater was encountered in Plot 1 between 1.1mbgl and 2.9mbgl. Groundwater was encountered in Plot 2 between 0.2mbgl and 3.6mbgl.

The depths and location of groundwater for the areas of contamination addressed within this report are shown in the table below:

Location	Depth during site works (m bgl)
WS08	1.00
WS14	2.00
WS202	2.00
WS204	3.00
WS205	2.50
WS208	4.00

BSL has undertaken some additional trial pits within the areas impacted by contamination as highlighted in the remedial strategy, and groundwater levels encountered are presented in the table below:

Location	Depth during site works (m bgl)
WS201/202	0.20 – Small Seepage

Location	Depth during site works (m bgl)
	1.60 – Ceramic pipe which released large amounts of water with hydrocarbon sheen
WS204	1.70 – Moderate seepage 2.00 – Strong groundwater strike with hydrocarbon sheen
WS211	0.60 – Small seepage with hydrocarbon sheen & odour 2.00 – Small seepage

2.5 Additional Pre-Remediation Site Investigation

BSL undertook three supplementary trial pits within the areas highlighted in the TRC Remedial Strategy as being the areas requiring remedial action. During this investigation, soil samples were taken and tested for hydrocarbons in order to confirm the risk highlighted in the remedial strategy from hydrocarbon impacted soils specifically, which has been identified as a potential risk, as well as the hydrocarbons within the groundwater. Laboratory testing certificates are presented in full in Appendix A and results are presented in the below table:

TPH CWG	Screening Level	WS201/202 1.60-2.00 (MG)	WS201/202 2.00 (Natural)	WS204 2.00-3.00 (MG)	WS211 1.80-2.00 (MG)	WS211 4.00-4.00 (Natural)
Petroleum Hydrocarbons Aliphatic >EC5-EC6	5900	15	15	46	16	34
Petroleum Hydrocarbons Aliphatic >EC6-EC8	17000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Petroleum Hydrocarbons Aliphatic >EC8-EC10	4800	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Petroleum Hydrocarbons Aliphatic >EC10-EC12	23000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Petroleum Hydrocarbons Aliphatic >EC12-EC16	82000	6	2	< 1.0	76	< 1.0
Petroleum Hydrocarbons Aliphatic >EC16-EC35	1700000	64	30	8	530	3
Petroleum Hydrocarbons Aliphatic >EC35-EC40	1700000	250	170	720	1300	< 10
Petroleum Hydrocarbons Aromatic >EC5-EC7	46000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Petroleum Hydrocarbons Aromatic >EC7-EC8	110000	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Petroleum Hydrocarbons Aromatic >EC8-EC10	8100	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Petroleum Hydrocarbons Aromatic >EC10-EC12	28000	2	1	5	25	< 1.0
Petroleum Hydrocarbons Aromatic >EC12-EC16	37000	21	10	27	310	< 2.0
Petroleum Hydrocarbons Aromatic >EC16-EC21	28000	59	35	180	600	< 10
Petroleum Hydrocarbons Aromatic >EC21-EC35	28000	88	52	340	290	14

The above table of the samples tested of both made ground and natural, shows no exceedances of petroleum hydrocarbons for commercial screening levels. Therefore, as per the TRC Remedial Strategy which recommends removal of grossly contaminated soils, we consider these appropriate to leave in-situ and not significantly contributing to the contaminant load previously identified in the groundwater. The site engineer logs (see appendix B) and associated lab testing produced from these excavations demonstrate that the hydrocarbons are not strongly adsorbed onto the soils, but instead occupying the perched porewater. In conclusion, BSL do not consider the soils onsite to be a risk in respect to hydrocarbon contamination and do not need to be removed as part of the remedial works.

2.6 Evidence of Contamination

Across the site, visual and olfactory evidence of contamination was found. The majority of the locations displaying evidence of contamination were found within Mathers Foundry. Within the Mathers Foundry plot, TRC noted hydrocarbon odours and oily sheens originating from six window sample locations and a trial pit location, as shown in the below table:

Location	Observation	Depth (m bgl)
TP05	Oil ingress which filled trial pit	0.90
WS08	Strong hydrocarbon odour & sheen	2.50 – 4.15
WS202	Hydrocarbon odour & sheen	2.00
WS204	Hydrocarbon odour & sheen	2.50
WS205	Hydrocarbon odour & sheen	2.50
WS208	Hydrocarbon odour & sheen	3.80
WS211	Strong hydrocarbon odour & sheen	2.00 – 3.20

WS202 is located within an area of an historic UST, which was removed as part of the demolition works onsite, and is likely the source of the hydrocarbons within this area of the site. Similarly, WS204, WS205, WS208 & WS211 were also located within proximity of historical UST's and associated pipework. The Remedial Strategy undertaken by TRC, states that all of the referenced historic tanks within these areas have been removed as part of the demolition works of Mathers Foundry but it should be noted that this was prior to BSL's involvement in the project and no record of the removal have been provided by the client.

BSL undertook some additional confirmatory trial pits on 20th July 2023 within the areas of the above contamination which also recorded visual and olfactory evidence of hydrocarbons and can be seen in the table below:

Location	Depth during site works (m bgl)
WS201/202	1.60 – Ceramic pipe which released large amounts of water.
WS204	2.00 – Strong groundwater strike with hydrocarbon sheen
WS211	0.60 – Small seepage with hydrocarbon sheen & odour 1.60 – 2.90 Slight hydrocarbon and sheen on arisings

The highest PID reading in the above trial pits was 88.6ppm at 1.80m bgl within WS211 (TP), with the rest of the readings from the trial pits ranging from 0.0-8.1ppm.

Within WS201/202 (TP), a ceramic pipe was encountered which was observed to release large amounts of water, however no hydrocarbons were noted originating from the soils. This was likely an historical drainage run.

Exploratory hole logs are presented in Appendix B. PID calibration certificates are presented in Appendix C.

3.0 SUMMARY OF RISK ASSESSMENTS

3.1 General

The previous site investigations have confirmed the following:

-
- Localised gross petroleum hydrocarbon contamination within groundwater and soils within the Mathers Foundry area of the site (Unit 2 & Unit 6).
 - Elevated carbon dioxide and methane recorded during gas monitoring at the site.
-

3.2 On Site Tanks

It is known that there were underground storage tanks present onsite prior to demolition of the previous development. It is noted in the previous reports by TRC that the tanks were removed as part of the demolition of Mathers Foundry, but BSL have not been provided the details of the removal as it was undertaken prior to BSLs involvement in the project.

3.3 Human Health Risks

Exceedances of the GAC for a commercial development have been exceeded for hydrocarbon contamination within the area of Mathers Foundry onsite, specifically in two localised areas, the area of the historically infilled pit (Unit 2) and the area surrounding of WS201 & WS202 (Unit 6). Although the majority of these areas will be surfaced in hardstanding, the Remedial Strategy undertaken by TRC (ref. 423207.0001.0000) states that the exceedances are considerably higher than the GAC, and therefore betterment of the ground conditions, specifically the groundwater is required as part of the Remedial Strategy. The above also presents a hydrocarbon vapours risk but as the site is already classed as CS-2 to CS-3 with respect to ground gases, the protection measures associated with this will provide protection against the risk to vapours.

3.4 Risks to Controlled Waters

The below summarises the Conceptual Site Model in respect to the controlled waters risk, based on the TRC Phase II Geo-Environmental Site Assessments for Plots 1 & 2 and Mathers Foundry (report refs 423207.0000.0001 & 385367.0000.0000):

-
- Although the section of the site impacted by the hydrocarbons is underlain by a Principal Aquifer, the site is underlain by a significant thickness of relatively impermeable Glacial Till that would not enable significant contaminant migration.
 - The nearest watercourse is the Rochdale Canal and lies directly north of the site. The canal is likely to be lined in order for it to hold water and the water level within the canal is higher than the groundwater within the site.
 - Additionally, the Grimshaw Lane Plot 1 investigation involved both soil sampling and groundwater monitoring that assessed locations between the contamination zones and the Rochdale Canal which showed no elevations of hydrocarbons and therefore it is unlikely that hydrocarbons will migrate into the canal.
 - Two surface water samples taken in the canal upstream and downstream of the Site only detected two minor exceedances of heavy metal concentrations, which suggests the groundwater at the site is not migrating into the canal and causing a detrimental impact to surface water quality.
 - The site does not lie within 500m of a Source Protection Zone.
 - The hydrocarbon contamination within the groundwater in the north section of the site is mainly concentrated within the area of the historical pit area, and testing from outside this area doesn't show hydrocarbon exceedances indicating that the historical pit is likely acting as a sump for the
-

hydrocarbon impacted groundwater and there is unlikely to be a migration pathway to the rest of the site.

- Therefore, the risk to groundwater is considered to be low. Although within TRCs Remedial Strategy, as the hydrocarbon elevations are significant, betterment of the site within these areas are recommended.

In order to mitigate the risk, betterment of the site through a programme of dewatering and oil skimming to remove gross contamination in groundwater was considered likely to be the most suitable remedial option, which will contribute to an overall betterment in groundwater quality.

3.5 Summary

A summary of the findings of the previous investigations and assessments where a risk is present (i.e. an unacceptable source-pathway-receptor linkage) which requires mitigation is presented in the table below.

Source	Receptor
<- Poses an unacceptable risk to ->	
Hydrocarbons	Water Pipe / Human Health
Ground gases and vapours	Human Health / Buildings

4.0 REMEDIATION STRATEGY

4.1 Outline

Based on the site investigations undertaken at the site and the contaminant sources identified within the CSM, the following require appraisal to determine the most suitable remedial options:

- Petroleum Hydrocarbon Impacted Groundwater – Two areas of hydrocarbon impacted groundwater were highlighted within the remedial strategy, seen within Annex A Figure 4 (TRC Phase II Geo-environmental Site Assessment report ref. 423207.0001.0000). As the testing results showed high elevation of hydrocarbons, they present a risk to human health and require betterment.
- Ground Gases and Vapours – Areas of the site have been classified as CS2/CS3 and in these areas ground gas protection measures will be required within buildings.

4.2 Site Remediation Requirements.

Following an options appraisal in the Remedial Strategy (TRC report ref. 423207.0001.0000), remedial measures were selected for each of the identified sources. Full details are available within the Remedial Strategy, with the key requirements summarised in the table below.

Source	Contaminants of Concern	Remediation Method	Further Details / Remedial Requirements
1 – Hydrocarbon Impacted Groundwater.	Petroleum Hydrocarbons	Source Removal and Site Betterment– Excavation of sumps and subsequent pumping and removal of water.	Groundwater sumps to be dug within the area of the hydrocarbon impacted groundwater and left overnight to fill up and then pumped out and removed from site by a suitably licenced carrier. Additional boreholes to be installed down-gradient of the hydrocarbon impacted areas in order to assess betterment of remedial measures by undertaking a programme of groundwater testing.
2 – Made ground	Ground Gases	Installation of ground gas protection measures	Based on the risk assessments undertaken, gas protection measures should be implemented in areas assessed as CS2/CS3 by the previous consultants. In addition, BSL recommend that due to the presence of volatile organic contamination, ground gas protection measures should include a gas and hydrocarbon vapour resistant membrane.

With reference to the remedial requirements, the testing data should be screened against historic data from that area to determine whether there has been betterment of the site.

5.0 SITE REMEDIATION AND VALIDATION

5.1 General

The remediation process was undertaken over several stages and site visits were undertaken between the dates of 21st September 2023 and 19th October 2023.

A summary of the site works undertaken in accordance with the Remedial Strategy (report ref. 423207.0001.0000) is detailed below.

5.2 Source 1: Hydrocarbon Impacted Groundwater

During the previous ground investigations onsite, undertaken by Curtins and TRC, both visual and olfactory evidence of hydrocarbon contamination were observed, with further chemical testing revealing exceedances of hydrocarbons within the groundwater onsite. These elevations of hydrocarbons were concentrated in two localised areas in the previous area of the Mathers Foundry and are likely associated with historical underground /above ground storage tanks which were demolished as part of the enabling work onsite. BSL undertook additional trial pits within these areas to confirm the presence of hydrocarbons and as seen in Section 2.5, evidence of hydrocarbon contamination was encountered within the groundwater. Although the site is proposed to be surfaced in hardstanding and there is not considered to be a risk to controlled waters, the recorded GAC exceedances are considered to be significantly higher than the recommended targets for remediation, and therefore betterment of the site is required. The below table shows the groundwater testing results from the previous investigations with exceedances in red, as shown on Figure 3 of the TRC Remedial Strategy:

TPH CWG	Screening Level	WS202 (Unit 6)	WS204 (Unit 2)	WS08 (Unit 1/2)	CP06 (Unit 1)
TPH-CWG - Aliphatic >C8 - C10	300	16000	8500	-	<1.0
TPH-CWG - Aliphatic >C10 - C12	300	-	9000	-	<10
TPH-CWG - Aliphatic >C12 - C16	300	200000	54000	-	<10
TPH-CWG - Aromatic >C5 - C6	10	33	<1.0	-	<1.0
TPH-CWG - Aromatic >C6 - C8	700	49	<1.0	-	<1.0
TPH-CWG - Aromatic >C8 - C10 (ethylbenzene)	300	110	<1.0	158	35
TPH-CWG - Aromatic >C8 - C10 (xylenes)	500	110	<1.0	158	35
TPH-CWG - Aromatic >C10 - C12	90	220000	2700	-	330
TPH-CWG - Aromatic >C12 - C16	90	2200000	9200	-	220

TPH-CWG - Aromatic >C16 - C21	90	2000000	590	-	29
-------------------------------------	----	---------	-----	---	----

Although the remedial strategy states that remediation of the soils is suggested as part of the remedial works, there are no significant exceedances of hydrocarbons recorded within the soils testing. Therefore, as the majority of the contamination is considered to be concentrated within the groundwater, the betterment of the groundwater contamination is likely to also contribute to the betterment of the soils in turn.

The approximate locations of the areas of visible free phase hydrocarbons in the groundwater are outlined in the TRC Remedial Strategy, Figure 3. These locations generally correspond to the areas which the above exceedances were recorded and are therefore the main areas targeted during BSLs remediation as detailed below.

As no existing monitoring wells could be found (presumably destroyed by demolition works) BSL initially visited site on 21st September 2023 in order to install three monitoring wells (BH01 – BH03), located down gradient (south-west) of the two zones of hydrocarbon groundwater contamination, as seen on the BSL Site Investigation Exploratory Hole Plan drawing ref. C5470/04. These were installed within the made ground strata, which is where the perched groundwater contamination was identified. Monitoring well installation details are summarised in the table below:

Location	Depth of plain pipe with bentonite surround (m bgl)	Depth of slotted pipe with gravel surround (m bgl)
BH01	0.00 – 1.00	1.00 – 4.00
BH02	0.00 – 1.00	1.00 – 3.00
BH03	0.00 – 1.00	1.00 – 3.00

Additionally, BSL also supervised the excavation of two sumps to collect hydrocarbon impacted groundwater within proximity of the impacted areas. It should be noted that excavation was unable to take place within the proposed building footprints of Units 1, 2 & 6 due to the construction works taking place in these areas at the time but were placed as close to the impacted areas as possible given the constraints.

Sump Pit 1, located adjacent to the proposed building footprint of Unit 2, was excavated down to 5.00m bgl and encountered a groundwater seepage at 3.00m bgl with a slight oily sheen and hydrocarbon odour. Made ground was encountered down to 3.10m bgl. This was then left open over a period of 4 Days (until 25th September 2023).

Sump Pit 2 was excavated adjacent to Unit 6 and was excavated down to 3.50m bgl, with made ground encountered to 1.50m bgl. No groundwater or evidence of hydrocarbons were encountered during the excavation of this pit. This pit was also left open for a total of 4 Days before being skimmed for any hydrocarbons and pumped into a tanker and taken offsite.

The Waste Transfer Notes, seen in Appendix D, show that a total of 7500kg of groundwater was pumped out of the pits, which was taken offsite on 27th September 2023.

Following the pumping and skimming exercise of the groundwater in the two sump locations, groundwater monitoring and testing was undertaken within the monitoring wells down-gradient of the sumps. It should be noted that BH02 is located closest to the hydrocarbon impacted area within Unit 2. The results of which are presented below.

Visit 1- 27th October 2023

TPH CWG	Screening Level	BH01 (Unit 1)	BH02 (Unit 2)	BH03 (Unit 6)
TPH-CWG - Aliphatic >C5 - C6	15000	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	1500	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	300	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	300	< 10	30	< 10
TPH-CWG - Aliphatic >C12 - C16	300	< 10	470	< 10
TPH-CWG - Aromatic >C5 - C6	10	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C6 - C8	700	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10 (ethylbenzene)	300	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10 (xylenes)	500	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	90	< 10	60	< 10
TPH-CWG - Aromatic >C12 - C16	90	35	270	42
TPH-CWG - Aromatic >C16 - C21	90	95	740	90
TPH-CWG - Aromatic >C21 - C35	90	58	610	90

Visit 2 – 19th October 2023

TPH CWG	Screening Level	BH01 (Unit 1)
TPH-CWG - Aliphatic >C5 - C6	15000	< 1.0
TPH-CWG - Aliphatic >C6 - C8	1500	< 1.0
TPH-CWG - Aliphatic >C8 - C10	300	< 1.0
TPH-CWG - Aliphatic >C10 - C12	300	< 10
TPH-CWG - Aliphatic >C12 - C16	300	< 10
TPH-CWG - Aromatic >C5 - C6	10	< 1.0
TPH-CWG - Aromatic >C6 - C8	700	< 1.0
TPH-CWG - Aromatic >C8 - C10 (ethylbenzene)	300	< 1.0
TPH-CWG - Aromatic >C8 - C10 (xylenes)	500	< 1.0
TPH-CWG - Aromatic >C10 - C12	90	< 10
TPH-CWG - Aromatic >C12 - C16	90	30
TPH-CWG - Aromatic >C16 - C21	90	60
TPH-CWG - Aromatic >C21 - C35	90	< 10

The chemical testing results are presented in Appendix A within i2 analytical reports number 23-59429 & 23-64138.

Unfortunately, due to construction and plant processes onsite, BH02 and BH03 were unable to be sampled during the second visit.

Although a second sampling visit was not possible for BH02 & BH03, as shown above, the subsequent monitoring down gradient from newly installed boreholes has shown a dramatic reduction in contaminants relative to the previously monitored holes. Therefore, it is considered that the hydrocarbon contamination is not migrating down gradient across the site, and it is possible that the pumping and skimming exercise has resulted in the betterment of the hydrocarbon groundwater contamination. Furthermore, it is also likely that if any hydrocarbon contamination is still present onsite, it is not mobile and unlikely to impact the wider site. This is supported by the fact that the impacted made ground and groundwater onsite is underlain by impermeable clay deposits, which will inhibit migration both laterally and horizontally. Additionally, any hydrocarbon impacted soils capable of producing vapours are not considered to be a risk to end-users, as the buildings are proposed to have CS2 to CS3 gas protection measures, this should produce adequate protection to mitigate against this risk subject to adequate verification of installation. BSL recommend that a gas membrane suitably impervious to hydrocarbon vapours is specified.

Watching Brief

A watching was maintained by the Groundworks Contractor throughout the remediation and redevelopment of the site. To the best of BSL's knowledge, no unexpected sources of contamination were identified. The ground conditions encountered during the redevelopment phase were understood to be consistent with those encountered during the earlier ground investigations.

Therefore, no additional remedial measures with respect to petroleum hydrocarbons were considered necessary at the site over and above those already stipulated within the approved Remedial Strategy and within this Verification report.

6.0 CONCLUSIONS

6.1 General

The remedial works described within this report were carried out between the dates of 21st September 2023 and 19th October 2023 under the supervision of experienced BSL geo-environmental engineers.

6.2 Hydrocarbon Impacted Groundwater

In order to address and provide betterment for the two areas of hydrocarbon impacted groundwater onsite, as detailed within Figure 3 of the TRC Remedial Strategy, two sumps were dug to allow excavation, skimming and pumping of the impacted groundwater.

Additionally, after discovering the original wells had been destroyed (pre-construction), as part of the initial visit, three groundwater monitoring wells were installed down-gradient of the impacted areas in order to provide further testing and show evidence of betterment relative to the contamination encountered during previous ground investigations.

Following the pumping and skimming exercise, groundwater samples were taken from the newly installed boreholes, with the aim of showing a reduction in contamination relative to the previously monitored holes undertaken as part of the previous investigations.

The subsequent monitoring down-gradient from newly installed boreholes has shown a significant reduction in contaminant concentrations relative to the previously monitored holes. Therefore, it is considered that the hydrocarbon contamination is not migrating down-gradient across the site, confirming that the pumping and skimming exercise has resulted in the betterment of the hydrocarbon groundwater contamination.

6.3 Watching Brief

A watching brief was maintained by the Principal Contractor throughout the remediation and redevelopment of the site. To the best of BSL's knowledge, gross contamination was not identified, and the ground conditions were understood to be broadly consistent with those encountered during the earlier ground investigations. Therefore, no additional remedial measures were considered necessary at the site over and above those already stipulated within the approved Remedial Strategy.

6.4 Long Term Monitoring and Other Requirements

BSL can confirm that there are no long-term monitoring requirements at the site.

Verification of ground gas protection measures was beyond the scope of this report and is expected to be reported under separate cover.

DRAWINGS



Existing public footpath between 'Ten Acres Lane' & 'Canal Tow Path' shown as ■■■ on plan (situated within ownership but beyond fence line).
Leading to byway (No. 66) on "Canal Tow Path". shown as ■■■ on plan

KEY

- ① Recycling & Refuse
- ② Cycle Storage (Sheffield Stands)
- ③ Motorbike Parking Bay
- ④ EV Electric Car Charging Points
- ⑤ Area for External Plant
- S/S Existing Electrical Sub Station
- S/S Proposed Electrical Sub Station
- ▲ Unit Entrance
- Existing Fence Line
- Proposed Fence Line
- Trees & Vegetation Existing & Proposed
 - Existing Trees
 - Existing Vegetation
 - Ground Cover: evergreen and deciduous shrub ground cover planting with specimen shrubs.
 - Deciduous Hedge: shrub hedge planted in double staggered rows as detailed.
 - Specimen Shrub: specimen native shrub planting as detailed.
 - Wild flower meadow areas: to be seeded with wildflower seed mix as detailed; refer to notes.
 - Native Shrub Planting: native shrub planting mix under planted with wildflower seed mix as detailed.
 - Bulb Planting: native bulbs to be scattered within soil as detailed.
 - Tree Planting: tree planting with tree canopy spread illustrated at 25 years growth.

Disclaimer:
Subject to survey.
The topographical information shown is based on the topographical survey by Greenhatch Group Survey project no. 37505_T Rev1 January 2021

Notes:

Site Boundary
(103,050m²/ 25.46 acres /10.31ha)

AREA SCHEDULE(GIA)

UNIT A (GIA) **5,400ft²**
Warehouse (Incl. office Undercroft) 4,450ft²
Office (FF Only) 950ft²
Car parking spaces 5

UNIT B (GIA) **5,050ft²**
Warehouse (Incl. office Undercroft) 4,175ft²
Office (FF Only) 875ft²
Car parking spaces 4

UNIT C (GIA) **5,050ft²**
Warehouse (Incl. office Undercroft) 4,175ft²
Office (FF Only) 875ft²
Car parking spaces 4

UNIT D (GIA) **5,800ft²**
Warehouse (Incl. office Undercroft) 4,750ft²
Office (FF Only) 1,050ft²
Car parking spaces 5

UNIT E (GIA) **7,300ft²**
Warehouse (Incl. office Undercroft) 5,950ft²
Office (FF Only) 1,350ft²
Car parking spaces 8

UNIT F (GIA) **11,500ft²**
Warehouse (Incl. office Undercroft) 9,900ft²
Office (FF Only) 1,600ft²
Car parking spaces 11

UNIT 1 (GIA) **39,500ft²**
Warehouse (Incl. office Undercroft) 36,900ft²
Office (FF Only) 2,600ft²
Car parking spaces 53

UNIT 2 (GIA) **25,800ft²**
Warehouse (Incl. office Undercroft) 23,750ft²
Office (FF Only) 2,050ft²
Car parking spaces 35

UNIT 3 (GIA) **30,000ft²**
Warehouse (Incl. office Undercroft) 28,000ft²
Office (FF Only) 2,000ft²
Car parking spaces 32

UNIT 4 (GIA) **153,700ft²**
Warehouse (Incl. office Undercroft) 144,100ft²
Office (FF Only) 4,800ft²
Office (SF Only) 4,800ft²
Car parking spaces 120

UNIT 5 (GIA) **123,600ft²**
Warehouse (Incl. office Undercroft) 116,300ft²
Office (FF Only) 3,650ft²
Office (SF Only) 3,650ft²
Car parking spaces 102

UNIT 6 (GIA) **47,800ft²**
Warehouse (Incl. office Undercroft) 44,200ft²
Office (FF Only) 3,600ft²
Car parking spaces 75

TOTAL AREA (GIA) **460,500ft²**
Car parking spaces 454

O	Site Boundary updated	09.12.22	HT	HA
N	Update to Unit 1 yard	21.09.22	HT	HA
M	Update to Unit 1 yard	14.09.22	HT	HA
L	Change reverted	-	HT	HA
K	Access to neighboring property	18.07.22	HT	HA
A-J	See previous versions	10.02.21	HT	HA

Rev: Notes: Date: Dwn: Iss:

0 10 20 30 40 50

Client:



hale

ARCHITECTURE

22c Leathermarket Street, London, SE1 3HP

Project:
Grimshaw Lane, Manchester

Drawing Title:
Proposed Site Plan

Project No:
20066

Scale @ A1 @ A3
1:1000 / 1:2000

Revision:
O

Drawing No:

PL-1003



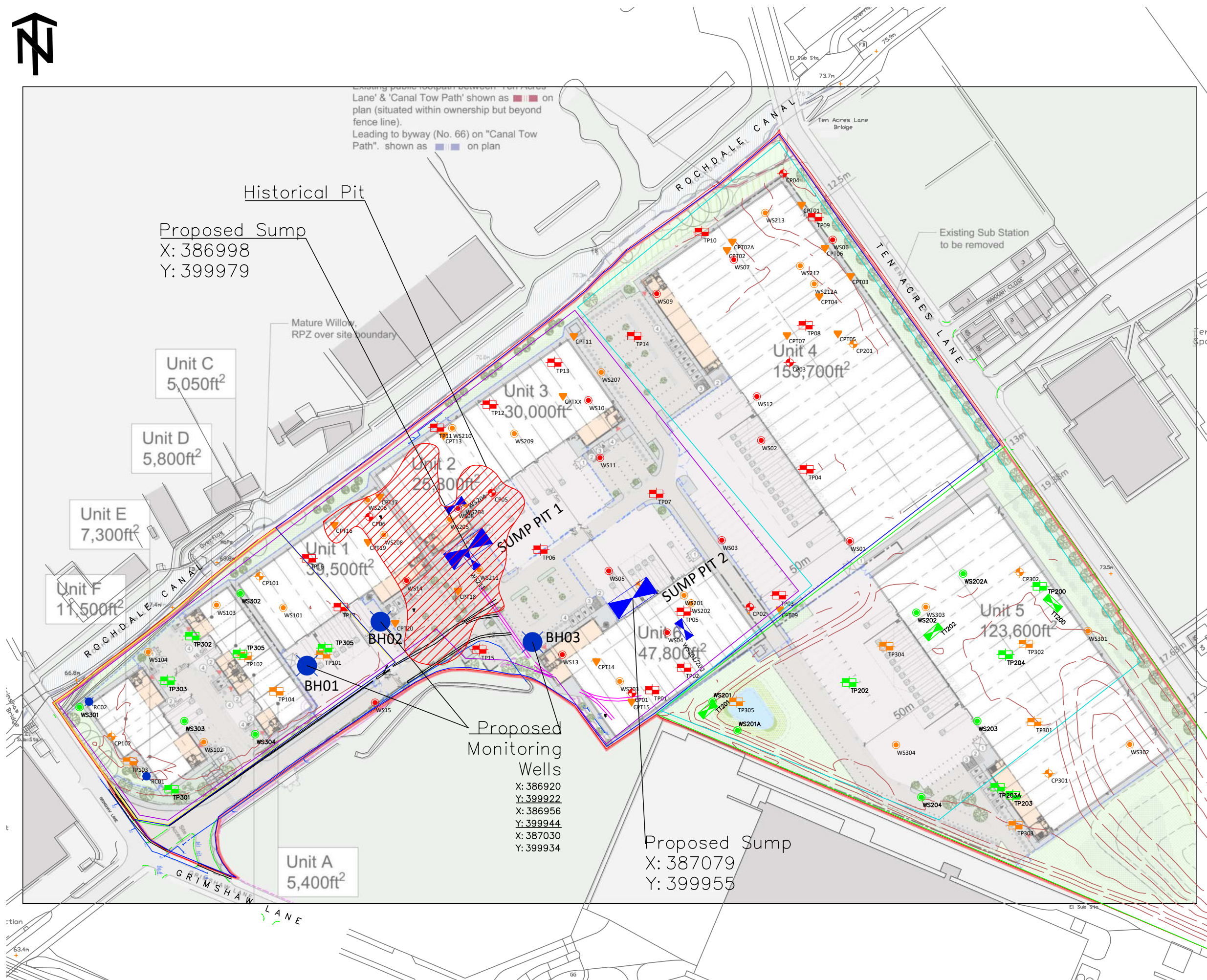
SITE LOCATION

NEAREST POSTCODE: M40 2BA

SITE ENTRANCE WHAT3WORDS:
///VERSE.FARM.ACID



REV	DATE	DESCRIPTION	BY	CKD
<div><div>BROWNFIELD SOLUTIONS LTD <small>CEO ENVIRONMENTAL ENGINEERING EXCELLENCE</small></div></div>				
CLIENT A & H CONSTRUCTION				
PROJECT TITLE LOWRY PARK, MANCHESTER				
DRAWING TITLE SITE LOCATION PLAN				
DRAWING No. C5470/01	REVISION -	SCALE NTS	DATE 12/07/23	
DRAWN BY SD		CHECKED BY JM		



APPENDIX A

Chemical Testing Results

**Harriet Williams**

Brownfield Solutions Ltd
William Smith House
173 - 183 Witton Street
Northwich
Cheshire
CW9 5LP

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

e: h.williams@brownfield-solutions.co.uk

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

Analytical Report Number : 23-46512

Project / Site name:	Lowry Park	Samples received on:	21/07/2023
Your job number:	C5470	Samples instructed on/ Analysis started on:	21/07/2023
Your order number:	C5470 4397 HW	Analysis completed by:	28/07/2023
Report Issue Number:	1	Report issued on:	28/07/2023
Samples Analysed:	5 soil samples		

Signed:

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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.

Analytical Report Number: 23-46512

Project / Site name: Lowry Park

Your Order No: C5470 4397 HW

Lab Sample Number				2756916	2756917	2756918	2756919	2756920
Sample Reference				WS201/202	WS201/202	WS204	WS211	WS211
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.60-2.00	2.00	2.00-3.00	1.80-2.00	4.00-4.00
Date Sampled				20/07/2023	20/07/2023	20/07/2023	20/07/2023	20/07/2023
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	15	15	46	16	34
Total mass of sample received	kg	0.001	NONE	1.1	1.1	0.9	1.1	0.9

Monoaromatics & Oxygenates

Total BTEX & MTBE	mg/kg	0.007	NONE	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
-------------------	-------	-------	------	---------	---------	---------	---------	---------

Monoaromatics & Oxygenates

Benzene	mg/kg	0.005	MCERTS	< 0.005~	< 0.005	< 0.005~	< 0.005	< 0.005~
Toluene	mg/kg	0.005	MCERTS	< 0.005~	< 0.005	< 0.005~	< 0.005	< 0.005~
Ethylbenzene	mg/kg	0.005	MCERTS	< 0.005~	< 0.005	< 0.005~	< 0.005	< 0.005~
p & m-xylene	mg/kg	0.005	MCERTS	< 0.005~	< 0.005	< 0.005~	< 0.005	< 0.005~
o-xylene	mg/kg	0.005	MCERTS	< 0.005~	< 0.005	< 0.005~	< 0.005	< 0.005~
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.005	NONE	< 0.005~	< 0.005	< 0.005~	< 0.005	< 0.005~

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	6	2	< 1.0	76	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	64	30	8	530	3
TPH-CWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	110	81	79	850	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	140	92	640	440	< 8.0
TPH-CWG - Aliphatic >EC16 - EC35 _{EH_CU_1D_AL}	mg/kg	10	MCERTS	250	170	720	1300	< 10
TPH-CWG - Aliphatic >EC35 - EC40 _{EH_CU_1D_AL}	mg/kg	10	NONE	12	< 10	70	11	< 10
TPH-CWG - Aliphatic (EC5 - EC35) _{EH_CU+HS_1D_AL}	mg/kg	10	NONE	320	200	730	1900	15

TPH-CWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH-CWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	1.9	1.1	4.9	25	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	21	10	27	310	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	59	35	180	600	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	88	52	340	290	14
TPH-CWG - Aromatic >EC35 - EC40 _{EH_CU_1D_AR}	mg/kg	10	NONE	< 10	< 10	16	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	170	99	550	1200	19
TPH Total C5 - C40 _{EH_CU+HS_1D_TOTAL}	mg/kg	10	NONE	510	310	1400	3100	35

TPH (C5 - C10) _{HS_1D_TOTAL}	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C10 - C16) _{EH_CU_1D_TOTAL}	mg/kg	10	NONE	93	43	40	950	< 10
TPH (C16 - C40) _{EH_CU_1D_TOTAL}	mg/kg	10	NONE	420	270	1300	2200	32

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-46512

Project / Site name: Lowry Park

* 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 *
2756916	WS201/202	None Supplied	1.60-2.00	Brown sandy clay.
2756917	WS201/202	None Supplied	2	Brown clay.
2756918	WS204	None Supplied	2.00-3.00	Brown loam and clay with gravel and vegetation.
2756919	WS211	None Supplied	1.80-2.00	Brown sandy clay.
2756920	WS211	None Supplied	4.00-4.00	Brown sandy clay.

Analytical Report Number : 23-46512

Project / Site name: Lowry Park

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	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
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	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS

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

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

~ - Quality control surrogate recovery outside of limits, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.



Peter Holland
Brownfield Solutions Ltd
William Smith House
173 - 183 Witton Street
Northwich
Cheshire
CW9 5LP

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: p.holland@brownfield-solutions.co.uk

Analytical Report Number : 23-59429

Project / Site name:	Lowry Park, Manchester	Samples received on:	28/09/2023
Your job number:	C5470	Samples instructed on/ Analysis started on:	28/09/2023
Your order number:		Analysis completed by:	04/10/2023
Report Issue Number:	1	Report issued on:	04/10/2023
Samples Analysed:	3 water samples		

Signed:

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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.

Analytical Report Number: 23-59429
Project / Site name: Lowry Park, Manchester

Lab Sample Number				2828903	2828904	2828905
Sample Reference				BH01	BH02	BH03
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				27/09/2023	27/09/2023	27/09/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status			

General Inorganics

pH (L099)	pH Units	N/A	ISO 17025	8.8	9.1	10.3
Electrical Conductivity at 20 °C (L031B)	µS/cm	10	ISO 17025	1200	1200	680
Sulphate as SO4	mg/l	0.045	ISO 17025	275	498	187
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Chloride	mg/l	0.15	ISO 17025	240	86	58
Ammoniacal Nitrogen as NH4	µg/l	15	ISO 17025	1300	450	2500
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	12.6	9.52	14.7
Nitrate as N	mg/l	0.01	ISO 17025	1.83	0.28	0.36
Nitrate as NO3	mg/l	0.05	ISO 17025	8.12	1.26	1.57
Nitrite as N	µg/l	1	ISO 17025	1400	2.1	130
Nitrite as NO2	µg/l	5	ISO 17025	4700	6.9	440

Hardness - Total	mgCaCO3/l	1	ISO 17025	185	497	170
------------------	-----------	---	-----------	-----	-----	-----

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	0.27	1.45	0.6
Acenaphthylene	µg/l	0.01	ISO 17025	0.12	0.36	0.17
Acenaphthene	µg/l	0.01	ISO 17025	0.33	1.93	0.99
Fluorene	µg/l	0.01	ISO 17025	0.27	1.36	0.44
Phenanthrene	µg/l	0.01	ISO 17025	1.45	5.3	2.06
Anthracene	µg/l	0.01	ISO 17025	0.66	1.92	1.14
Fluoranthene	µg/l	0.01	ISO 17025	3.31	11.2	3.88
Pyrene	µg/l	0.01	ISO 17025	3.08	10.6	3.58
Benzo(a)anthracene	µg/l	0.01	ISO 17025	1.37	4.03	1.48
Chrysene	µg/l	0.01	ISO 17025	1.42	4.18	1.5
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	1.75	5.65	1.69
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	0.55	1.74	0.75
Benzo(a)pyrene	µg/l	0.01	ISO 17025	1.47	4.89	1.63
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	0.74	2.39	0.78
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	0.2	0.57	0.2
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	0.95	3.01	0.95

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	17.9	60.6	21.8
-------------------	------	------	-----------	------	------	------

Analytical Report Number: 23-59429
Project / Site name: Lowry Park, Manchester

Lab Sample Number	2828903	2828904	2828905
Sample Reference	BH01	BH02	BH03
Sample Number	None Supplied	None Supplied	None Supplied
Depth (m)	None Supplied	None Supplied	None Supplied
Date Sampled	27/09/2023	27/09/2023	27/09/2023
Time Taken	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	140	200	190
Calcium (dissolved)	mg/l	0.012	ISO 17025	70	190	68
Chromium (hexavalent)	µg/l	5	ISO 17025	U/S**	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	U/S**	< 5.0	< 5.0
Magnesium (dissolved)	mg/l	0.005	ISO 17025	2.2	5.9	0.32

Arsenic (dissolved)	µg/l	0.15	ISO 17025	9.64	6.22	33.4
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.03	0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	2.8	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	17	2.6	0.9
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.8	0.3
Manganese (dissolved)	µg/l	0.05	ISO 17025	2.6	94	1.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	7	4.3	4
Selenium (dissolved)	µg/l	0.6	ISO 17025	3.9	2.1	5.6
Zinc (dissolved)	µg/l	0.5	ISO 17025	3.1	1	1.3

Monoaromatics & Oxygenates

Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6 _{HS, 1D, AL}	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8 _{HS, 1D, AL}	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10 _{HS, 1D, AL}	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12 _{EH, 1D, AL, MS}	µg/l	10	NONE	< 10	30	< 10
TPH-CWG - Aliphatic >C12 - C16 _{EH, 1D, AL, MS}	µg/l	10	NONE	< 10	470	< 10
TPH-CWG - Aliphatic >C16 - C21 _{EH, 1D, AL, MS}	µg/l	10	NONE	< 10	1100	< 10
TPH-CWG - Aliphatic >C21 - C35 _{EH, 1D, AL, MS}	µg/l	10	NONE	< 10	3300	< 10
TPH-CWG - Aliphatic (C5 - C35) _{HS+EH, 1D, AL, MS}	µg/l	10	NONE	< 10	4900	< 10

TPH-CWG - Aromatic >C5 - C7 _{HS, 1D, AR}	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8 _{HS, 1D, AR}	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10 _{HS, 1D, AR}	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12 _{EH, 1D, AR, MS}	µg/l	10	NONE	< 10	60	< 10
TPH-CWG - Aromatic >C12 - C16 _{EH, 1D, AR, MS}	µg/l	10	NONE	35	270	42
TPH-CWG - Aromatic >C16 - C21 _{EH, 1D, AR, MS}	µg/l	10	NONE	95	740	90
TPH-CWG - Aromatic >C21 - C35 _{EH, 1D, AR, MS}	µg/l	10	NONE	58	610	90
TPH-CWG - Aromatic (C5 - C35) _{HS+EH, 1D, AR, MS}	µg/l	10	NONE	190	1700	220

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-59429
Project / Site name: Lowry Park, Manchester

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode.	In-house method	L029-PL	W	NONE
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260. Refer to CoA for analyte specific accreditation	L073B-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025

Analytical Report Number : 23-59429
Project / Site name: Lowry Park, Manchester

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Chloride in water	Determination of Chloride (diissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

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

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

****U/S - Unsuitable for analysis due to high colour intensity.**



Peter Holland
Brownfield Solutions Ltd
William Smith House
173 - 183 Witton Street
Northwich
Cheshire
CW9 5LP

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: p.holland@brownfield-solutions.co.uk

Analytical Report Number : 23-64138

Project / Site name:	Lowry Park, Manchester	Samples received on:	23/10/2023
Your job number:	C5470	Samples instructed on/ Analysis started on:	23/10/2023
Your order number:	C5470-4672-PH	Analysis completed by:	27/10/2023
Report Issue Number:	1	Report issued on:	27/10/2023
Samples Analysed:	1 water sample		

Signed:

Joanna Szwagrak
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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.

Analytical Report Number: 23-64138
Project / Site name: Lowry Park, Manchester

Your Order No: C5470-4672-PH

Lab Sample Number	2853545			
Sample Reference	BH01			
Sample Number	None Supplied			
Depth (m)	None Supplied			
Date Sampled	19/10/2023			
Time Taken	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	

General Inorganics

pH (L099)	pH Units	N/A	ISO 17025	7.5
Electrical Conductivity at 20 °C (L031B)	µS/cm	10	ISO 17025	1800
Sulphate as SO4	mg/l	0.045	ISO 17025	448
Sulphide	µg/l	5	NONE	< 5.0
Chloride	mg/l	0.15	ISO 17025	100
Ammoniacal Nitrogen as NH4	µg/l	15	ISO 17025	540
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	20.4
Nitrate as N	mg/l	0.01	ISO 17025	1.03
Nitrate as NO3	mg/l	0.05	ISO 17025	4.56
Nitrite as N	µg/l	1	ISO 17025	140
Nitrite as NO2	µg/l	5	ISO 17025	440

Hardness - Total	mgCaCO3/l	1	ISO 17025	814
------------------	-----------	---	-----------	-----

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	0.24
Fluorene	µg/l	0.01	ISO 17025	0.17
Phenanthrene	µg/l	0.01	ISO 17025	1.28
Anthracene	µg/l	0.01	ISO 17025	0.37
Fluoranthene	µg/l	0.01	ISO 17025	2.3
Pyrene	µg/l	0.01	ISO 17025	2.09
Benzo(a)anthracene	µg/l	0.01	ISO 17025	0.91
Chrysene	µg/l	0.01	ISO 17025	0.98
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	1
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	0.53
Benzo(a)pyrene	µg/l	0.01	ISO 17025	0.89
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	0.39
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	0.5

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	11.7
-------------------	------	------	-----------	------

Analytical Report Number: 23-64138
Project / Site name: Lowry Park, Manchester

Your Order No: C5470-4672-PH

Lab Sample Number	2853545			
Sample Reference	BH01			
Sample Number	None Supplied			
Depth (m)	None Supplied			
Date Sampled	19/10/2023			
Time Taken	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	380
Calcium (dissolved)	mg/l	0.012	ISO 17025	270
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0
Magnesium (dissolved)	mg/l	0.005	ISO 17025	35

Arsenic (dissolved)	µg/l	0.15	ISO 17025	4.43
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.2
Chromium (dissolved)	µg/l	0.2	ISO 17025	1
Copper (dissolved)	µg/l	0.5	ISO 17025	18
Lead (dissolved)	µg/l	0.2	ISO 17025	9.9
Manganese (dissolved)	µg/l	0.05	ISO 17025	1500
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	20
Selenium (dissolved)	µg/l	0.6	ISO 17025	2.3
Zinc (dissolved)	µg/l	0.5	ISO 17025	15

Monoaromatics & Oxygenates

Benzene	µg/l	3	ISO 17025	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6 _{HS 1D AL}	µg/l	1	NONE	< 1.0
TPH-CWG - Aliphatic >C6 - C8 _{HS 1D AL}	µg/l	1	NONE	< 1.0
TPH-CWG - Aliphatic >C8 - C10 _{HS 1D AL}	µg/l	1	NONE	< 1.0
TPH-CWG - Aliphatic >C10 - C12 _{EH 1D AL MS}	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16 _{EH 1D AL MS}	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21 _{EH 1D AL MS}	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35 _{EH 1D AL MS}	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35) _{HS+EH 1D AL MS}	µg/l	10	NONE	< 10

TPH-CWG - Aromatic >C5 - C7 _{HS 1D AR}	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8 _{HS 1D AR}	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10 _{HS 1D AR}	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12 _{EH 1D AR MS}	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C12 - C16 _{EH 1D AR MS}	µg/l	10	NONE	30
TPH-CWG - Aromatic >C16 - C21 _{EH 1D AR MS}	µg/l	10	NONE	60
TPH-CWG - Aromatic >C21 - C35 _{EH 1D AR MS}	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35) _{HS+EH 1D AR MS}	µg/l	10	NONE	90

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-64138
Project / Site name: Lowry Park, Manchester

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode.	In-house method	L029-PL	W	NONE
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260. Refer to CoA for analyte specific accreditation	L073B-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025

Analytical Report Number : 23-64138
Project / Site name: Lowry Park, Manchester

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Chloride in water	Determination of Chloride (diissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

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

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Sample Deviation Report



Analytical Report Number : 23-64138

Project / Site name: Lowry Park, Manchester

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH01	None Supplied	W	2853545	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH01	None Supplied	W	2853545	c	Ammonium as NH4 in water	L082-PL	c
BH01	None Supplied	W	2853545	c	Electrical conductivity at 20oC of water	L031-PL	c
BH01	None Supplied	W	2853545	c	pH at 20oC in water (automated)	L099-PL	c



4041

Peter Holland

Brownfield Solutions Ltd
William Smith House
173 - 183 Witton Street
Northwich
Cheshire
CW9 5LP

e: p.holland@brownfield-solutions.co.uk



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

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 23-63160

Project / Site name:	Lowry Park, Manchester	Samples received on:	17/10/2023
Your job number:	C5470	Samples instructed on/ Analysis started on:	17/10/2023
Your order number:		Analysis completed by:	24/10/2023
Report Issue Number:	1	Report issued on:	24/10/2023
Samples Analysed:	1 water sample		

Signed:

Joanna Szwagrak
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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.

Analytical Report Number: 23-63160
Project / Site name: Lowry Park, Manchester

Lab Sample Number				2848718
Sample Reference				bh03
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				27/09/2023
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	

General Inorganics

pH (L099)	pH Units	N/A	ISO 17025	9.5
Electrical Conductivity at 20 °C (L031B)	µS/cm	10	ISO 17025	1600
Sulphate as SO ₄	mg/l	0.045	ISO 17025	712
Sulphide	µg/l	5	NONE	< 5.0
Chloride	mg/l	0.15	ISO 17025	120
Ammoniacal Nitrogen as NH ₄	µg/l	15	ISO 17025	870
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	15.7
Nitrate as N	mg/l	0.01	ISO 17025	0.38
Nitrate as NO ₃	mg/l	0.05	ISO 17025	1.68
Nitrite as N	µg/l	1	ISO 17025	8.4
Nitrite as NO ₂	µg/l	5	ISO 17025	28

Hardness - Total	mgCaCO ₃ /l	1	ISO 17025	832
------------------	------------------------	---	-----------	-----

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	0.58
Acenaphthylene	µg/l	0.01	ISO 17025	0.28
Acenaphthene	µg/l	0.01	ISO 17025	1.67
Fluorene	µg/l	0.01	ISO 17025	1.39
Phenanthrene	µg/l	0.01	ISO 17025	2.68
Anthracene	µg/l	0.01	ISO 17025	0.96
Fluoranthene	µg/l	0.01	ISO 17025	5.03
Pyrene	µg/l	0.01	ISO 17025	5.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	2.04
Chrysene	µg/l	0.01	ISO 17025	2.43
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	3.51
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	1.56
Benzo(a)pyrene	µg/l	0.01	ISO 17025	3.07
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	1.88
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	0.45
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	2.41

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	35
-------------------	------	------	-----------	----

Analytical Report Number: 23-63160
Project / Site name: Lowry Park, Manchester

Lab Sample Number				2848718
Sample Reference				bh03
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				27/09/2023
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	180
Calcium (dissolved)	mg/l	0.012	ISO 17025	330
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0
Magnesium (dissolved)	mg/l	0.005	ISO 17025	4.7

Arsenic (dissolved)	µg/l	0.15	ISO 17025	10
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.04
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	5.1
Lead (dissolved)	µg/l	0.2	ISO 17025	2.8
Manganese (dissolved)	µg/l	0.05	ISO 17025	37
Mercury (dissolved)	µg/l	0.05	ISO 17025	0.06
Nickel (dissolved)	µg/l	0.5	ISO 17025	7
Selenium (dissolved)	µg/l	0.6	ISO 17025	2.3
Zinc (dissolved)	µg/l	0.5	ISO 17025	9.1

Monoaromatics & Oxygenates

Benzene	µg/l	3	ISO 17025	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6 _{HS_1D_AL}	µg/l	1	NONE	< 1.0
TPH-CWG - Aliphatic >C6 - C8 _{HS_1D_AL}	µg/l	1	NONE	< 1.0
TPH-CWG - Aliphatic >C8 - C10 _{HS_1D_AL}	µg/l	1	NONE	< 1.0
TPH-CWG - Aliphatic >C10 - C12 _{EH_1D_AL_MS}	µg/l	10	NONE	140
TPH-CWG - Aliphatic >C12 - C16 _{EH_1D_AL_MS}	µg/l	10	NONE	520
TPH-CWG - Aliphatic >C16 - C21 _{EH_1D_AL_MS}	µg/l	10	NONE	560
TPH-CWG - Aliphatic >C21 - C35 _{EH_1D_AL_MS}	µg/l	10	NONE	1400
TPH-CWG - Aliphatic (C5 - C35) _{HS+EH_1D_AL_MS}	µg/l	10	NONE	2600

TPH-CWG - Aromatic >C5 - C7 _{HS_1D_AR}	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8 _{HS_1D_AR}	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10 _{HS_1D_AR}	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12 _{EH_1D_AR_MS}	µg/l	10	NONE	56
TPH-CWG - Aromatic >C12 - C16 _{EH_1D_AR_MS}	µg/l	10	NONE	210
TPH-CWG - Aromatic >C16 - C21 _{EH_1D_AR_MS}	µg/l	10	NONE	300
TPH-CWG - Aromatic >C21 - C35 _{EH_1D_AR_MS}	µg/l	10	NONE	350
TPH-CWG - Aromatic (C5 - C35) _{HS+EH_1D_AR_MS}	µg/l	10	NONE	920

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-63160

Project / Site name: Lowry Park, Manchester

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Nitrite in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry).Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode.	In-house method	L029-PL	W	NONE
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260. Refer to CoA for analyte specific accreditation	L073B-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrite as N in water	Determination of nitrite in water by addition of sulphanilamide and NED followed by discrete analyser (colorimetry). Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025

Analytical Report Number : 23-63160

Project / Site name: Lowry Park, Manchester

Water matrix abbreviations:

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Chloride in water	Determination of Chloride (diissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

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

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Sample Deviation Report



Analytical Report Number : 23-63160

Project / Site name: Lowry Park, Manchester

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
bh03	None Supplied	W	2848718	c	BTEX and MTBE in water (Monoaromatics)	L073B-PL	c
bh03	None Supplied	W	2848718	c	Hexavalent chromium in water	L080-PL	c
bh03	None Supplied	W	2848718	c	Ammoniacal Nitrogen as N in water	L082-PL	c
bh03	None Supplied	W	2848718	c	Ammonium as NH4 in water	L082-PL	c
bh03	None Supplied	W	2848718	c	Boron in water	L039-PL	c
bh03	None Supplied	W	2848718	c	Cr (III) in water	L080-PL	c
bh03	None Supplied	W	2848718	c	Dissolved Organic Carbon in water	L037-PL	c
bh03	None Supplied	W	2848718	c	Electrical conductivity at 20oC of water	L031-PL	c
bh03	None Supplied	W	2848718	c	Metals in water by ICP-MS (dissolved)	L012-PL	c
bh03	None Supplied	W	2848718	c	Metals in water by ICP-OES (dissolved)	L039-PL	c
bh03	None Supplied	W	2848718	c	Nitrate as N in water	L078-PL	c
bh03	None Supplied	W	2848718	c	Nitrate in water	L078-PL	c
bh03	None Supplied	W	2848718	c	Nitrite as N in water	L082-PL	c
bh03	None Supplied	W	2848718	c	Nitrite in water	L082-PL	c
bh03	None Supplied	W	2848718	c	Speciated EPA-16 PAHs in water	L102B-PL	c
bh03	None Supplied	W	2848718	c	Sulphate in water	L039-PL	c
bh03	None Supplied	W	2848718	c	Sulphide in water	L029-PL	c
bh03	None Supplied	W	2848718	c	TPHCWG (Waters)	L070-PL	c
bh03	None Supplied	W	2848718	c	Total Hardness of water	L045-PL	c
bh03	None Supplied	W	2848718	c	pH at 20oC in water (automated)	L099-PL	c

APPENDIX B

Exploratory Hole Logs

<div><div>BROWNFIELD SOLUTIONS LTD</div></div>						<div>Trial Pit Log</div>		<div>No.</div> <div>WS201/202</div> <div>Sheet 1 of 1</div>	
<div>PROJECT NO: C5470</div>						<div>CO-ORDS:</div>		<div>Hole Type</div> <div>TP</div>	
<div>PROJECT NAME: LOWRY PARK</div>						<div>LEVEL:</div>		<div>Scale</div> <div>1:25</div>	
<div>CLIENT: A&H CONSTRUCTION & DEVELOPMENT PLC.</div>						<div>DATES: 20/07/23</div>		<div>Logged</div> <div>HW</div> <div>Checked</div> <div>CM</div>	
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description		
	Depth (m)	Type	Results						
							MADE GROUND: Brown slightly gravelly clay. Gravel is angular fine to coarse of brick, concrete, and timber. <i>Small seepage of groundwater encountered at 0.2m bgl.</i>		1.0
	1.60-2.00 1.60	ES PID	3.9PPM	1.60	MADE GROUND: Grey gravelly clay. Gravel is angular fine to coarse of slate and brick. <i>Ceramic pipe encountered at 1.60m bgl, which released large amounts of water that exhibited a sheen.</i>				
	2.00	ES PID	8.1PPM	2.00	Stiff bluish grey and brown slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mudstone.		2.0		
				2.20	End of Trial Pit at 2.20m				
									3.0
									4.0
									5.0
Remarks		1. Clearance of services by BSL engineer using CAT and Genny. 2. Small seepage of groundwater encountered at 0.20m bgl. 3. Excavation terminated within natural strata. 4. Trial pit sides stable. 5. Trial pit backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane	

<div>BROWNFIELD SOLUTIONS LTD</div>						Trial Pit Log		No. WS204			
PROJECT NO: C5470						CO-ORDS:		Sheet 1 of 1			
								Hole Type TP			
PROJECT NAME: LOWRY PARK						LEVEL:		Scale 1:25			
CLIENT: A&H CONSTRUCTION & DEVELOPMENT PLC.						DATES: 20/07/23		Logged	Checked		
								HW	CM		
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description				
	Depth (m)	Type	Results								
<div><div></div><div></div></div>	2.00-3.00 2.00	ES PID	0.0PPM	0.20			MADE GROUND: Brown slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular fine to coarse of brick, concrete, and sandstone.			1.0	
				0.30			MADE GROUND: Black slightly sandy angular to subangular fine to coarse gravel of tarmacadam. Sand is fine to coarse.				
							MADE GROUND: Soft bluish grey and brown clay. Slight hydrocarbon odour.				
				1.20							
				1.70			MADE GROUND: Blueish grey slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone, plastic, and slate. Slight hydrocarbon odour and sheen on arisings.				
				2.00			MADE GROUND: Brown gravelly fine to coarse sand with a low cobble content. Gravel is subangular to rounded fine to coarse of sandstone. Cobbles are angular of sandstone up to 200mm in diameter. <i>Moderate seepage of groundwater encountered at 1.70m bgl.</i>				2.0
							MADE GROUND: Black sandy angular to subangular fine to coarse gravel of brick, sandstone, timber, iron nails, and plastic. Sand is fine to coarse. <i>Strong groundwater strike at 2.00m bgl with a hydrocarbon sheen.</i> <i>Flank collapse from 2.00m to 3.00m bgl.</i>				
				3.00			End of Trial Pit at 3.00m				
Remarks											
1. Clearance of services by BSL engineer using CAT and Genny. 2. Moderate seepage of groundwater encountered at 1.70m bgl and high groundwater seepage encountered at 2.00m bgl. 3. Excavation terminated due to high water level making it difficult to distinguish soil horizons. 4. Flank collapse from 2.00m to 3.00m bgl. 5. Trial pit backfilled with arisings upon completion.								ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane			

<div>BROWNFIELD SOLUTIONS LTD</div>					Trial Pit Log		No. WS211	
PROJECT NO: C5470					CO-ORDS:		Sheet 1 of 1	
PROJECT NAME: LOWRY PARK					LEVEL:		Hole Type TP	
CLIENT: A&H CONSTRUCTION & DEVELOPMENT PLC.					DATES: 20/07/23		Scale 1:25	
							Logged HW	Checked CM
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m OD)	Legend	Stratum Description	
	Depth (m)	Type	Results					
▼	0.00-0.60	ES					MADE GROUND: Dark brown and dark grey slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of brick, concrete, and metal. Slight hydrocarbon odour.	
	0.60	PID	1.6PPM	0.60			Loose metal pipe encountered between 0.50m and 0.60m bgl, with a slight hydrocarbon odour and sheen.	
▼	1.80-2.00 1.80	ES PID	88.6PPM	1.60			MADE GROUND: Soft bluish grey and brown clay. Small seepage of perched groundwater at 0.60m bgl.	
				2.90			MADE GROUND: Bluish grey slightly sandy gravelly clay. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone, plastic, and slate. Slight hydrocarbon odour and sheen on arisings. Timber log encountered at 1.80m approximately 1.00m in length. Small seepage of groundwater encountered at 2.00m bgl.	
				3.60			MADE GROUND: Black slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to sub rounded fine to coarse of plastic, timber, and metal.	
	4.00	ES PID	0.6PPM	5.00			Very soft brown CLAY.	
							End of Trial Pit at 5.00m	
Remarks		1. Clearance of services by BSL engineer using CAT and Genny. 2. Small seepage of groundwater encountered at 0.60m bgl and 2.00m bgl. 3. Excavation terminated within natural strata. 4. Trial pit sides stable. 5. Trial pit backfilled with arisings upon completion.						ES = Environmental Sample D = Disturbed Sample B = Bulk Sample LB = Large Bulk Sample U = Undisturbed Sample UT = Undisturbed Thin Wall Sample SPT = Standard Penetration Test PID = Photoionization Detector (ppm) PPM = Part Per Million HSV = Hand Shear Vane

APPENDIX C

PID Calibration Certificates

ESS
11 MICKELTON ROAD
RIVERSIDE INDUSTRIAL ESTATE
MIDDLESBROUGH
TS2 1RQ
TEL: 01642 458886

CERTIFICATE OF CALIBRATION



ESS

Safety, Survey, Test & Measurement

CUSTOMER	BROWNFIELD SOLUTIONS LTD
JOB/CERTIFICATE NO:	21004087
MAKE/MODEL	ION SCIENCE PHOCHECK TIGER PID
SERIAL NO:	T-108655

VISUAL INSPECTION	OK
-------------------	----

OPERATIONAL	OK
-------------	----

	CHANNEL 1	CHANNEL 2	CHANNEL 3	CHANNEL 4	CHANNEL 5	CHANNEL 6
SENSOR TYPE:	VOC/PID					
GAS CYL NO:	AGG7104 3-2					
CAL GAS USED:	ISOBUTYLENE (100PPM)					
HIGH ALARM:	100PPM					
LOW ALARM:	50PPM					
DATE OF SERVICE:	10/02/2023					
CAL DUE DATE:	10/08/2023					

THE INSTRUMENT DETAILED ABOVE HAS BEEN TESTED & CALIBRATED AGAINST THE MANUFACTURERS SPECIFICATION USING EQUIPMENT TRACEABLE TO THE MANUFACTURERS STANDARDS AND IN ACCORDANCE WITH ISO 9001:2021. EVERY PRECAUTION HAS BEEN TAKEN TO ENSURE THAT THE EQUIPMENT SPECIFIED HAS BEEN INSPECTED IN FULL AND IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. IT IS THE OWNERS RESPONSIBILITY TO ENSURE IT FUNCTIONS CORRECTLY BEFORE EACH USE. ESS VP WILL NOT ACCEPT LIABILITY FOR ANY DAMAGE OR LOSS THAT OCCURS AS A RESULT OF IMPROPER CHECKS AND/OR USE OF EQUIPMENT.

SIGNED:

ESS
11 MICKELTON ROAD
RIVERSIDE INDUSTRIAL ESTATE
MIDDLESBROUGH
TS2 1RQ
TEL: 01642 458886

CERTIFICATE OF CALIBRATION



ESS

Safety, Survey, Test & Measurement

CUSTOMER	BROWNFIELD SOLUTIONS LTD
JOB/CERTIFICATE NO:	21004603
MAKE/MODEL	IONSCIENCE PHOCHECK TIGER
SERIAL NO:	T-108655

VISUAL INSPECTION	OK
-------------------	----

OPERATIONAL	OK
-------------	----

	CHANNEL 1	CHANNEL 2	CHANNEL 3	CHANNEL 4	CHANNEL 5	CHANNEL 6
SENSOR TYPE:	PID/VOC					
GAS CYL NO:	WO272326					
CAL GAS USED:	ISOBUTYLENE (100PPM)					
HIGH ALARM:	100PPM					
LOW ALARM:	50PPM					
DATE OF SERVICE:	21/08/2023					
CAL DUE DATE:	21/02/2024					

THE INSTRUMENT DETAILED ABOVE HAS BEEN TESTED & CALIBRATED AGAINST THE MANUFACTURERS SPECIFICATION USING EQUIPMENT TRACEABLE TO THE MANUFACTURERS STANDARDS AND IN ACCORDANCE WITH ISO 9001:2021. EVERY PRECAUTION HAS BEEN TAKEN TO ENSURE THAT THE EQUIPMENT SPECIFIED HAS BEEN INSPECTED IN FULL AND IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS. IT IS THE OWNERS RESPONSIBILITY TO ENSURE IT FUNCTIONS CORRECTLY BEFORE EACH USE. ESS VP WILL NOT ACCEPT LIABILITY FOR ANY DAMAGE OR LOSS THAT OCCURS AS A RESULT OF IMPROPER CHECKS AND/OR USE OF EQUIPMENT.

SIGNED:

APPENDIX D

Waste Transfer Notes

The Hazardous Waste Regulations 2005: Consignment Note

ADLER

PART A Notification details

1 Consignment note code:

A H C O N S / E A 8 7 0

2 The waste described below is to be removed from (name, address, postcode, telephone, e-mail, facsimile):

A & H CONSTRUCTION, LOWERY PARK, GRIMSHAW
LANE, MANCHESTER M40 2BA

3 The waste will be taken to (name, address and postcode):

ADLER & ALLAN MANCHESTER M28 3GN

4 The waste producer was (if different from 2) (name, address, postcode, telephone, e-mail, facsimile):

SAME AS A2

PART B Description of the waste

If continuation sheet used, tick here ☐ n

1 The process giving rise to the waste(s) was:

INTERCEPTOR

2 SIC (2007) for the process giving rise to the waste:

41 . 20 / 1

3 WASTE DETAILS (where more than one waste type is collected all of the information given below must be completed for each EWC identified)

Description of waste	List of wastes (EWC code) (6 digits)	Quantity (kg)	The chemical/biological components in the waste and their concentrations are:		Physical form (gas, liquid, solid, powder, sludge or mixed)	Hazard code(s)	Container type, number and size
			Component	Concentration (% or mg/kg)			
OILY WATER	1 3 0 5 0 7	7500 G			LIQUID		

The information given below is to be completed for each EWC identified

EWC code	UN identification number(s)	Proper shipping name(s)	UN class(es)	Packing group(s)	Special handling requirements
1 3 0 5 0 7					

PART C Carrier's certificate

(If more than one carrier is used, please attach schedule for subsequent carriers. If schedule carriers is attached tick here. ☐)

I certify that I today collected the consignment and that the details in A2, A3 and B3 are correct and I have been advised of any specific handling requirements.

Where this note comprises part of a multiple collection the round number and collection number

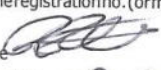
1 Carrier name: **TARDIS ENVIRONMENTAL**

On behalf of (name, address, postcode, telephone, e-mail, facsimile):

SITE 4, HALESFIELD 21, TELFORD, TF7 4PA

2 Carrier registration no./reason for exemption: **CBDU84986**

3 Vehicle registration no. (or mode of transport, if not road):

Signature 

Date 27 09 23

Time

PART D Consignor's certificate

I certify that the information in A, B and C has been completed and is correct, that the carrier is registered or exempt and was advised of the appropriate precautionary measures. All of the waste is packaged and labelled correctly and the carrier has been advised of any special handling requirements.

I confirm that I have fulfilled my duty to apply the waste hierarchy as required by Regulation 12 of the Waste (England and Wales) Regulations 2011.

1 Consignor name:

On behalf of (name, address, postcode, telephone, e-mail, facsimile):

A. G. Surral

Signature 

Date 27/9/23

Time

0808

PART E Consignee's certificate (where more than one waste type is collected all of the information given below must be completed for each EWC)

Individual EWC code(s) received	Quantity of each EWC code received (kg)	EWC code accepted/rejected	Waste management operation (R or D code)
1 3 0 5 0 7	7500	✓	R13

1 I received this waste at the address given in A3 on: Date

27 09 2023

Time 0900

2 Vehicle registration no. (or mode of transport if not road):

BV72 DGX

3 Where waste is rejected please provide details:

Name:

On behalf of (name, address, postcode, telephone, e-mail, facsimile):

J TYRER

A + A

M28 3GN

I certify that waste permit/exempt waste operation number:

NP3234LD

authorises the management of the waste described in B at the address given in A3.

Where the consignment forms part of a multiple collection, as identified in Part C, I certify that the total number of consignments forming the collection are:

Signature 

Date 27 09 2023

Time

1000

North West

**William Smith House
173 – 183 Witton Street
Northwich
Cheshire
CW9 5LP**

Tel: 01606 334 844

Midlands

**Unit 5, Alfred Court
Saxon Business Park
Stoke Prior
Bromsgrove
Worcestershire
B60 4AD**

Tel: 01215 729014

www.brownfield-solutions.com



Annex D: Ground Gas Membrane Verification Report



Gas Membrane Installation
Validation Report
A&H Construction
Lowry Park
Grimshaw Lane
Manchester
M40 2BA



THIS PAGE IS INTENTIONALLY BLANK

1. INTRODUCTION

1.1 Purpose

UK Membranes are installing a gas protection membrane to the aforementioned site. MEC Environmental Ltd (MEC) has been appointed by UK Membranes to carry out independent validation of the installation of the membrane on the site as per our terms of engagement. The frequency of independent inspections has been determined by the client, comprehensive CQA should be forwarded by the installer to cover any data gaps for areas that have not been subjected to independent inspections.

The **SOLE** purpose of the works undertaken by MEC Environmental is to provide independent inspections and a factual report as and when requested to assist the client in gaining regulatory approval with regards to the gas membrane installation. This is as per the scope of work section within our term's engagement.

1.2 Limitations

This report is limited to providing lines of evidence to the regulatory authority for the areas components inspected by MEC only in support of the discharging of the relevant planning conditions only and cannot be used or relied upon for any other purpose. No professional liability shall be extended to any other parties by MEC, the report should explicitly not be relied on by any future vendor or tenant as proof that the gas protection measures are sufficient for the site and functioning at the time of purchase or start of any tenancy. Gas protection systems are not solely reliant on the gas membrane as points are scored under BS8485 for the floor slab, membrane and venting, these components work collaboratively to provide a gas protection system. This is as per the conditions within our term's engagement.

The report has been provided on the assumption that no damage or works that may have compromised the components and integrity of the gas membrane have been made after our inspections, failure to report any such occurrences will invalidate any liability and render the report and contents invalid. This is as per the conditions within our term's engagement.

This report has been prepared in accordance with the best available practice and the relevant guidance documents listed below of which the author of the report was a contributor and member of the steering committees:

Mallett H, Wilson S, Corban M (2014) "Good practice on the testing and verification of protection systems for buildings against hazardous ground gases". CIRIA Report C735

1.3 Compliance with Regulation 7 of Building Regulations

Regulation 7 of the building regulations requires that building work shall be carried out in a workmanlike manner. Approved document 7 suggests installation can comply with the regulation if workmanship is such that, where relevant, materials are adequately mixed or prepared and applied, used or fixed so as to perform adequately the functions for which they are intended.

A reasonable standard may be demonstrated by:

Compliance with a standard and independent certification - The relevant standard for gas protection measures is BS8485:2015 +A1:2019, Table 7 of the standard requires that gas membranes are verified as per CIRIA C735.

Past experience – The installers qualifications are checked by MEC Environmental to ensure that the installation supervisor holds the NVQ Level 2 in gas membrane installations.

Integrity Testing methods. – are carried out as prescribed in CIRIA C735, unless stated elsewhere
Frequency of Visits – MEC have not been employed to prepare a validation plan for this project, the frequency of visits is as per the instructions of the client, in essence MEC inspected the available membrane that could be inspected each time an inspection visit was requested. The area inspected on each visit is noted on the survey sheets in appendix 1. This report should be read in conjunction with the installers CQA report.

1.4 Method of Inspection (Per Visit)

All seams and non-seam areas of the available gas membrane were inspected/tested by the Validation Surveyor for identification of defects, protruding and penetrating objects, lack of subgrade support, overheating, holes, blisters, undispersed raw materials, scratches and gouges, and any sign of contamination by foreign matter.

Any portion of the gas membrane exhibiting a flaw or failing a visual inspection/testing was repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure was agreed upon between the Validation Consultant and the Installer at the time of the repair and is noted in the survey sheets.

Major repairs are visually inspected/tested, repairs passing the inspection/testing were considered acceptable. In some cases minor repairs may be carried out under contractor CQA and photographic evidence supplied to the verifier for inclusion in the report.

1.5 MEC Staff Competency

All site inspections have been carried out by suitably qualified staff as defined in CIRIA C735, the qualification held by all MEC inspection surveyors is either the NVQ Level 4 in gas protection verification or the NVQ Level 2 in gas membrane installation

The author of this report is also a CL:AIRE accredited Specialist in Gas Protection Verification (SGPV) and holds both the NVQ Level 2 in gas membrane installation and the NVQ Level 4 in gas protection verification.

1.6 Conclusion

During our inspections to the areas denoted in Appendix 1 (Site Surveys Sheets) we witnessed the installer carrying out the installation in a workmanlike manner, the materials were adequately prepared and applied, used and fixed so as to perform adequately the functions for which they are intended as per Regulation 7 of the building regulations. In instances where 100% of the installation has not been independently inspected/tested then this report should be read in conjunction with the gas membrane installers CQA records.

The installers all hold the NVQ Level 2 "Gas membrane Installations" qualification and as such are classed as a qualified and experienced installer. MEC Environmental have checked the CSCS Trade Cards of the installers, which confirms the holder has attained the qualification.

Signed



Date: 03/05/2024

Michael Corban S.G.P.V.

Director

MEC Environmental Ltd

Appendix 1 – Site Survey Sheets

Site name: A&H Construction @ Lowry Park, Grimshaw Lane, Manchester		Units/ plots checked: : Office area line out to units E & F	
Postcode: M40 2BA			
Installers Name: UK Membranes			
Date: 19/10/2023			
Inspection by: Dan Squire		Weather: 13°C Wet	
Item	Comments		
Sub-floor void	N/A		
Ventilation Inlets and Outlets	N/A		
Number Of Vents	N/A		
Materials used:	Membrane – Juta GP5 gas barrier membrane		
	Self-Adhesive Membrane ☒ Yes	Preformed Top hats ☐ Yes	
	Double Sided Butyl Tape ☐ Yes	Preformed Corners ☐ Yes	
	Others Please List: N/A		
Installation Notes	<p><u>(brief description of area/plots and list of defects/repairs identified to the main membrane sheet, excluding detailing and joints)</u></p> <p>MEC Environmental carried out a thorough visual inspection of the membrane, the membrane had been installed to a good standard. The membrane is lined across the full base of each office area in units E & F, extending into the building so the membrane can sit under temporary shuttering for the concrete pour. The membrane is hand welded and is joined to the perimeter steel frame using SAGM as a retro fit detail. All pipe penetrations & stanchions are also sealed using SAGM and heat applied.</p>		
Type of Joint	Tape Joint ☐	Auto Weld ☐	Hand Weld ☒ Extrusion Weld ☐
Jointing/Detailing Testing	☐ Air Lance (ASTM D4437)		☒ Probe Test (ASTM D4437)
Laps, welds and detailing Ventilation Inlets & Outlets	Have all joints passed testing prior to surveyor leaving site?	☒ Yes	☐ No ☐ N/A
	Have all pipes passed testing prior to surveyor leaving site?	☒ Yes	☐ No ☐ N/A
	Have all stanchions/wind braces/columns passed testing prior to surveyor leaving site?	☒ Yes	☐ No ☐ N/A
	Have all piles and pile caps passed testing prior to surveyor leaving site?	☐ Yes	☐ No ☒ N/A

Has all other detailing work passed inspection	☒ Yes	☐ No	☐ N/A
<p><u>(List any defects to detailing work and joints):</u></p> <p>During our inspection the following defects and repairs were carried out: 3no patch repairs made by the installers using SAGM and heat applied.</p> <p>Have any defects identified above been satisfactorily rectified ☒ Yes ☐ No ☐ N/A</p> <p>The Area has passed inspection ☒</p> <p>The Area has failed inspection and a corrective action sheet has been left with the contractor ☐</p> <p>The Area is incomplete as detailed above ☐</p> <p>Signed: Dan Squire Date: 19/10/2023</p>			

Area Inspected

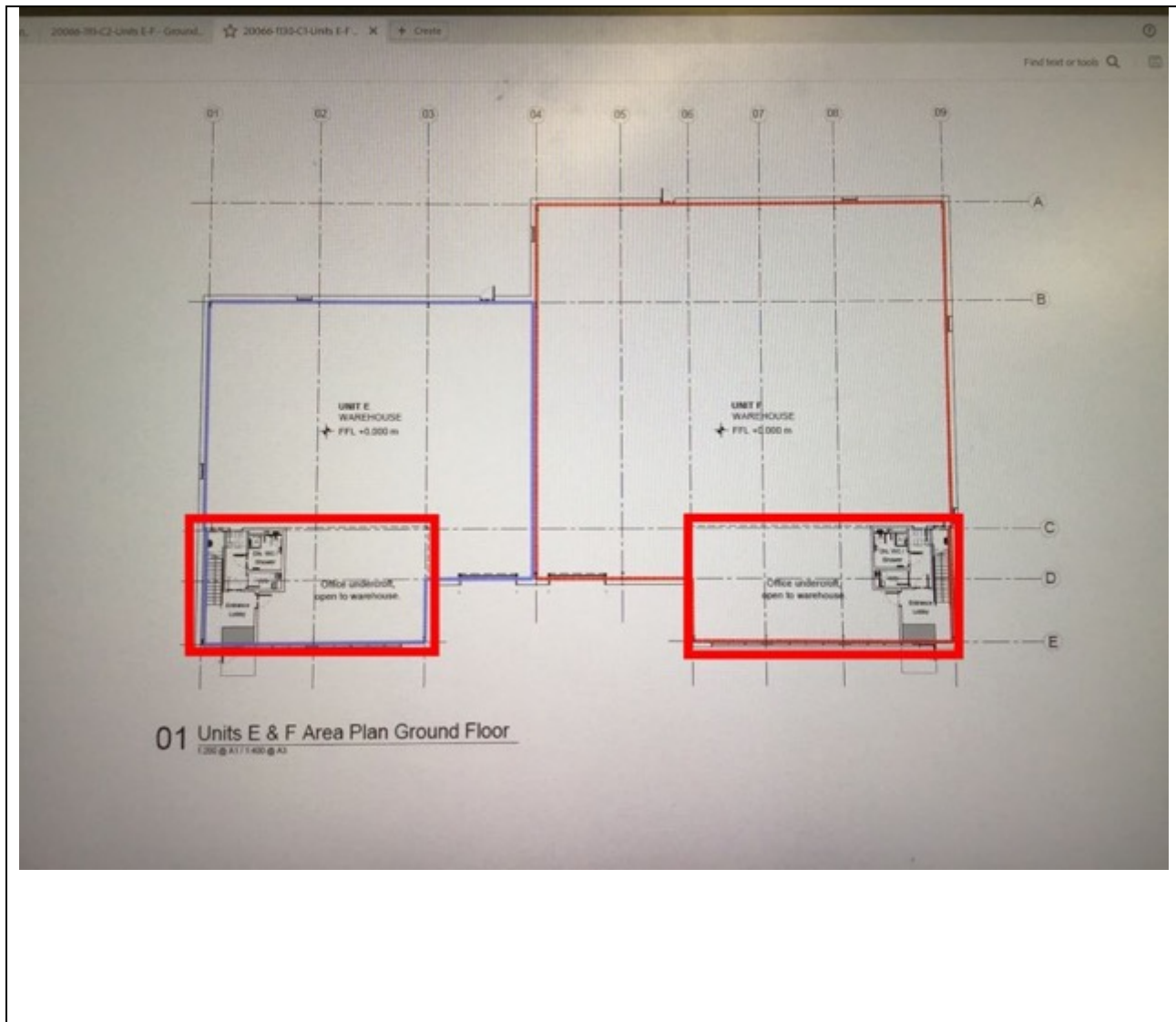


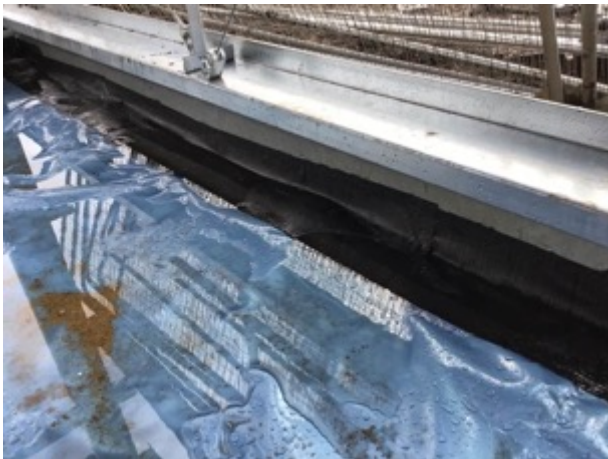
Photo 19/10/2023



Block F office area overview



Block F sealed stanchion detailing



Block F sealed retro fit detailing



Block F sealed pipe penetrations



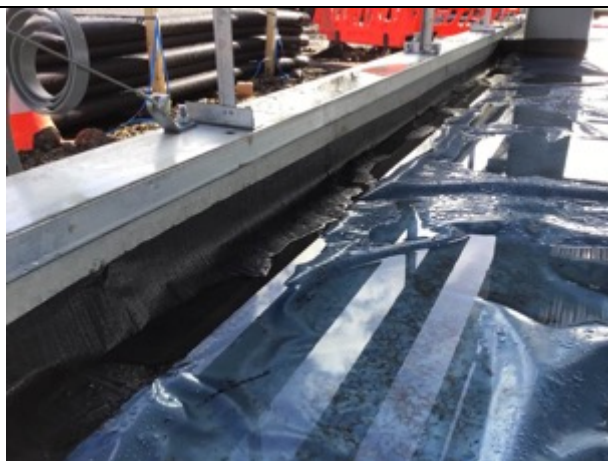
Block F sealed stair detail



Block E office area overview



Block E sealed stanchion detailing



Block E sealed retro fit detailing



Block E sealed pipe penetrations



Block E sealed stair detail



Pick test to sealed hand weld membrane joint



Sealed SAGM patch repair

Site name: A&H Construction @ Lowry Park, Grimshaw Lane, Manchester.		Units/ plots checked: : Units A-B-C-D Office areas	
Postcode: M40 2BA			
Installers Name: UK Membranes			
Date: 04/01/2024			
Inspection by: Ross Edwards		Weather: 7°C Overcast	
	Item	Comments	
	Sub-floor void		
	Ventilation Inlets and Outlets	N/A	
	Number Of Vents		
	Materials used:	Membrane – JUTA GP5 Gas Membrane Self-Adhesive Membrane ☒ Yes Preformed Top hats ☐ Yes Double Sided Butyl Tape ☐ Yes Preformed Corners ☐ Yes Others Please List: Bitumen primer	
	Installation Notes	<u>(brief description of area/plots and list of defects/repairs identified to the main membrane sheet, excluding detailing and joints)</u> MEC Environmental carried out a thorough visual inspection of the membrane, the membrane had been installed to a good standard, the membrane has been installed across the footprints of the office areas with the membrane terminated to the perimeter steel with SAGM applied as a retro fit detailing applied. All other forms of detailing sealed with SAGM.	
	Type of Joint	Tape Joint ☐	Auto Weld ☐ Hand Weld ☒ Extrusion Weld ☐
	Jointing/Detailing Testing	☐ Air Lance (ASTM D4437) ☒ Probe Test (ASTM D4437)	
	Laps, welds and detailing	Have all joints passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A
		Have all pipes passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A
	Ventilation Inlets & Outlets	Have all stanchions/wind braces/columns passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A
		Have all piles and pile caps passed testing prior to surveyor leaving site?	☐ Yes ☐ No ☒ N/A
		Has all other detailing work passed inspection	☒ Yes ☐ No ☐ N/A

	<p><u>(List any defects to detailing work and joints):</u></p> <p>During our inspection the following defects and repairs were carried out: no defects located</p> <p>Have any defects identified above been satisfactorily rectified ☐ Yes ☐ No ☒ N/A</p> <p>The Area has passed inspection ☒</p> <p>The Area has failed inspection and a corrective action sheet has been left with the contractor ☐</p> <p>The Area is incomplete as detailed above ☐</p> <p>Signed: Ross Edwards Date: 04/01/2024</p>
--	--

Area Inspected

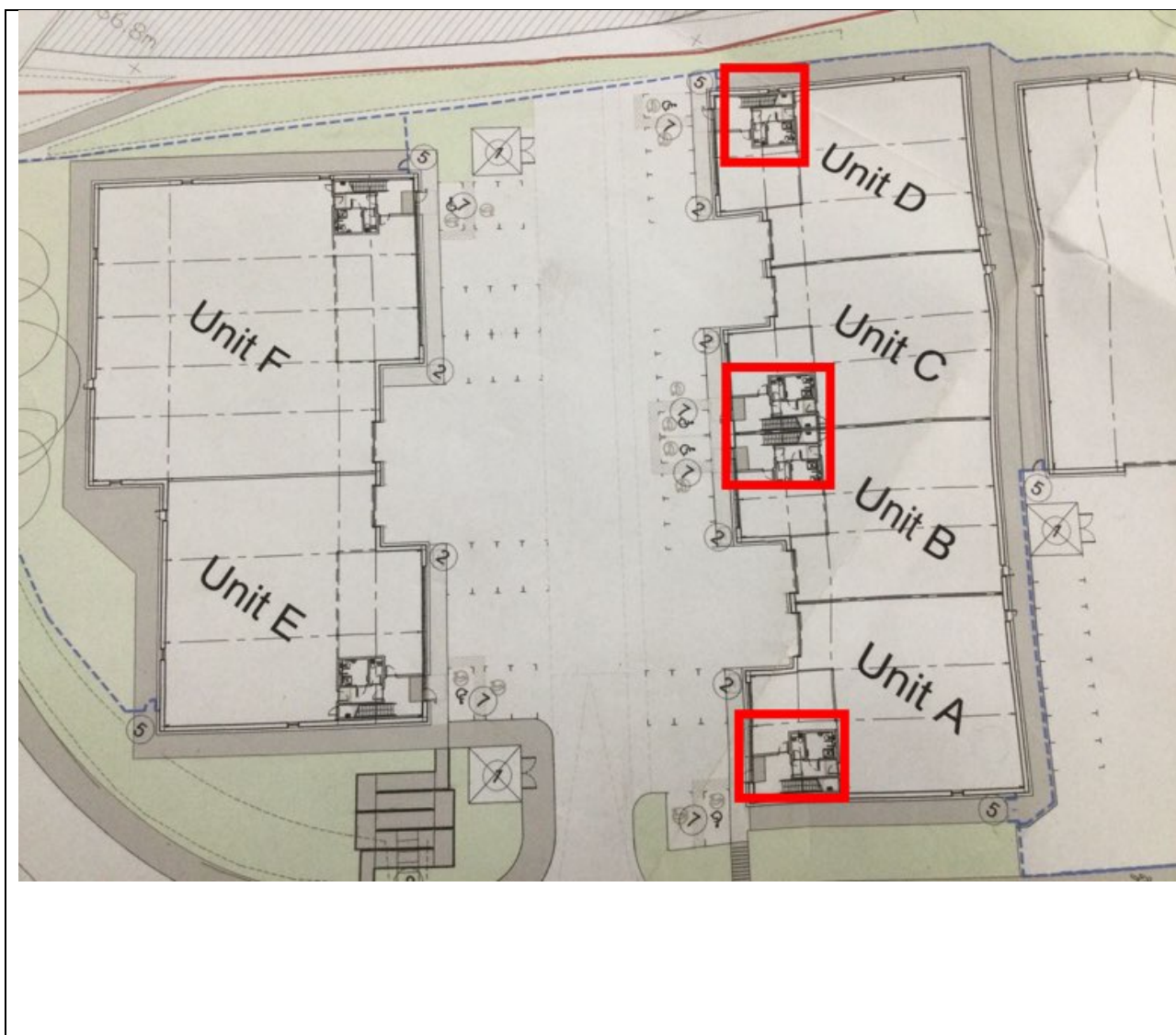


Photo 04/01/2024



Unit A office area lined out.



Steel stanchion detailing completed using SAGM.



Stairwell detailing sealed with SAGM within Unit A.



Overview to the hand welded lap joint to Unit A.



Unit B office area.



Pipe penetration details sealed with SAGM within Unit B office area.



Pick testing along the lap joints to Unit B.



Retro detailing completed along the perimeter steel to Unit B office area.



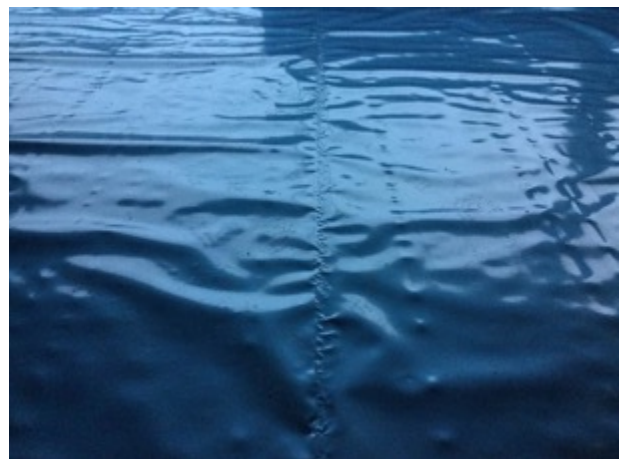
Unit C office area.



Typical pipe penetration detail within unit C office area.



Sealed steel stanchion detail using SAGM to Unit C



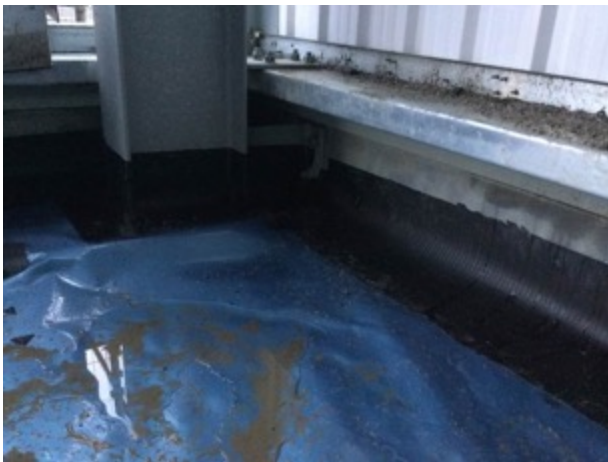
Welded lap seams within Unit C office area.



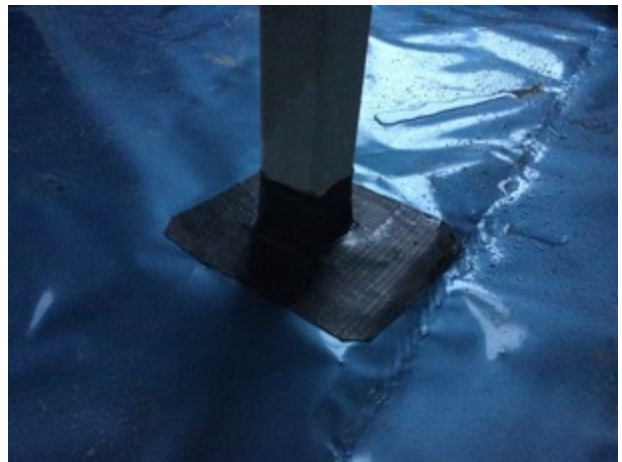
Overview to Unit D membrane line out.



Multiple pipe penetration details sealed with SAGM to Unit D.



Retro detailing and steel stanchion detailing sealed with SAGM.



Steel column detailing sealed with SAGM to Unit D office area.

Site name: A&H Construction - Lowry Park, Grimshaw Lane, Manchester.		Units/ plots checked: : Unit 2-3 core area line outs		
Postcode: M40 2BA				
Installers Name: UK Membranes				
Date: 23/01/2024				
Inspection by: Dan Squire		Weather: 5°C Wet		
	Item	Comments		
	Sub-floor void	N/A		
	Ventilation Inlets and Outlets	N/A		
	Number Of Vents	N/A		
	Materials used:	Membrane – Juta GP5 gas barrier membrane Self-Adhesive Membrane ☒ Yes Preformed Top hats ☐ Yes Double Sided Butyl Tape ☐ Yes Preformed Corners ☐ Yes Others Please List: N/A		
	Installation Notes	<u>(brief description of area/plots and list of defects/repairs identified to the main membrane sheet, excluding detailing and joints)</u> MEC Environmental carried out a thorough visual inspection of the membrane, the membrane had been installed to a good standard. The membrane is lined across the full core area. Sealing to the perimeter steel as a retro fit detail using SAGM. All pipes and stanchions sealed using SAGM. The membrane extends under the temporary shuttering into the building to allow membrane to be joined at a later date. Stair cores also sealed as a retro fit detail using SAGM and heat applied.		
	Type of Joint	Tape Joint ☐	Auto Weld ☐	Hand Weld ☒ Extrusion Weld ☐
	Jointing/Detailing Testing	☐ Air Lance (ASTM D4437)		☒ Probe Test (ASTM D4437)
	Laps, welds and detailing	Have all joints passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A	
	Ventilation Inlets & Outlets	Have all pipes passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A	
		Have all stanchions/wind braces/columns passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A	
		Have all piles and pile caps passed testing prior to surveyor leaving site?	☐ Yes ☐ No ☒ N/A	
		Has all other detailing work passed inspection	☒ Yes ☐ No ☐ N/A	

	<p><u>(List any defects to detailing work and joints):</u></p> <p>During our inspection the following defects and repairs were carried out: no recorded defects</p> <p>Have any defects identified above been satisfactorily rectified ☐ Yes ☐ No ☒ N/A</p> <p>The Area has passed inspection ☒</p> <p>The Area has failed inspection and a corrective action sheet has been left with the contractor ☐</p> <p>The Area is incomplete as detailed above ☐</p> <p>Signed: Dan Squire Date: 23/01/2024</p>
--	---

Area Inspected

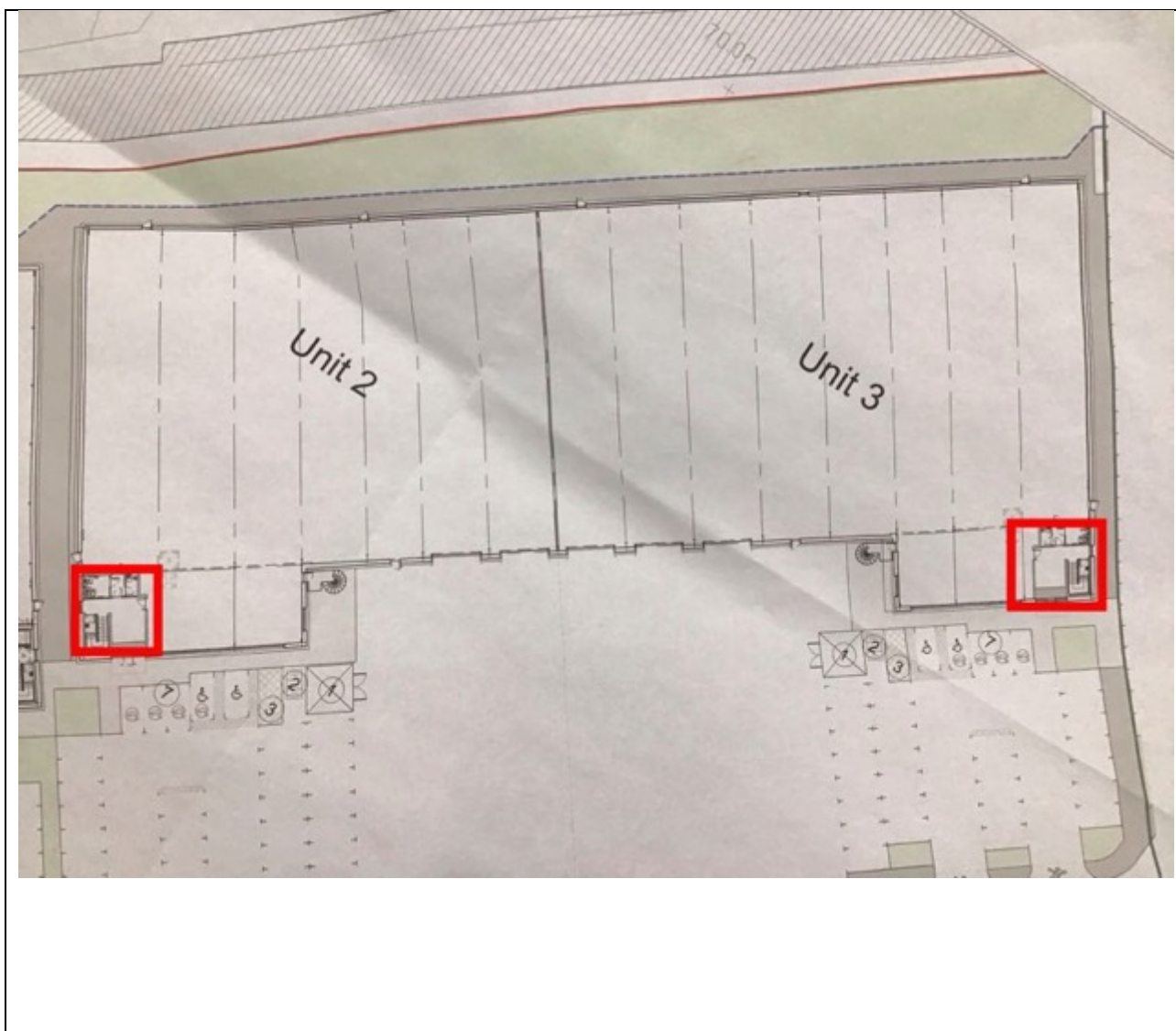


Photo 23/01/2024