Ground Gas Addendum Report
Land at Jersey Street, Ancoats, Manchester

Parcel A

Reference:13-729-R3-A
Date: April 2020

GROUND GAS ADDENDUM REPORT

Parcel A
Manchester Life Phase 3
Land to the north of Jersey Street
Ancoats
Manchester
M4 6JW

Prepared for:

Report Ref: 13-729-R3-A
Date Issued: 28th April 2020

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QUALITY ASSURANCE

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1. INTRODUCTION

1.1. BACKGROUND

E3P has previously completed a ground investigation on the site known as Manchester Life, Phase 3 located to the north of Jersey Street, Ancoats.

The findings of the ground investigation are presented within the E3P report entitled Parcel A - Phase II Geo-environmental Site Assessment (Report Ref: 13-729-R2).

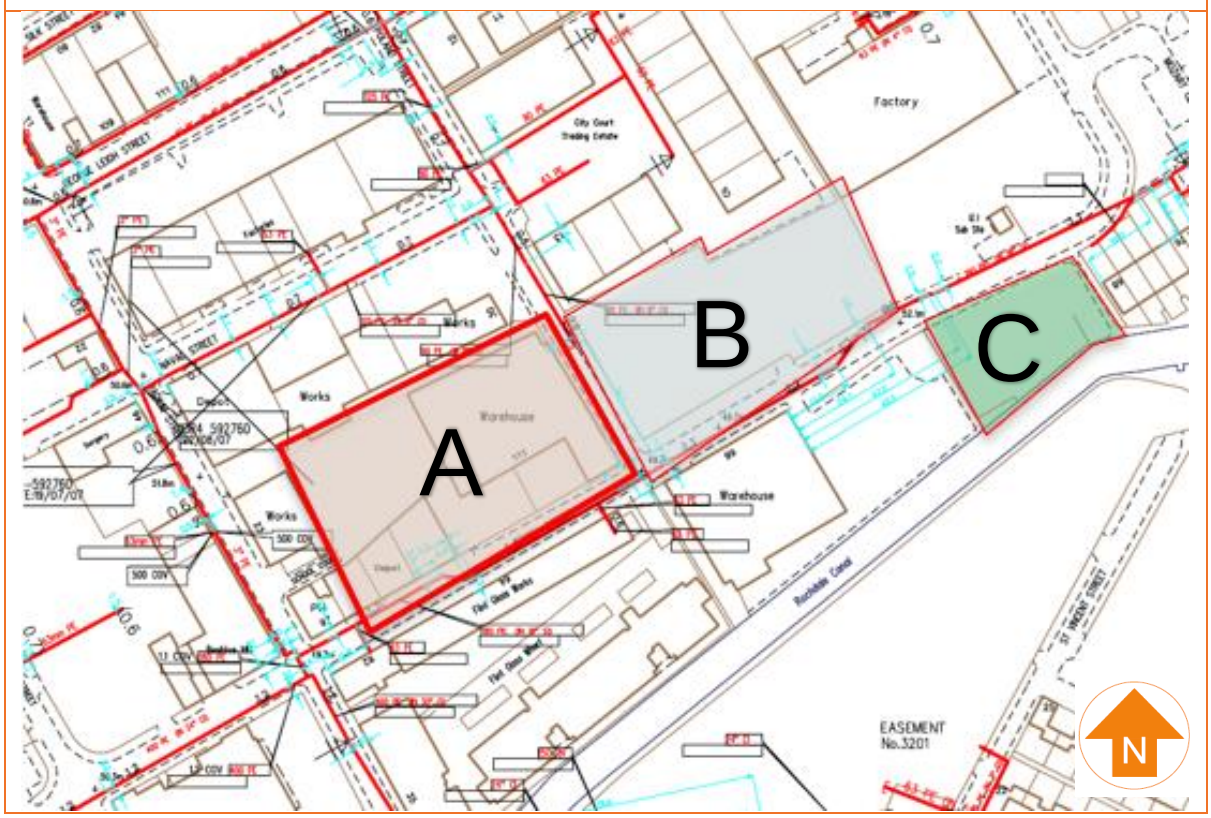
During the investigation E3P installed ground gas monitoring wells, which were to be monitored over three months after installation. The data collected from the gas monitoring wells are summarised in this report and this comprises the completed ground gas assessment.

1.2. PROPOSED DEVELOPMENT

E3P understands that three adjacent sites referred to as Parcel A, B and C will be developed into residential high rise buildings with some commercial use to the ground floor and the potential provision for undercroft parking.

Currently E3P has not yet been presented with a proposed development plan for the subject sites, however, for the avoidance of doubt a location and parcel plan is included in Figure 1.1.

FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



1.3. OBJECTIVES

The objectives of the ground gas addendum report are to provide a detailed assessment of ground gas risk based on all available data from the E3P ground investigation works.

1.4. LIMITATIONS

The limitations of this report are presented in Appendix I.

1.5. CONFIDENTIALITY

E3P has prepared this report solely for the use of the client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from E3P; a charge may be levied against such approval.

2. INVESTIGATION RATIONALE

The Initial Conceptual Site Model has identified that the underlying Made Ground and infilled land may represent a potential source of ground gas generation. Ground conditions are discussed in more detail in Section 3. Based on the identification of these sources, E3P has determined that the site represents a low ground gas source generation potential.

Within the context of the proposed residential end use and ground gas generation potential, the gas assessment requires that six visits are required over three months, with at least two sets of readings at low or falling atmospheric pressure as set out within CIRIA 665 Tables 5.5a and 5.5b.

TABLE 1.1 GROUND GAS MONITORING LOCATION RATIONALE

LOCATION	GROUND GAS SOURCE	DEPTH OF MONITORING WELL (m)
WS103	Made Ground	0.50-1.20
WS104	Made Ground	0.50-0.70
WS108	Natural Strata (CLAY)	1.00-4.00
WS110	Natural Strata (CLAY)	1.00-5.00

2.1. MONITORING METHODOLOGY

Concentrations of methane (CH_4), carbon dioxide (CO_2) and oxygen (O_2) were measured using an infra-red gas analyser (GFM435) calibrated to a reference standard (before and after each survey) and gas flow rates were measured using an integrated flow meter.

Gas measurements were recorded for a minimum of 60 seconds at each location, at which point the maximum concentration of CH_4 and CO_2, together with the lowest concentration of O_2 were recorded.

The results of the ground gas monitoring are presented in Table 1.2.

TABLE 1.2 SUMMARY OF GROUND GAS MONITORING RESULTS

WELL	DATE	CH_4 INITIAL (%V/V)	CH_4 STEADY (%V/V)	CH_4 GSV (l/hr)	CO_2 INITIAL (%V/V)	CO_2 STEADY (%V/V)	CO_2 GSV (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS103	09/12/19	0.10	0.10	0.0001	0.20	0.20	0.0002	18.80	1006	Rising	0.10	0.50-1.20	1.00	1.00
	05/02/20	0.10	0.10	0.00108	0.20	0.20	0.0022	20.00	1033	Falling	1.08		0.97	0.86
	24/02/20	0.10	0.10	0.00088	0.20	0.20	0.0018	20.10	1005	Falling	0.88		0.98	0.84
	12/03/20	0.10	0.10	-0.00095	0.50	0.50	-0.0048	18.00	999	Rising	-0.95		0.95	0.85
	23/03/20	0.10	0.10	0.00097	0.40	0.40	0.0039	19.70	1019	Steady	0.97		0.98	0.97
	07/04/20	0.10	0.10	0.00183	0.50	0.85	0.0092	19.60	1025	Rising	1.83		0.99	0.98
WS104	09/12/19	0.10	0.10	0.0001	0.10	0.10	0.0001	19.50	1006	Rising	0.10	0.50-0.70	0.70	Dry
	05/02/20	0.10	0.10	0.00026	0.10	0.10	0.0003	19.70	1033	Falling	0.26		0.70	Dry
	24/02/20	0.10	0.10	0.00052	0.10	0.10	0.0005	19.80	1005	Falling	0.52		0.75	Dry
	12/03/20	Monitoring well could not be located.												
	23/03/20	0.10	0.10	0.00026	0.10	0.10	0.0003	19.90	1019	Steady	0.26		0.73	Dry
	07/04/20	0.10	0.10	0.00013	0.10	0.10	0.0001	19.70	1025	Rising	0.13		0.72	Dry
WS108	09/12/19	0.10	0.10	0.00238	0.10	0.10	0.0024	20.30	1006	Rising	2.38	1.00-4.00	3.40	0.87
	05/02/20	0.10	0.10	-0.00127	1.10	1.10	-0.0140	15.30	1033	Falling	-1.27		Monitoring well damaged – bung jammed.	
	24/02/20	0.10	0.10	-0.0023	0.80	0.80	-0.0184	16.80	1005	Falling	-2.3			
	12/03/20	Monitoring well flooded.												
	23/03/20													
	07/04/20													

WELL	DATE	CH_4 INITIAL (%V/V)	CH_4 STEADY (%V/V)	CH_4 GSV (l/hr)	CO_2 INITIAL (%V/V)	CO_2 STEADY (%V/V)	CO_2 GSV (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS110	09/12/19	0.10	0.10	-0.00079	0.10	0.10	-0.0008	19.90	1006	Rising	-0.79	1.00-5.00	Monitoring well damaged- bung jammed.	
	5/02/20	0.10	0.10	0.0001	0.10	0.10	0.0001	15.10	1033	Falling	0.10			
	24/02/20	0.10	0.10	0.00013	0.10	0.10	0.0001	16.70	1005	Falling	0.13			
	12/03/20	0.10	0.10	0.00137	0.10	0.10	0.0014	16.50	999	Rising	1.37			
	23/03/20	0.10	0.10	0.00088	0.10	0.10	0.0009	17.90	1019	Steady	0.88			
	07/04/20	0.10	0.10	0.00013	0.10	0.10	0.0001	19.90	1025	Rising	0.13			

3. GROUND GAS RISK ASSESSMENT

3.1. GROUND GAS RISK ASSESSMENT METHODOLOGY

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report 665 – *Assessing risks posed by hazardous ground gases to buildings* (2007). However, it is recommended that the full ground gas assessment and recommended protection measures are agreed with the local authority prior to their adoption on site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.

CIRIA C665 and NHBC Report No 10627-R01 provide assessments for carbon dioxide and methane based upon gas screening values (GSVs) utilising flow rates and concentrations. The site-based GSVs for steady state methane and carbon dioxide are based upon the following equation:

$$GSV = \frac{concentration\ (by\ vol)}{100} \times flowrate\ (1\ /\ hr)$$

The GSVs within CIRIA C665 are based upon all buildings other than standard residential houses. The NHBC GSVs are based upon standard residential houses with precast concrete floors (block and beam). The CIRIA 665 report author (Steve Wilson) since provided further clarification regarding which guidance should be adopted for residential houses that have suspended cast in-situ concrete floor slab: for the avoidance of doubt, it was confirmed that the GSVs within the CIRIA 665 guidance should be adopted.

For this development the Ciria thresholds have been adopted due to the absence of a subfloor void.

The GSVs within CIRA C665 are based upon all buildings other than standard residential houses. The thresholds for GSVs based upon CIRIA guidance are provided within Table 3.1.

TABLE 3.1 THRESHOLDS FOR GAS SCREENING VALUES (GSV) IN ACCORDANCE WITH CIRIA C665 COMMERCIAL END USE.

CLASSIFICATION	GSV (METHANE AND CARBON DIOXIDE)
CS1	< 0.07
CS2	< 0.70
CS3	< 3.5
CS4	< 15
CS5	< 70
CS6	> 70

3.1.1. SOURCES OF GROUND GAS

The Phase I report and subsequent ground investigation has identified the following potential sources of ground gas:

- Made Ground deposits; and,
- Infilled land.

3.1.2. GROUNDWATER

Monitoring well WS108 was flooded during the monitoring and therefore all wells can be included within the gas assessment. Monitoring well WS110 was damaged and beyond repair during the monitoring regime and therefore groundwater could not be monitored.

Monitoring well WS104 was found to be dry during the monitoring regime.

Within the remaining well WS103, groundwater levels were observed to fluctuate over the monitoring period, with levels fluctuating by 0.12 m over the monitoring period. WS103 was set within a low-permeability clay stratum and groundwater may be a result of surface water collecting in the well rather than a measure of true groundwater.

3.1.3. GAS FLOW

During the monitoring a positive flow was noted in WS104 and WS110. The measure of positive flow is considered to be the result of groundwater fluctuations and flooding of the well causing compression – as opposed to gas generation – as the highest flows are recorded during periods of high groundwater levels.

Negative flows were recorded in WS103 and WS108 and may be indicative of back pressure from wind being greater than the active flow from the wells.

3.1.4. GAS CONCENTRATIONS

No elevated concentrations of methane have been recorded within any monitoring wells (<0.10% v/v).

Carbon dioxide concentrations were recorded within all the monitoring wells at concentrations ranging from 0.10% v/v to 1.10% v/v (WS108). The maximum carbon dioxide levels were also associated with low oxygen concentrations and appear to be associated with Made Ground, identified in WS108.

3.1.5. GAS ASSESSMENT

In accordance with the methodology outlined with the CIRIA publication C665, E3P have utilised the results of the ground gas monitoring surveys to calculate a tentative gas screening value (GSV).

The GSVs for the monitoring positions are summarised in Table 3.2.

TABLE 3.2 GAS RISK PROFILE AND LOCATION

LOCATION	MAX CO_2 (% v/v)	GSV (l/hr)	MAX CH_4 (% v/v)	GSV (l/hr)	CLASSIFICATION
WS103	0.50	0.0092	0.10	0.00183	CS1
WS104	0.10	0.0005	0.10	0.00052	CS1
WS108	1.10	-0.0184	0.10	0.00238	CS1
WS110	0.10	0.0014	0.10	0.00088	CS1

The GSV has been compared to the criteria outlined with CIRIA C665 to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into any future building design in this area.

A completed phase of ground gas monitoring confirms that the site can be classified as characteristic situation 1 (CS1), and that gas protection measures will not be required.

END OF REPORT

APPENDIX I
LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the client as indicated in Section 1.3.

2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.

3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.

4. During the site walkover, reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover, no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.

5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.

6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and do not constitute or replace full and proper surveys.

8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.

10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

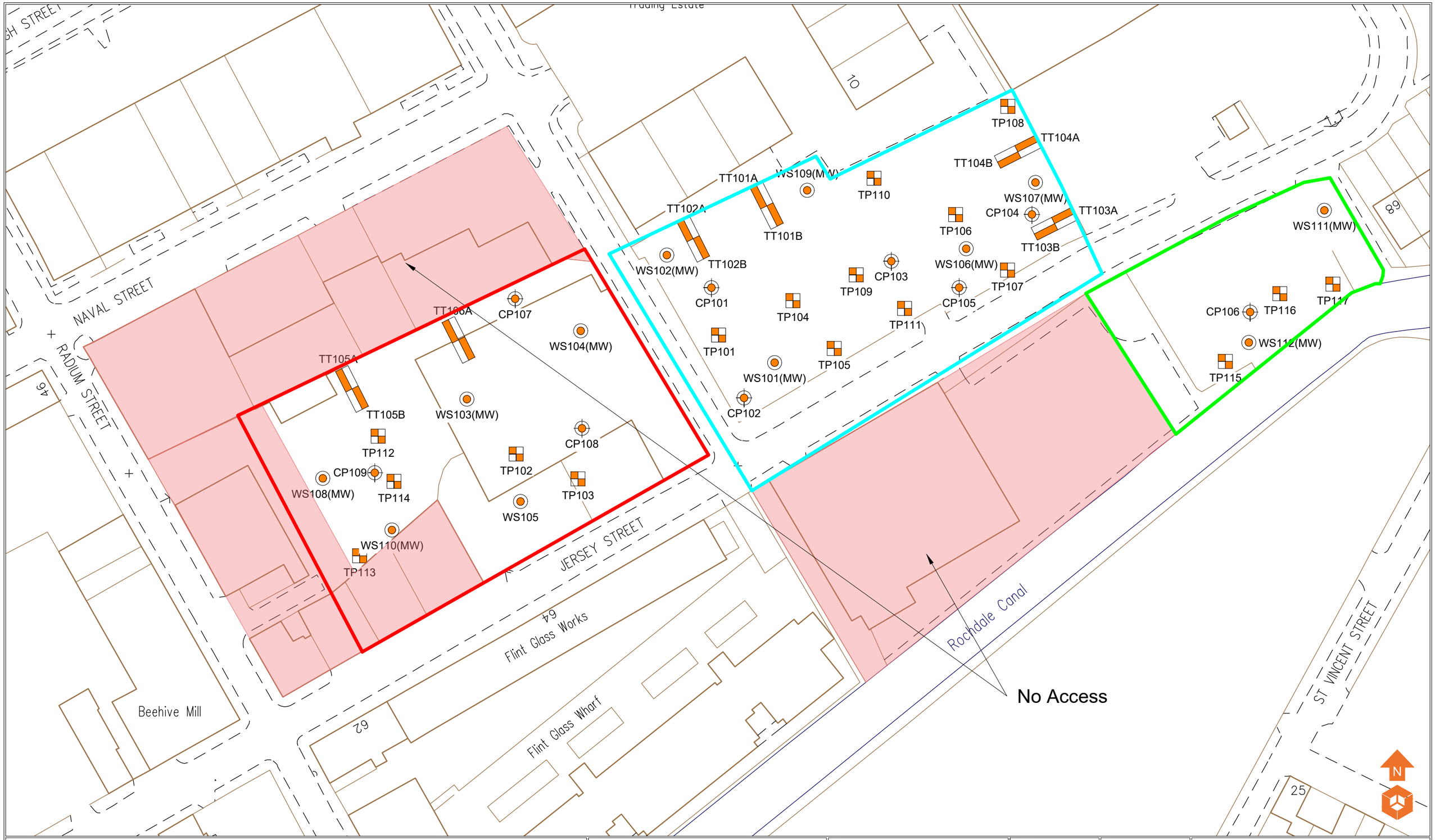
APPENDIX II
GLOSSARY

TERMS

ACM	Asbestos-containing material	**MMP**	Materials management plan
ADS	Acoustic design statement	**ND**	Not detected
AST	Above-ground storage tank	**NDP**	Nuclear density probe
BGS	British Geological Survey	**NMP**	Noise management plan
BSI	British Standards Institute	**NPSE**	Noise policy statement for England
BTEX	Benzene, toluene, ethylbenzene, xylenes	**NR**	Not recorded
CA	Coal Authority	**PAH**	Polycyclic aromatic hydrocarbon
CBR	California bearing ratio	**PCB**	Polychlorinated biphenyl
CIEH	Chartered Institute of Environmental Health	**PI**	Plasticity index
CIRIA	Construction Industry Research Association	**PID**	Photo ionisation detector
CLEA	Contaminated land exposure assessment	**POS**	Public open space
CML	Council of Mortgage Lenders	**PPE**	Personnel protective equipment
CoC	Contaminants of concern	**ProPG**	Professional practice guidance
CSM	Conceptual site model	**QA**	Quality assurance
DNAPL	Dense non-aqueous phase liquid (chlorinated solvents, PCB)	**SGV**	Soil guideline value
DWS	Drinking water standard	**SPH**	Separate-phase hydrocarbon
EA	Environment Agency	**SPT**	Standard penetration test
EQS	Environmental quality standard	**SVOC**	Semi-volatile organic compound
FFL	Finished floor level	**TPH**	Total and speciated petroleum hydrocarbon
GAC	General assessment criteria	**TPH CWG**	Total Petroleum Hydrocarbon (Criteria Working Group)
GL	Ground level	**UKWIR**	United Kingdom Water Infrastructure Risk
GSV	Gas screening value	**UST**	Underground storage tank
HCV	Health criteria value	**VCC**	Vibro-concrete column
ICSM	Initial conceptual site model	**VOC**	Volatile organic compound
LEL	Lower explosive limit	**VRSC**	Vibro-replacement stone columns
LMRL	Lower method reporting limit	**VSC**	Vibro-stone columns
LNAPL	Light non-aqueous phase liquid (petrol, diesel, kerosene)	**WHO**	World Health Organisation
MCV	Moisture condition value	**WRAP**	Waste and Resources Action Programme

MIBK	Methyl isobutyl ketone	**WTE**	Water table elevation
m	Metres	**ppm**	Parts per million
km	Kilometres	**mg/m^3**	Milligram per metre cubed
% v/v	Percent volume in air	**m bgl**	Metres below ground level
mb	Millibars (atmospheric pressure)	**m bcl**	Metre below cover level
l/hr	Litres per hour	**mAOD**	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	**kN/m^2**	Kilonewtons per metre squared
ppb	Parts per billion	**µm**	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	**SSRT**	Site Specific Remediation Target
PSD	Particle Size Distribution	**DD**	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	**Mc**	Moisture Content
ρ	Bulk Density	**GPR**	Ground Penetrating Radar
NDP	Nuclear Density Probe	**FFL**	Finished Floor Level
LEL	Lower Explosive Limit	**UKWIR**	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	**LOD**	Limit of Detection

APPENDIX III
DRAWINGS



Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Trial Pit Location
- Approximate Slit Trench Location
- No Access
- Parcel A
- Parcel B
- Parcel C

Notes:

Phase	Revision	Date	Issue	Drawn	Checked
P1	-	22.11.2019	DRAFT	CB	RJW

Client: Manchester Life

Job No: 13-729

Date: 22.11.2019

Drawing No: 004

Scale: NTS

Job Title: Jersey Street

Drawing Title: Exploratory Hole Location Plan

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