Ground Gas Addendum Report
Former Boddingtons Site, Cheetham Hill

Reference: 15-175-R4-2
Date: August 2022

GROUND GAS ADDENDUM REPORT

Former Boddingtons Site
Great Ducie Street
Manchester
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Prepared for:

Latimer Developments Ltd

Report Ref: 15-175-R4-2
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1. INTRODUCTION

1.1. BACKGROUND

E3P has previously completed a ground investigation on the former Boddingtons site. The findings of the ground investigation are presented within the E3P report entitled Phase II, Geoenvironmental Site Assessment (Ref: 15-175-R2 Rev 2).

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 Latimer Developments Ltd is involved with a proposed scheme to redevelop the site for. Assael Architects have completed a feasibility study for a car-free development comprising 442 homes and commercial spaces. The development will comprise two main blocks with differing number of stories, between 1 story and 27 stories.

The site forms part of the adopted Great Ducie Street Strategic Regeneration Framework Masterplan, bringing forward the redevelopment of the former Boddingtons Brewery demolished circa 10 years ago.

The site has been purchased from LTE Group (trading as Manchester College) who are delivering a new college facility on the southern part of the site, this is due for completion by summer 2022.

Drawing 15-175-002 (Appendix III) identifies the proposed development layout. A snapshot of the Proposed Development Layout is indicated 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 may represent a potential source of ground gas generation. Volatile compounds may also be present in relation to the potential halogenated solvents and chlorinated hydrocarbons identified in soils underlying the site however the historic sources identified on-site are limited. 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 end use and ground gas generation potential, the gas assessment requires that 6 visits are required over 3 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. Due to WS105 being obstructed during the initial 5 rounds of testing, a futher 5 gas monitoring visits were added to undertake further testing on WS105.

2.1. MONITORING METHODOLOGY

Concentrations of methane (CH_4), carbon dioxide (CO_2), oxygen (O_2) and hydrogen sulphide (H_2S) were measured using a calibrated infra-red gas analyser (GFM435) with gas flow rates measured using an integrated flow meter.

Gas measurements were recorded for a minimum of 500 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 2.1 overleaf.

In addition to the raw data, the results for each individual standpipe have been assessed with reference to guidance provided in BS8485:2015+A1:2019. Based on the initial peak measured flow rates and hazardous gas concentrations, individual hazardous gas flow rates (Q_{hg}) have been derived for each monitoring point, from which an individual Characteristic Situation (CS) can ultimately be determined.

TABLE 2.1 SUMMARY OF GROUND GAS MONITORING RESULTS

WELL	STRATA	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	CLAY	05/11/2021	0.1	0.1	0.0036	0.1	0.1	0.0036	18.8	1020	Steady	3.6	1.00-4.00	3.76	0.79
		18/11/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	18.4	1020	Steady	0.1		3.70	1.10
		23/11/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1020	Steady	0.1		3.70	1.30
		02/12/2021	Monitoring well inaccessible due to vehicle.											N/A	
		09/12/2021													
		24/12/2021	Monitoring well inaccessible - well sunk / destroyed.												
WS105	MADE GROUND	05/11/2021	Monitoring well inaccessible due to vehicle.										0.50-2.00	N/A	
		18/11/2021													
		23/11/2021													
		02/12/2021													
		09/12/2021													
		24/12/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	19.8	1000	Steady	0.1		2.01	Dry
		20/06/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1018	Falling	0.1		2.03	1.99
		30/06/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1005	Rising	0.1		2.03	2.00
		06/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.6	1021	Rising	0.1		2.03	2.00
		13/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.7	1018	Steady	0.1		2.03	2.00
		20/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	18.8	1008	Rising	0.1		2.03	2.00

WELL	STRATA	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)
WS108	MADE GROUND	05/11/2021	0.1	0.1	0.0001	1.9	1.9	0.0019	10.8	1020	Steady	0.1	1.00-6.00	5.35	4.80
		18/11/2021	0.1	0.1	0.0001	2.1	1.8	0.0021	13.2	1021	Steady	0.1		5.30	4.15
		23/11/2021	Monitoring well inaccessible due to vehicle											N/A	
		02/12/2021	0.1	0.1	0.0001	1	1	0.0010	15.2	1007	Falling	0.1		5.40	1.05
		09/12/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	19.5	995	Falling	0.1		5.38	2.10
		24/12/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	19.7	1001	Steady	0.1		5.38	4.06
WS109	MADE GROUND	05/11/2021	0.1	0.1	0.0001	2.3	2.3	0.0023	14.9	1020	Steady	0.1	0.50-2.50	2.25	2.20
		18/11/2021	0.1	0.1	0.0001	2.0	1.9	0.0020	15.5	1020	Steady	0.1		2.25	Dry
		23/11/2021	Monitoring well inaccessible due to vehicle											N/A	
		02/12/2021	0.1	0.1	0.0001	2.5	2.5	0.0025	12	1006	Falling	0.1		2.40	2.20
		09/12/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	19.4	997	Falling	0.1		2.30	Dry
		24/12/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	19.7	1000	Steady	0.1		2.38	Dry
WS111	MADE GROUND/ Natural SAND	05/11/2021	Monitoring well inaccessible due to vehicle										1.00-4.00	N/A	
		18/11/2021	0.1	0.1	0.0001	1.9	1.5	0.0019	18.6	1022	Steady	0.1		4.30	Dry
		23/11/2021	0.1	0.1	0.0001	2.2	2.2	0.0022	17.2	1020	Steady	0.1		4.30	3.90
		02/12/2021	0.1	0.1	0.0001	2.5	2.5	0.0025	11	1007	Falling	0.1		4.50	4.00
		09/12/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	19.5	996	Falling	0.1		4.50	4.10
		24/12/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	19.7	1001	Steady	0.1		4.50	4.10

WELL	STRATA	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)
BH102	CLAY	05/11/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	20.2	1019	Steady	0.1	3.50-5.50	4.70	Dry
		18/11/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	20.1	1020	Steady	0.1		4.65	4.10
		23/11/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	19.7	1021	Steady	0.1		4.70	Dry
		02/12/2021	Monitoring well inaccessible due to vehicle											N/A	
		09/12/2021	Monitoring well flooded											N/A	
		24/12/2021													
BH103	SAND and GRAVEL	05/11/2021	Monitoring well inaccessible due to vehicle										3.50-4.50		
		18/11/2021													
		23/11/2021													
		02/12/2021													
		09/12/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	19.5	996	Falling	0.1		4.15	Dry
		24/12/2021	0.1	0.1	0.0001	0.1	0.1	0.0001	19.7	1000	Steady	0.1		4.13	Dry

NOTES

BS8485:2015+A1:2019 Characteristic Situation	GSV	
CS1	<0.07	Typical Max CO2 <5 % Typical Max CH4 <1 %
CS2	<0.7	Flow rate not to exceed 70 l/hr otherwise consider increase to CS3
CS3	<3.5	
CS4	<15	Quantitative Risk Assessment required to evaluate scope of protective measures

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)*
- BS8485:2015+A1:2019 – *Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*

BS8485 provides guidance on the level of gas protection requirements based upon the characteristic situation (CS) and the proposed development based on building type.

Therefore, in accordance with BS8485, based on the measured flow rates and hazardous gas concentrations, individual hazardous gas flow rates (Q_{hg}) shall be derived for each monitoring point, from which the site characteristic hazardous gas flow rate (Q_{hgs}), and then the Characteristic Situation (CS) can be determined.

The following equation should be utilised:

$$Q_{hg} = q\left(\frac{C_{hg}}{100}\right)$$

Where:
q is the measured flow rate (in litres per hour) of combined gases from the monitoring standpipe
C_{hg} is the measured hazardous gas concentration (in percentage volume/volume).

The subsequent derived gas screening value (GSV) should be the maximum Q_{hg} (flow rate x concentration as a percentage volume) for all the monitoring events.

A 'worst-case check' may be carried out using the maximum recorded flow in any hole with the maximum concentration in any hole to present the plausible worst-case conditions. Adoption of the worst-case Q_{hg} requires thorough justification and reference to the CSM.

The thresholds for GSVs based upon BS8485:2015+A1:2019 guidance are provided in Table 3.1.

TABLE 3.1 SITE CHARACTERISATION BY GSV (BS8485:2015+A1:2019)

CS	HAZARD POTENTIAL	GSV (l/hr) FOR METHANE AND CARBON DIOXIDE	ADDITIONAL FACTORS
CS1	Very Low	< 0.07	Typically <1% methane concentration and <5% carbon dioxide concentration (otherwise consider an increase to CS2)
CS2	Low	< 0.70	Typical measured flow rate <70 l/h (otherwise consider an increase to CS3)
CS3	Moderate	< 3.5	N/A
CS4	Moderate to High	< 15	N/A
CS5	High	< 70	N/A
CS6	Very High	> 70	N/A

Notes
1. The CS is equivalent to the characteristic GSV in CIRIA C665.
2. The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst-case temporal conditions that the site may be expected to encounter should be considered.
3. Gas Screening Value is the Borehole Gas Volume Flow Rate, in litres per hour, multiplied by the concentration in the air stream of the particular gas being considered.
4. The Gas Screening Value thresholds should not generally be exceeded without the completion of a detailed ground gas risk assessment taking into account site-specific conditions.

3.1.1. SOURCES AND PATHWAYS OF GROUND GAS

Table 3.2 summarised the potential sources and pathways of ground gas within the context of the recorded site setting and proposed development.

TABLE 3.2 IDENTIFIED POTENTIAL SOURCES OF GROUND GAS

SOURCE
Made Ground Made Ground was encountered within all exploratory hole locations to a maximum proven depth of 5.10 m bgl (WS108), however, typically Made Ground deposits were encountered at depths less than 3.00 m bgl. The majority of locations comprised concrete or asphalt in the upper 0.3 m with the exception of WS101, WS102, WS104 and WS108 which comprised brown sandy gravel or gravelly sandy clay with gravel of brick, mudstone, concrete and sandstone. The underlying Made Ground deposits generally comprised sandy gravel with brick, coal, sandstone, concrete and occasional clinker (TP102 and WS110) and metal (WS110). Reworked silty clay deposits were identified within TP102 (1.40-2.20 m bgl), WS105 (2.00-3.10 m bgl), WS108 (1.00-2.60 m bgl). An organic odour was identified within Made Ground clay deposits in WS106 at 1.60-1.80 m bgl. The anthropogenic material has the potential to generate ground gas.

Drift Strata

Drift deposits were encountered within the majority of exploratory locations with the exception of those where the full depth of Made Ground could not be proven. Drift deposits were not encountered within TP102, TP103, WS101, WS102, WS109 and WS110.

Brown silty CLAY was encountered within ten exploratory hole locations between the depths of 0.40 m bgl to a maximum encountered depth of 6.00 m bgl. CLAY deposits were generally firm to stiff, however soft very low strength CLAY was identified within WS105 at circa 5.00 m bgl.

The CLAY deposits were typically identified to be underlain by a silty fine to medium SAND within four exploratory locations between depths of 1.80 m bgl to a maximum confirmed depth of 6.70 m bgl. SAND deposits were noted to be loose to medium dense. Loose SAND deposits were noted in BH102 at 2.00 m bgl. and BH104 at 4.00 m bgl.

A SAND and GRAVEL (and further GRAVEL) band were noted within WS103 (1.65-1.80 m bgl) and BH103 (3.50-4.60 m bgl.)

A stiff to very stiff clayey SILT was identified in WS107 at 3.20-5.45 m bgl.

No natural material that could generate significant ground gas was identified during the site investigation.

Solid Strata

Sandstone bedrock was encountered within four exploratory hole locations from 4.60 m bgl - 6.70 m bgl.

Deep rotary boreholes confirmed the presence of a weak to moderately strong SANDSTONE bedrock to a maximum depth of 29.00 m bgl.

The site is located within a Coal Mining Reporting Area but not within a development high risk area. There are no mine entries, coal outcrops, past or probable shallow coal mine workings beneath or close to the site. The risk from underground coal workings is therefore considered to be very low and no further works are deemed to be required in relation to coal mining.

Landfill Sites

No landfill sites (current or historic) are located within 250 m of the site. The site has undergone numerous phases of historic development which is likely to have resulted in the deposition of variable Made Ground across the site, which may be a potential source of hazardous ground gases such as methane and carbon dioxide.

Potentially infilled land (water and non-water) has been identified between 23 m and 248 m from the site.

Other Gases

The BGS reports that full radon protective measures are not necessary in the construction of new dwellings or extensions.

Naphthalene has been identified within one isolated location on site (WS109 at 0.80 m bgl) and presents a risk of vapour inhalation. This material is currently capped by hardstanding and therefore does not present a risk to current site users. As the proposed development comprises residential apartments, this material will require delineation and removal in its entirety from the footprint of the buildings to render the site suitable for residential development. The materials would likely be suitable for retention within areas of Public Open Space (POS).

Carbazole above the limit of detection was identified within WS111 at 0.80m at a concentration of 0.80 mg/kg.

Carbazole is a non-threshold substance and is a white, crystalline solid. It has a characteristic odour. It is a product of incomplete combustion of organic matter and occurs in petroleum, coal, peat, crude oil and coal tar.

There is no toxicological data available to inform the preparation of a robust site-specific risk based assessment criteria that would model the potential for ingress of vapour to indoor air.

The US national library for medicine confirms:

"Carbazole released to air will also be in or on particles that eventually fall to the ground. It is expected to be broken down by sunlight, depending on environmental conditions. It will not move into air from moist soil and water surfaces."

If released to soil, carbazole can have high to no mobility based upon a Koc range of 114-4980, with most values suggesting low mobility to immobility. Volatilisation from moist soil surfaces is not expected to be an important fate process based upon a Henry's Law constant of 1.16X10-7 atm-cu m/mole. Carbazole is not expected to volatilise from dry soil surfaces based upon its vapour pressure.

It is accepted that carbazole is a non-threshold substance, however, it will be encapsulated in soils with a temperature in the region of 10°C, furthermore given that it is highly unlikely to move into the ambient air via a vapour phase migratory pathway from a soil or water there cannot be a complete pollutant linkage in this instance.

The recorded concentration is marginally above the limit of detection for the analytical method and is not considered a material factor in the ground gas assessment.

Proposed Development

The proposed development comprises private residential properties and commercial spaces, which would be classified as a Type C development (low sensitivity) in accordance with BS8485:2015+A1:2019.

3.1.2. GROUNDWATER

Groundwater was typically encountered at depths in excess of 2.00 m bgl with the exception of WS103 where the groundwater was recorded at 0.79 m bgl in the first visit which indicated the well was flooded above the response zone during this visit. No other occurrences of flooded wells have been noted in the monitoring programme.

Groundwater levels only appeared to fluctuate slightly within the monitoring visits and typically remained within 1.00m of the base of the wells, except WS108, where levels increased by 3.75 m between the first and fourth monitoring visits.

Perched Made Ground Groundwater

WS108 was set within high permeability Made Ground and the fluctuations were likely to be a result of heavy rainfall over the winter monitoring period rather than a measure of true groundwater.

3.1.3. GAS FLOW

During the monitoring a positive flow was noted within all monitoring locations typically recorded as 0.1 l/hr, however, a flow of 3.6 l/hr was recorded during the initial monitoring visit within WS103.

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 may be indicative of back pressure from wind being greater than the active flow from the wells.

3.1.4. BAROMETRIC PRESSURE

Falling pressure events were recorded on 09/12/21 (997 mb to 995 mb) and 02/12/2021 (1007 mb to 1006 mb). Gas emissions rates from the ground are likely to be at their highest when there are falling pressure events due to the differential pressure rates between the atmosphere and those within the monitoring well.

3.1.5. GAS CONCENTRATIONS

Methane has not been recorded above the limit of detection (LOD) within any monitoring locations during the monitoring visits completed to date.

Carbon dioxide concentrations were recorded within all the monitoring wells at concentrations ranging from 0.1% v/v (LOD) to 2.5% v/v (WS109 and WS111). The maximum carbon dioxide levels were also associated with lower oxygen concentrations and also appear to be associated with Made Ground. However, the threshold level for carbon dioxide has not been exceeded.

3.1.6. GAS ASSESSMENT

In accordance with the methodology outlined with the BS8485:2015+A1:2019, E3P has 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 3.3.

TABLE 3.3 GAS RISK PROFILE AND LOCATION

LOCATION	MAX CO_2 (% v/v)	GSV (l/hr)	MAX CH_4 (% v/v)	GSV (l/hr)	CLASSIFICATION
Made Ground					
WS105	0.10	0.0001	0.10	0.0001	CS1
WS108	2.10	0.0021	0.10	0.0001	CS1
WS109	2.50	0.0025	0.10	0.0001	CS1
WS111	2.50	0.0025	0.10	0.0001	CS1
Drift					
WS103	0.10	0.0036	0.10	0.0036	CS1
BH102	0.10	0.0001	0.10	0.0001	CS1
BH103	0.10	0.0001	0.10	0.0001	CS1

The GSV has been compared to the criteria outlined with BS8485:2015+A1:2019 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.

Ground gas monitoring suggests that the site can be classified as CS1, and it is considered that ground gas protection measures will not be required.

3.2. FOUNDATION DESIGN AND GROUND GAS

E3P understands that the structural loads of the proposed apartment building will necessitate the use of piled foundations and likely a ground bearing floor slab meaning the development will be of a low sensitivity. Additionally, the CSM and ground gas monitoring has not identified any significantly elevated levels of methane or carbon dioxide.

Based on these findings, it is considered that structural foundations will not create any additional ground gas risk.

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 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

Notes:	Client:	Job No:	Date:
	Latimer Developments LTD	15-175	24.11.2021
		Drawing No: 002	Scale: NTS

Phase	Issue	Date	Drawn	Checked
P1	REVB	24.11.2021	EB	ND
P1	REVA	14.10.2021	CB	BH

Job Title: Former Boddingtons Site, Great Ducie Street

Drawing Title: Proposed Development Plan

e3p
Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
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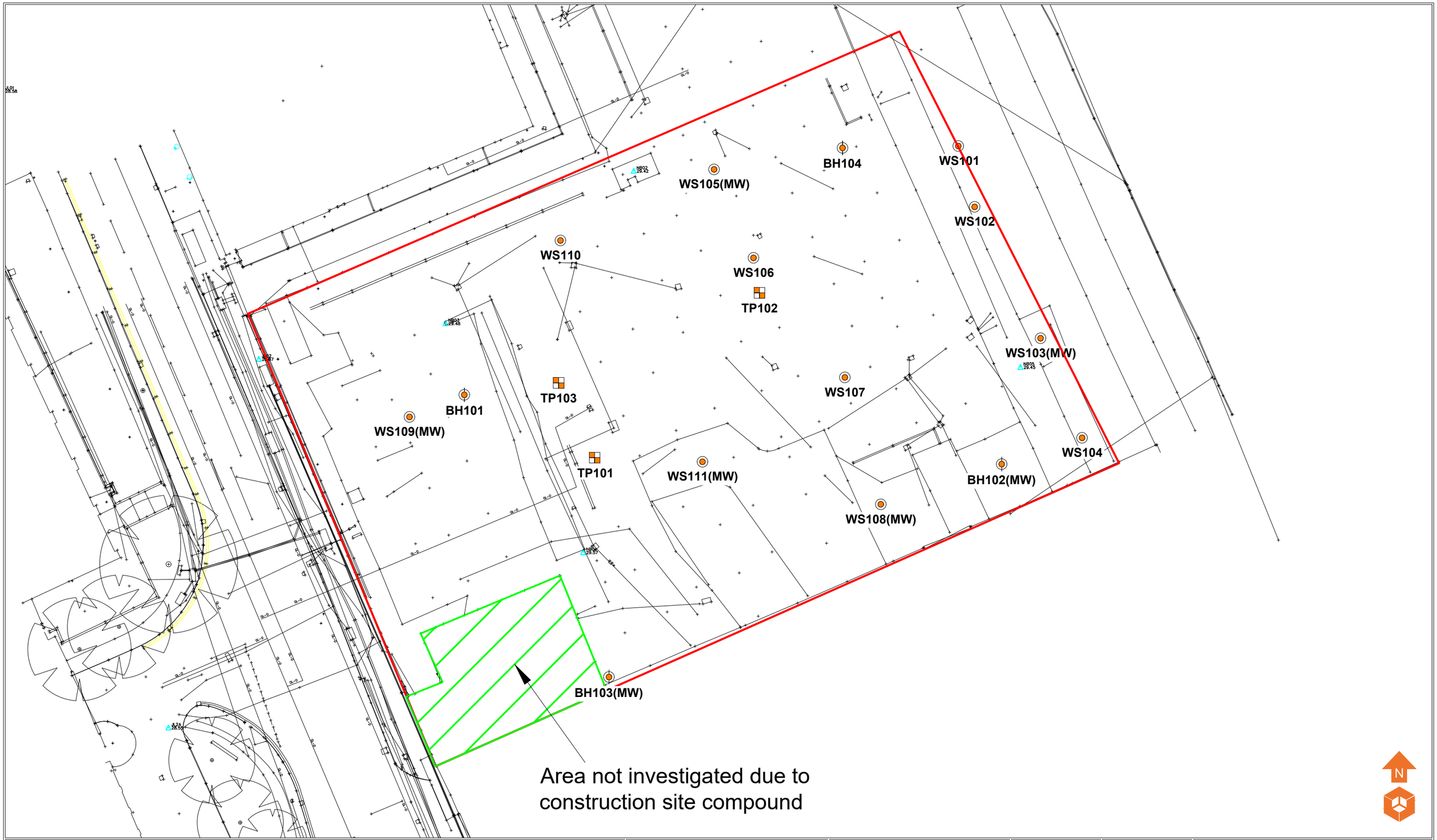

Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install
- Approximate Trial Pit Location
- Approximate Rotary Borehole Location
- Area not investigated

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVF	26.11.2021	EB	BH
P1	REVE	24.11.2021	EB	ND
P1	REVD	10.11.2021	HM	ND
P1	REVC	12.10.2021	HM	ND
P1	REVB	07.10.2021	LM	MD
P1	REVA	05.10.2021	LM	MD

Client: Latimer Developments LTD

Job No: 15-175

Date: 26.11.2021

Drawing No: 005

Scale: NTS

Job Title: Former Boddingtons Site, Great Ducie Street

Drawing Title: Exploratory Hole Location Plan

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