Ground Gas Addendum Report
Burnage Sports Club
Manchester

Reference:16-953R3
Date: November 2023

GROUND GAS ADDENDUM REPORT

Burnage Sports Club,
Manchester,
United Kingdom,
M19 1AL

Prepared for:

KELLEN HOMES

Report Ref: 16-953-R3
Date Issued: November 2023

E3P

Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

+ 44 (0) 161 707 9612
https://e3p.co.uk

Registered in England
CRN: 08725262

QUALITY ASSURANCE

Report reference	**16-953-R1**

REV REF:	DESCRIPTION	AUTHOR	CHECKED	AUTHORISED	DATE
R1-rev-a	First issue	JC	MSD		

This report has been prepared for the sole benefit, use, and information of the client. The liability of Environmental Engineering Partnership Limited t/a E3P with respect to the information contained in the report will not extend to any third party. This report has been prepared by the qualified persons as listed below.

WRITTEN BY	QUALIFICATIONS	DATE
J. Clayton	BSc(Hons)	November 2023

REVIEWED BY	QUALIFICATIONS	DATE
M. Dee	MESci (Hons), FGS	November 2023

AUTHORISED BY	QUALIFICATIONS	DATE
A Edgar	BSc, MSc, PIEMA, MIEnvSc, CEnv	November 2023

Table of Contents

1. INTRODUCTION 2
1.1. Background 2
1.2. Proposed Development 2
1.3. Objectives 3
1.4. Limitations 3
1.5. Confidentiality 3

2. RATIONALE 4
2.1. sources and pathways of ground gas 4

3. GROUND GAS RISK ASSESSMENT 5
3.1. Ground Gas Risk Assessment Methodology 5
3.2. Monitoring Methodology 6
3.3. Summary of Monitoring Results 9
3.3.1. Groundwater 9
3.3.2. Barometric pressure 9
3.3.3. Gas Flow 9
3.3.4. Gas Concentrations 9
3.4. Conclusion 10

APPENDIX I LIMITATIONS 12

APPENDIX II GLOSSARY 14

APPENDIX III DRAWINGS 17

1. INTRODUCTION

1.1. BACKGROUND

E3P has previously completed a ground investigation on the site known as Burnage Sports Club, Manchester. The findings of the ground investigation are presented within the E3P report entitled Phase II Geoenvironmental Site Assessment Burnage Sports Club. Report reference 16953-R2-1, dated August 2023).

During the investigation E3P installed six ground gas monitoring wells, which were to be monitored over a period of 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 Kellen Homes intends to construct a residential development consisting of low-rise dwellings and 3 apartment blocks totalling circa 85 total dwellings. Accompanied with associated gardens, estate roads and infrastructure.

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. RATIONALE

Hazardous ground gas qualitative risk assessment is based on a conceptual site model (CSM) similar to that used for soil and groundwater contamination sources (i.e., source pathway receptor pollutant linkages).

The risk can be assessed based on knowledge of the ground conditions and CSM and a measure of hazardous gas concentrations and gas flow at the site within monitoring standpipes.

2.1. SOURCES AND PATHWAYS OF GROUND GAS

Table 2.1 summarises the potential sources and pathways of ground gas within the context of the recorded site setting and proposed development.

TABLE 2.1 IDENTIFIED POTENTIAL SOURCES OF GROUND GAS

SOURCE
Made Ground (Historical development and infilled ponds); Heavy metal, PAH and long chain TPH contamination has been identified within isolated areas of Made Ground deposits ranging from 0.60 – 1.00 m bgl. Within areas of former ponds in the south of the site (TP102, TP105a, and WS104), soft highly organic Made Ground material (SILT and PEAT) were noted beneath the blackish sandy gravel, representative of the base of the former ponds and encountered to maximum depths ranging between 2.00 m – 3.10 m bgl. As organic soils degrade, these organic silts and peats have a potential to generate ground gas.
Drift Strata Drift deposits were encountered within all of the exploratory locations and generally comprised uniform strata of an orange, brown slightly gravelly CLAY, with subangular to subrounded gravel of MUDSTONE. CLAY deposits were generally noted as strengths of a firm to very stiff. The presence of this low permability strata across the site will inhibt the vertical and lateral migration of ground gas.
Landfill Sites No landfill sites (current or historic) are located within 250 m of the site. There are two identified infilled historical ponds located in the south and east of site. The Made Ground associated with these infilled ponds may produce hazardous ground gases such as methane and carbon dioxide
Other Gases Less than 1% of houses above the 'Action Level' – no special precautions required.

The CIRIA C665 guidance on gas risk assessment includes recommendations for periods and frequencies for monitoring visits. These recommendations take into account the nature of the proposed development and the likely generation potential of the source.

The proposed development comprises private residential properties, which would be classified as a Type A development (high sensitivity) in accordance with BS8485:2015+A1:2019. However, it is considered that the likely generation potential of the identified gas sources (taking into account the likelihood of future increases in gas generation) would be best classified as low.

Therefore within the context of the proposed residential end-use and ground gas generation potential, the gas assessment requires six visits over three months, with at least two sets of readings at low or falling atmospheric pressure.

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 final derived GSV can then be used to characterise the site as summarised in Table 3.1.

TABLE 3.1 SITE CHARACTERISATION BY GSV (BS8485:2015)

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.

3.2. MONITORING METHODOLOGY

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

Gas measurements were recorded for a minimum of 300 seconds (5 minutes) at each location, increasing to 600 seconds if elevated concentrations identified, 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 3.2.

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 3.2 SUMMARY OF GROUND GAS MONITORING RESULTS

WELL	STRATA	DATE	CH_4 PEAK (%V/V)	CH_4 STEADY (%V/V)	CH_4 Q_{hg} (l/hr)	CO_2 PEAK (%V/V)	CO_2 STEADY (%V/V)	CO_2 Q_{hg} (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS101	Natural CLAY Drift	20/06/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.1	1000	Falling	0.1	0.1	1.00-4.00	4.2	Dry
		10/07/2023	0.1	0.1	0.0001	0.7	0.7	0.0007	20.2	1011	Falling	0.1	0.1		3.04	3.97
		26/07/2023	0.1	0.1	0.0001	1.3	0.9	0.0013	19.8	1001	Falling	0.1	0.1		4	3.8
		11/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1011	Rising	0.1	0.1		4.05	2.88
		25/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1002	Falling	0.1	0.1		4.05	2.45
		08/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	1011	Steady	0.1	0.1		4.05	2.12
WS102	Natural CLAY Drift	20/06/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.3	999	Falling	0.1	0.1	1.00-4.00	4.3	Dry
		10/07/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1012	Falling	0.1	0.1		4.06	Dry
		26/07/2023	0.1	0.1	0.0001	0.6	0.5	0.0006	18.3	1012	Falling	0.1	0.1		4	Dry
		11/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.7	1012	Rising	0.1	0.1		4.06	Dry
		25/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1012	Falling	0.1	0.1		4.07	Dry
		08/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	1011	Steady	0.1	0.1		4.07	Dry
WS103	Natural CLAY Drift	20/06/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	999	Falling	0.1	0.1	1.00-4.00	4.2	4.1
		10/07/2023	0.1	0.1	0.0001	0.2	0.1	0.0002	20.8	1010	Falling	0.1	0.1		3.77	0.5
		26/07/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	21	1000	Falling	0.1	0.1		3.7	0.5
		11/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1007	Rising	0.1	0.1		3.76	0.6
		25/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1002	Falling	0.1	0.1		3.71	1.68
		08/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1011	Steady	0.1	0.1		3.72	2.84
WS104	MADE GROUND (Organic Deposits)	20/06/2023	0.1	0.1	0.0025	0.1	0.1	0.0025	20.4	999	Falling	2.5	0.1	1.00-2.00	2.2	1.9
		10/07/2023	0.3	0.1	0.0003	0.5	0.2	0.0005	20.8	1010	Falling	0.1	0.1		2.05	1.25

WELL	STRATA	DATE	CH_4 PEAK (%V/V)	CH_4 STEADY (%V/V)	CH_4 Q_{hg} (l/hr)	CO_2 PEAK (%V/V)	CO_2 STEADY (%V/V)	CO_2 Q_{hg} (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS104	MADE GROUND (Organic Deposits)	26/07/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	21.1	1000	Falling	0.1	0.1	1.00-2.00	1.95	1.01
		11/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1007	Rising	0.1	0.1		2.06	1.06
		25/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1001	Falling	0.1	0.1		2.06	1.33
		08/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1011	Steady	0.1	0.1		2.06	1.48
WS105	Natural CLAY Drift	20/06/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	999	Falling	0.1	0.1	1.00-4.00	4.3	Dry
		10/07/2023	0.1	0.1	0.0001	1	0.8	0.0010	19.8	1011	Falling	0.1	0.1		4.04	3.97
		26/07/2023	0.1	0.1	0.0001	0.8	0.6	0.0008	20.1	1000	Falling	0.1	0.1		4	Dry
		11/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.7	1006	Rising	0.1	0.1		4.05	3.99
		25/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1002	Falling	0.1	0.1		4.03	3.98
		08/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1011	Steady	0.1	0.1		4.03	4
WS106	Natural CLAY Drift	20/06/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	999	Falling	0.1	0.1	1.00-4.00	4.2	Dry
		10/07/2023	0.1	0.1	0.0001	1.5	1.5	0.0015	19.1	1011	Falling	0.1	0.1		4.07	Dry
		26/07/2023	0.1	0.1	0.0001	0.9	0.6	0.0009	20.2	1000	Falling	0.1	0.1		4	Dry
		11/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1007	Rising	0.1	0.1		4.08	3.5
		25/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1002	Falling	0.1	0.1		4.08	3.21
		08/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.7	1011	Steady	0.1	0.1		4.08	2.98

Notes

CIRIA Characteristic Situation	Q_{hg}		
CS1	<0.07	Typical Max CO2 <5 % Typical Max CH4 <1 %	Values in **BOLD** exceed CS1 Thresholds
CS2	<0.7	Flow rate not to exceed 70 l/hr otherwise consider increase to CS3	Values in BLUE denote water above level of response zone (flooded)
CS3	<3.5		
CS4	<15	Quantitative Risk Assessment required to evaluate scope of protective measures	

3.3. SUMMARY OF MONITORING RESULTS

3.3.1. GROUNDWATER

The water level within several of the monitoring wells was recorded to be above the top of the response zone (flooded) on a number of occasions, as summarised in Table 3.3, thus rendering some of the monitoring data unreliable. Therefore, each time a flooded well was encountered, the well was bailed and left to re-equilibrate. Wells were re-monitored after a period of 20–30 minutes.

Table 3.2 FLOODED MONITORING WELL DATA

WELL	VISIT 1 20/06/2023	VISIT 2 10/07/2023	VISIT 3 26/07/2023	VISIT 4 11/08/2023	VISIT 5 25/08/2023	VISIT 6 08/09/2023
WS101	-	-	-	-	-	-
WS102	-	-	-	-	-	-
WS103	-	Y	Y	Y	-	-
WS104	-	-	-	-	-	-
WS105	-	-	-	-	-	-
WS106	-	-	-	-	-	-

Within remaining monitoring wells, groundwater levels were observed to rise over the monitoring period, however, due to the predominantly low permeability cohesive drift stratum, it is likely that water levels are representative of surface water collecting within the standpipes and not a true representation of groundwater.

3.3.2. BAROMETRIC PRESSURE

Visit 1, 2, 3 and 5 were undertaken during falling pressure events. Visit 1 was undertaken during a falling pressure event where the atmospheric pressure dropped 3 mbar across two days. Visits 2 and 3 were undertaken during falling pressure events where the atmospheric pressure dropped 10 mbar across two days. Visit 5 was undertaken during a falling pressure event where the atmospheric pressure dropped 15 mbar across four days.

Visit 4 was undertaken during a period of rising pressure, with pressure recorded to be increase by 3 mbar across one day.

Visits 6 was undertaken during a period of steady relatively high pressure, with pressure recorded to be 1011 mbar.

It is therefore considered that the visits have been undertaken over representative conditions.

3.3.3. GAS FLOW

Throughout the monitoring period, flow rates were recorded to be 0.1 l/hr (limit of detection of the analyser), with the exception of visit one for WS104 which was recorded to be 2.5 l/hr.

3.3.4. GAS CONCENTRATIONS

The maximum methane value recorded within the monitoring wells was 0.3% v/v on one occasion at WS104 on 10/07/2023, every other result was recorded as 0.1% v/v (limit of detection of the analyser).

Carbon dioxide concentrations were recorded at concentrations ranging from 0.1% v/v to 1.3% v/v (WS101).

3.4. CONCLUSION

The determined Characteristic Situation for each standpipe for each visit is presented in Table 3.3. This indicates that based on the peak flow rates the majority of the monitoring visits classify as Characteristic Situation (CS)1 – Very Low Gas Risk.

TABLE 3.3 GAS RISK PROFILE AND LOCATION

WELL	DATE	DEPTH TO WATER (m bgl)	MAX FLOW (l/hr)	MAX CH_4 (%V/V)	MAX CH_4 Q_{hg} (l/hr)	MAX CO_2 (%V/V)	MAX CO_2 Q_{hg} (l/hr)	CHARACTERISTIC SITUATION
WS101	20/06/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	10/07/2023	3.97	0.1	0.1	0.0001	0.7	0.0007	CS1
	26/07/2023	3.8	0.1	0.1	0.0001	1.3	0.0013	CS1
	11/08/2023	2.88	0.1	0.1	0.0001	0.1	0.0001	CS1
	25/08/2023	2.45	0.1	0.1	0.0001	0.1	0.0001	CS1
	08/09/2023	2.12	0.1	0.1	0.0001	0.1	0.0001	CS1
WS102	20/06/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	10/07/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	26/07/2023	Dry	0.1	0.1	0.0001	0.6	0.0006	CS1
	11/08/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	25/08/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	08/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
WS103	20/06/2023	4.1	0.1	0.1	0.0001	0.1	0.0001	CS1
	10/07/2023	Well Flooded						
	26/07/2023							
	11/08/2023							
	25/08/2023	1.68	0.1	0.1	0.0001	0.1	0.0001	CS1
	08/09/2023	2.84	0.1	0.1	0.0001	0.1	0.0001	CS1
WS104	20/06/2023	1.9	2.5	0.1	0.0025	0.1	0.0025	CS1
	10/07/2023	1.25	0.1	0.3	0.0003	0.5	0.0005	CS1
	26/07/2023	1.01	0.1	0.1	0.0001	0.1	0.0001	CS1
	11/08/2023	1.06	0.1	0.1	0.0001	0.1	0.0001	CS1
	25/08/2023	1.33	0.1	0.1	0.0001	0.1	0.0001	CS1
	08/09/2023	1.48	0.1	0.1	0.0001	0.1	0.0001	CS1
WS105	20/06/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	10/07/2023	3.97	0.1	0.1	0.0001	1.0	0.0010	CS1
	26/07/2023	Dry	0.1	0.1	0.0001	0.8	0.0008	CS1
	11/08/2023	3.99	0.1	0.1	0.0001	0.1	0.0001	CS1
	25/08/2023	3.98	0.1	0.1	0.0001	0.1	0.0001	CS1
	08/09/2023	4	0.1	0.1	0.0001	0.1	0.0001	CS1

WELL	DATE	DEPTH TO WATER (m bgl)	MAX FLOW (l/hr)	MAX CH_4 (%V/V)	MAX CH_4 Q_{hg} (l/hr)	MAX CO_2 (%V/V)	MAX CO_2 Q_{hg} (l/hr)	CHARACTERISTIC SITUATION
WS106	20/06/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	10/07/2023	Dry	0.1	0.1	0.0001	1.5	0.0015	CS1
	26/07/2023	Dry	0.1	0.1	0.0001	0.9	0.0009	CS1
	11/08/2023	3.5	0.1	0.1	0.0001	0.1	0.0001	CS1
	25/08/2023	3.21	0.1	0.1	0.0001	0.1	0.0001	CS1
	08/09/2023	2.98	0.1	0.1	0.0001	0.1	0.0001	CS1

With due consideration to the Conceptual Site Model and the absence of any persistent gas source (following removal of organic pond deposits) and gas generation potential, it is considered by E3P that the site can be classified as CS1, and therefore no gas protection measures are required.

It is recommended that the full ground gas assessment and recommended protection measures (if applicable) 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.

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 reinterpretation 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	Aboveground 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 nonaqueous 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**	Vibrionaceae column
ICSM	Initial conceptual site model	**VOC**	Volatile organic compound
LEL	Lower explosive limit	**VRSC**	Vibroreplacement stone columns
LMRL	Lower method reporting limit	**VSC**	Vibrostone columns
LNAPL	Light nonaqueous 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



Site Features

- Former Building
- Hardstanding
- Former Cricket Club
- Former Pond

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVB	06.07.2023	EB	MD
P1	REVA	28.06.2023	OW	MD

Client: Kellen

Job No: 16-953

Date: 06.07.2023

Drawing No: 003

Scale: NTS@ A3

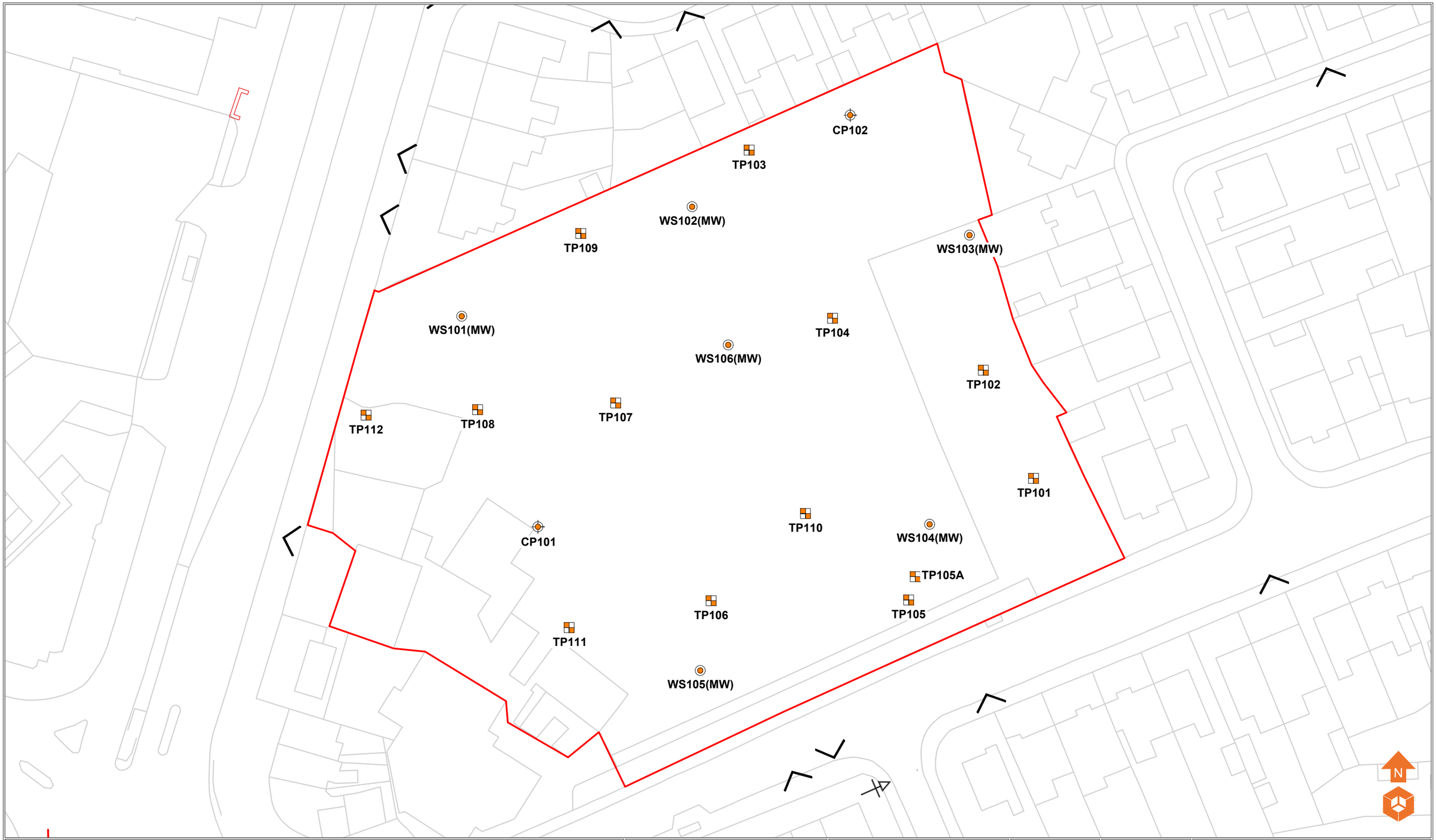
Job Title: Burnage Sports Club, Manchester

Drawing Title: Historical Features Plan

e3p

Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.



Location Symbols

- Approximate Window Sample Probehole Location with Install
- Approximate Trial Pit Location
- Approximate Cable Percussive Borehole Location

Notes:

P1	REVA	12.06.2023	EB	MD
Phase	Issue	Date	Drawn	Checked

Client: Kellen

Job No: 16-953

Date: 12.06.2023

Drawing No: 005

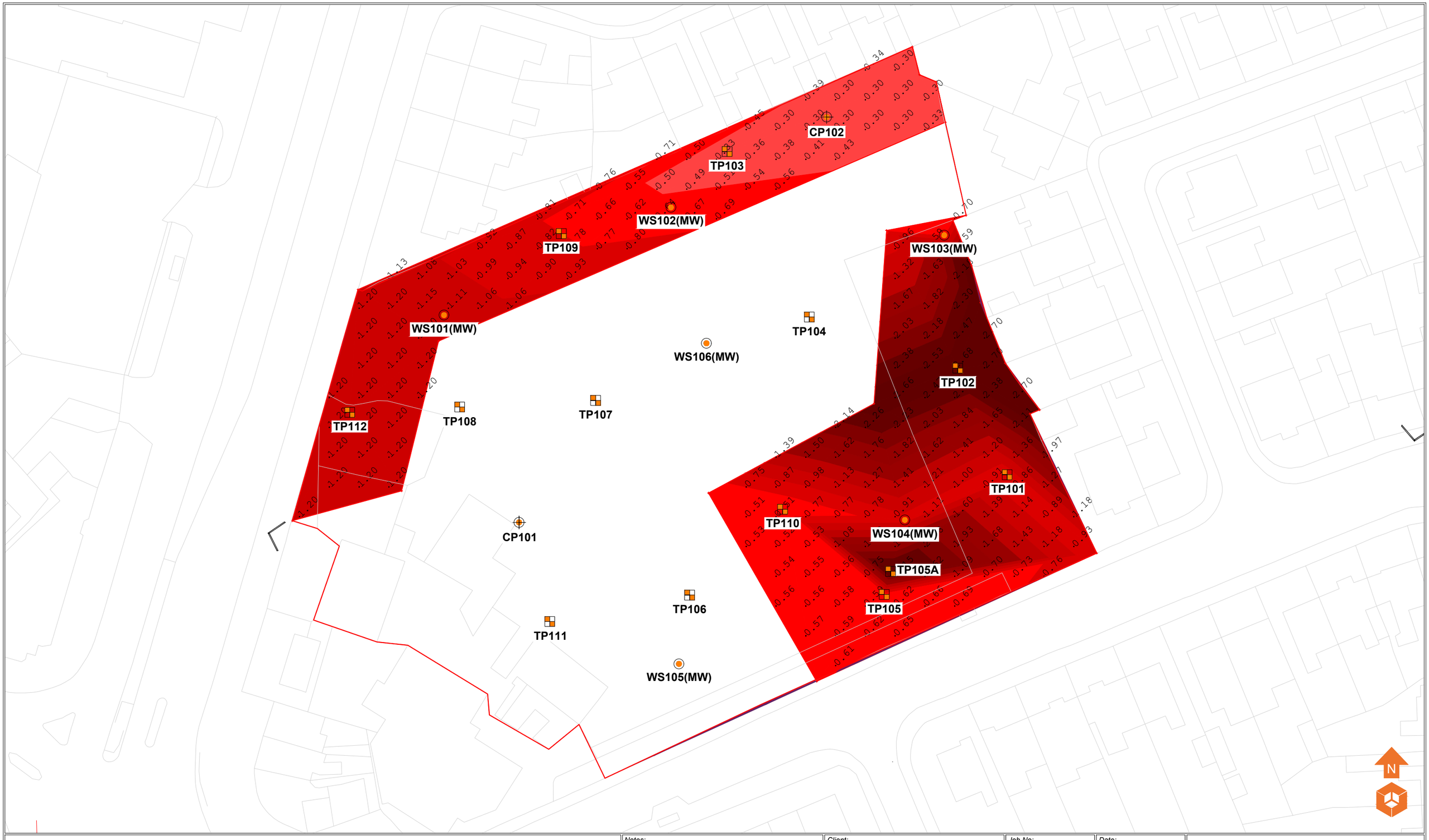
Scale: NTS@ A3

Job Title: Burnage Sports Club, Manchester

Drawing Title: Exploratory Hole Location Plan

Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.



Location Symbols

- WS101(MW) — Approximate Window Sample Probehole Location with Install
- TP101 — Approximate Trial Pit Location
- CP101 — Approximate Cable Percussive Borehole Location

Made Ground Depth (m)

- Depth of Made Ground 0.00 - 0.55m
- Depth of Made Ground 0.79 - 0.80m
- Depth of Made Ground 1.04 - 1.05m
- Depth of Made Ground > 1.30m

Notes:

Client: Kellen

Job No: 16-953

Date: 03.08.2023

Drawing No: 006

Scale: NTS@ A3

Phase	Issue	Date	Drawn	Checked
P1	REVB	03.08.2023	OW	MW
P1	REVA	15.06.2023	OW	ID

Job Title: Burnage Sports Club, Manchester

Drawing Title: Depth of Made Ground Plan

e3p
Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.