



Ground Gas Addendum Report
Kenyon Lane, Failsworth

Reference:16-717-R2
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GROUND GAS ADDENDUM REPORT

Kenyon Lane
Moston
Manchester
M9 4PF

Prepared for:



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1. INTRODUCTION

1.1. BACKGROUND

E3P has previously completed a ground investigation on a parcel of land to the south of Kenyon Lane in Failsworth, Manchester. The findings of the ground investigation are presented within the E3P report entitled Phase II Geoenvironmental Site Assessment Kenyon Lane, Failsworth. Report reference 16-717-R1-1, dated September 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 Jigsaw Homes intends to construct a low-rise residential development with associated adopted estate roads, gardens and infrastructure at land to the south of Kenyon Lane, Manchester.

A proposed development layout has not been provided at the time of writing this report.

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 POTENTIAL SOURCES OF GROUND GAS

SOURCE
Made Ground
Made Ground was encountered across the entirety of the site from ground level to a maximum proven depth of 7.10 m bgl (CP102).
A reworked topsoil of a brown slightly gravelly clayey medium to coarse sand with frequent roots and gravel of brick and mudstone was encountered within each exploratory hole location to 0.20–0.40 m bgl.
In the northern sector, Made Ground generally comprised a reworked clay overlying brick fill, indicative of relict foundations/demolition materials from the former terraced residential properties to a maximum proven depth of 1.80 m. The base of Made Ground was unproven in TP109 due to encountering a concrete slab. TP111 was also terminated due to the presence of a potential drain/service encountered at 1.20 m bgl.
Within TP101 and WS101 located to the very southwest of the site, the Made Ground deposits differed and comprised a slightly gravelly clayey sand with pockets of clay and gravel of brick and clinker to 3.40 m bgl, with a gravelly reworked ashy clay underlying the sand with inclusions of wood and organic matter in TP101 and a grey sandy gravel of clinker and concrete within WS101.
During the E3P intrusive site investigation seven exploratory hole locations were advanced in the south sector of the site in the positions where the historical landfill encroached the site, these included WS102, WS103, TP102–TP105 and CP102.
The base of Made Ground was unproven in the southern sector in the majority of locations, except WS103 and CP102, where the Made Ground was proven at 2.00 m and 7.10 m bgl, respectively.
A hydrocarbon odour was noted within the Made Ground at four locations in the southern sector, WS105, TP102, TP104 and CP102. A concrete slab obstruction was also encountered at 1.10 m bgl in TP102 (likely to be a large boulder rather than in-situ slab).



SOURCE

Drift Strata

Drift deposits were encountered within nine out of the 19 exploratory hole locations across the site, to a maximum depth of 12.35 m bgl (base not proven).

The shallow (<5.00 m bgl) soils generally comprised an orange/brown medium to coarse SAND overlying a greyish brown SILT.

A stiff medium-strength CLAY was encountered in WS103 and WS104 to >5.45 m bgl.

Cable percussive boreholes encountered deeper soil horizons comprising a sandy SILT with CLAY bands to 6.00 m bgl in CP101 and a silty SAND within CP102 to 10.90 m bgl. A brown boulder CLAY was encountered underlying the silt and sand in both locations. CP101 refused in the CLAY, likely on a boulder at 8.41 m bgl, whereas CP102 refused within a brown sandy GRAVEL at 12.35 m bgl, that was encountered underlying the boulder CLAY.

Based on-site observations, the natural drift strata are not considered to be a potentially significant source of ground gas.

Solid Strata

The solid bedrock geology was not encountered during the site investigation and BGS borehole records within 100 m of the site also did not encounter bedrock within boreholes advanced to 7.62 m bgl.

Landfill Sites

There is an area of historical landfill which encroaches into the site from the south. The type of waste included inert and industrial waste. Input dates between May 1980 and December 1981.

Within the former landfill Made Ground deposits were generally deeper than that of the deposits in the north of the site. The depth of the Made Ground deposits in five of the seven locations could not be proven due to both obstructions and the extent of these deposits. WS103 and CP102 fully penetrated the Made Ground and the deposits were proven to 2.00 m and 7.10 m bgl, respectively.

The deposits in the south generally comprised of greyish brown clayey gravelly medium to coarse sand and gravelly clay, with frequent concrete and brick cobbles and boulders and inclusions of intact bricks, plastic, metal, wood, concrete and cloth.

Other Gases

The site is situated within an area of maximum radon potential of 1–3%. The BGS reports that full radon protective measures are not necessary in the construction of new dwellings or extensions.

Hydrocarbon odours were noted within Made Ground deposits at four locations in the southern sector, WS105, TP102, TP104 and CP102, as such S/VOC analysis was undertaken with the geochemical testing reporting that all concentrations were below the limit of detection (LOD). A single elevated concentration of heavy end TPH has been identified in TP102 at 0.80 m bgl, it is seen that the primary exposure pathways related to dermal contact and ingestion, soil ingestion and consumption of homegrown produce, as such can be mitigated through the installation of an appropriate cover system.

Elevated total mercury has been encountered in Made Ground deposits in TP101 at 1.20 m bgl, this contamination presents a potential volatilisation to indoor air risk. It should be noted that only the elemental proportion of the total mercury is potentially volatile, and speciation of this mercury may conclude the elemental proportion to be lower than the GAC value of 1.2 mg/kg. However, speciation was not undertaken as part of the Phase II GSA as it was outside of the scope of the investigation. The material is deemed to have a potential vapour risk and may require hotspot removal, during a the enabling works.



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 moderate to high.

Therefore within the context of the proposed residential end-use and ground gas generation potential, the gas assessment requires nine 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*

BS8485:2015+A1:2019 provides guidance on the level of gas protection requirements based on the characteristic situation (CS) and the proposed development based on building type.

Therefore, in accordance with BS8485:2015+A1:2019, 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.

NHBC guidance (Report No 10627R01) can also be considered, if appropriate, which is based on standard residential houses with precast concrete floors (block and beam) / suspended cast in situ concrete floor slabs.

It should be noted that in the first instance, this assessment has been carried out in accordance with BS8485:2015+A1:2019 and the thresholds given in Table 3.1.

3.2. MONITORING METHODOLOGY

Concentrations of methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) 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 were identified, at which point the maximum concentration of CH₄ and CO₂, together with the lowest concentration of O₂ 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 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	MADE GROUND	05/07/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.7	998	Falling	0.1	0.1	1.00–4.00	4.60	Dry
		25/07/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.3	998	Falling	0.1	0.1		4.60	Dry
		02/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	974	Falling	0.1	0.1		4.70	Dry
		08/08/2023	0.1	0.1	0.0001	0.8	0.6	0.0008	20.5	1002	Falling	0.1	0.1		4.70	Dry
		15/08/2023	0.1	0.1	0.0001	1.2	1.2	0.0012	19.3	1003	Rising	0.1	0.1		4.70	Dry
		24/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.3	998	Steady	0.1	0.1		4.70	Dry
		04/09/2023	0.1	0.1	0.0001	0.4	0.3	0.0004	20.9	1006	Rising	0.1	0.1		4.63	Dry
		15/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	21.1	1003	Falling	0.1	0.1		4.63	Dry
		22/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	986	Falling	0.1	0.1		4.65	Dry
WS102	MADE GROUND	05/07/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.7	999	Falling	0.1	0.1	1.00–2.00	1.85	Dry
		25/07/2023	0.1	0.1	0.0001	5.4	5.4	0.0054	13.2	999	Falling	0.1	0.1		1.90	Dry
		02/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	999	Falling	0.1	0.1		1.94	Dry
		08/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.2	999	Falling	0.1	0.1		1.94	Dry
		15/08/2023	0.1	0.1	0.0001	6.3	6.3	0.0063	11.6	999	Rising	0.1	0.1		1.94	Dry
		24/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	999	Steady	0.1	0.1		1.98	Dry
		04/09/2023	0.1	0.1	0.0001	6	5.9	0.0060	12.5	999	Rising	0.1	0.1		1.98	Dry
		15/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	21	999	Falling	0.1	0.1		1.97	Dry
		22/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	999	Falling	0.1	0.1		1.96	Dry



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)
WS103	CLAY	05/07/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	998	Falling	0.1	0.1	2.00–5.00	Bung Stuck	
		25/07/2023	0.1	0.1	0.0001	5.3	5.3	0.0053	4.8	998	Falling	0.1	0.1			
		02/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	975	Falling	0.1	0.1			
		08/08/2023	0.1	0.1	0.0001	5.4	5.3	0.0054	12.1	1002	Falling	0.1	0.1			
		15/08/2023	0.1	0.1	0.0001	3.4	3.4	0.0034	14.3	1004	Rising	0.1	0.1			
		24/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	998	Steady	0.1	0.1			
		04/09/2023	0.1	0.1	0.0001	6.4	6.4	0.0064	0.1	1010	Rising	0.1	0.1			
		15/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1005	Falling	0.1	0.1			
		22/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	987	Falling	0.1	0.1			
WS104	MADE GROUND	05/07/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1000	Falling	0.1	0.1	0.50–2.00	2.00	Dry
		25/07/2023	0.1	0.1	0.0001	8.2	8.1	0.0082	2.5	1000	Falling	0.1	0.1		1.90	Dry
		02/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.3	975	Falling	0.1	0.1		2.05	1.50
		08/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.1	1001	Falling	0.1	0.1		2.05	1.37
		15/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1004	Rising	0.1	0.1		2.05	1.20
		24/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	998	Steady	0.1	0.1		1.98	Dry
		04/09/2023	0.1	0.1	0.0001	6.5	6.5	0.0065	11.9	1010	Rising	0.1	0.1		1.80	Dry
		15/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	21	1004	Falling	0.1	0.1		1.98	Dry
		22/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	991	Falling	0.1	0.1		1.98	Dry



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)
WS105	SILT	05/07/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1000	Falling	0.1	0.1	2.50–4.50	4.10	3.90
		25/07/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	19.8	1000	Falling	0.1	0.1		3.30	2.90
		02/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.1	976	Falling	0.1	0.1		3.25	2.54
		08/08/2023	0.1	0.1	0.0001	0.2	0.1	0.0002	20.1	1001	Falling	0.1	0.1		3.25	2.67
		15/08/2023	0.1	0.1	0.0001	0.3	0.1	0.0003	20.4	1005	Rising	0.1	0.1		3.25	2.75
		24/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	998	Steady	0.1	0.1		3.20	Dry
		04/09/2023	0.1	0.1	0.0001	0.7	0.6	0.0007	20.5	1010	Rising	0.1	0.1		3.15	Dry
		15/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.9	1004	Falling	0.1	0.1		3.18	Dry
		22/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	989	Falling	0.1	0.1		3.15	3.03
WS106	CLAY / SILT	05/07/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	1000	Falling	0.1	0.1	2.00–4.00	3.70	3.40
		25/07/2023	0.1	0.1	0.0001	9.1	7.4	0.0091	4.9	998	Falling	0.1	0.1		3.60	3.20
		02/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	974	Falling	0.1	0.1		3.70	3.26
		08/08/2023	0.1	0.1	0.0001	0.9	0.8	0.0009	15.3	1001	Falling	0.1	0.1		3.70	3.10
		15/08/2023	0.1	0.1	0.0001	7.7	7.7	0.0077	1.2	1005	Rising	0.1	0.1		3.70	3.10
		24/08/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	998	Steady	0.1	0.1		3.70	3.39
		04/09/2023	0.1	0.1	0.0001	10.6	10.6	0.0106	0.1	1006	Rising	0.1	0.1		3.65	3.35
		15/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	21	1002	Falling	0.1	0.1		3.37	Dry
		22/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	988	Falling	0.1	0.1		3.64	3.32



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

Groundwater was recorded between 2.54 m and 3.90 m bgl within WS105 and WS106. Water levels dropped during visits 6–8 with WS105 being recorded as dry and WS106 recording a drop of roughly 0.30 m.

Shallower water levels were recorded between 1.20 m and 1.50 m bgl within WS104, however, this is likely perched and a result of heavy rainfall events, as the monitoring installation was installed at a shallow depth within Made Ground.

WS101 and WS102 were recorded as dry throughout the monitoring visits to date.

It should be noted that although water has been recorded in the boreholes, the maximum depth of the water column recorded is 3.90 m in WS105.

3.3.2. BAROMETRIC PRESSURE

Visits 5 and visit 7 were undertaken during a period of relatively high/rising pressure, with pressure recorded to be 1005 and 1010 mbar, respectively.

Visit 6 was undertaken during a period of relatively steady pressure.

Visits 1–4, 8 and 9 were undertaken during periods of falling pressure and visit 3 was also undertaken during a period of relatively low pressure, with pressure recorded to be 974 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).

3.3.4. GAS CONCENTRATIONS

The maximum methane value recorded within the monitoring wells was 0.1% v/v (limit of detection of the analyser).

Carbon dioxide concentrations were recorded at concentrations ranging from 0.1% v/v to 10.6% v/v (WS106).

Concentrations of carbon dioxide have been recorded >5% in WS102, WS103 and WS106 on three occasions and WS104 on two occasions. Typically these occurred during Visit 2 (27/08/2023 – steady low pressure 998-1000 mbar), Visit 5 (15/08/2023 – rapidly rising pressure 999-1005 mbar) and Visit 7 (04/09/2023 – rapidly rising pressure 999-1005 mbar).

Elevated carbon dioxide readings are linked to depleted levels of oxygen.



3.4. CONCLUSION

The determined Characteristic Situation for each standpipe and visit is presented in Table 3.3. A ground gas conceptual model for the site is presented in Figure 3.1.

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	05/07/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	25/07/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	02/08/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	08/08/2023	Dry	0.1	0.1	0.0001	0.8	0.0008	CS1
	15/08/2023	Dry	0.1	0.1	0.0001	1.2	0.0012	CS1
	24/08/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	04/09/2023	Dry	0.1	0.1	0.0001	0.4	0.0004	CS1
	15/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	22/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
WS102	05/07/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	25/07/2023	Dry	0.1	0.1	0.0001	5.4	0.0054	CS2
	02/08/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	08/08/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	15/08/2023	Dry	0.1	0.1	0.0001	6.3	0.0063	CS2
	24/08/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	04/09/2023	Dry	0.1	0.1	0.0001	6.0	0.0060	CS2
	15/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	22/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
WS103	05/07/2023	N/A – Bung stuck	0.1	0.1	0.0001	0.1	0.0001	CS1
	25/07/2023		0.1	0.1	0.0001	5.3	0.0053	CS2
	02/08/2023		0.1	0.1	0.0001	0.1	0.0001	CS1
	08/08/2023		0.1	0.1	0.0001	5.4	0.0054	CS2
	15/08/2023		0.1	0.1	0.0001	3.4	0.0034	CS1
	24/08/2023		0.1	0.1	0.0001	0.1	0.0001	CS1
	04/09/2023		0.1	0.1	0.0001	6.4	0.0064	CS2
	15/09/2023		0.1	0.1	0.0001	0.1	0.0001	CS1
	22/09/2023		0.1	0.1	0.0001	0.1	0.0001	CS1
WS104	05/07/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	25/07/2023	Dry	0.1	0.1	0.0001	8.2	0.0082	CS2
	02/08/2023	1.50	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
WS104 (continued)	08/08/2023	1.37	0.1	0.1	0.0001	0.1	0.0001	CS1
	15/08/2023	1.20	0.1	0.1	0.0001	0.1	0.0001	CS1
	24/08/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	04/09/2023	Dry	0.1	0.1	0.0001	6.5	0.0065	CS2
	15/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	22/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
WS105	05/07/2023	3.90	0.1	0.1	0.0001	0.1	0.0001	CS1
	25/07/2023	2.90	0.1	0.1	0.0001	0.1	0.0001	CS1
	02/08/2023	2.54	0.1	0.1	0.0001	0.1	0.0001	CS1
	08/08/2023	2.67	0.1	0.1	0.0001	0.2	0.0002	CS1
	15/08/2023	2.75	0.1	0.1	0.0001	0.3	0.0003	CS1
	24/08/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	04/09/2023	Dry	0.1	0.1	0.0001	0.7	0.0007	CS1
	15/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	22/09/2023	3.03	0.1	0.1	0.0001	0.1	0.0001	CS1
WS106	05/07/2023	3.40	0.1	0.1	0.0001	0.1	0.0001	CS1
	25/07/2023	3.20	0.1	0.1	0.0001	9.1	0.0091	CS2
	02/08/2023	3.26	0.1	0.1	0.0001	0.1	0.0001	CS1
	08/08/2023	3.10	0.1	0.1	0.0001	0.9	0.0009	CS1
	15/08/2023	3.10	0.1	0.1	0.0001	7.7	0.0077	CS2
	24/08/2023	3.39	0.1	0.1	0.0001	0.1	0.0001	CS1
	04/09/2023	3.35	0.1	0.1	0.0001	10.6	0.0106	CS2
	15/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	22/09/2023	3.32	0.1	0.1	0.0001	0.1	0.0001	CS1

E3P has assessed the previous variables and come to the following conclusions:

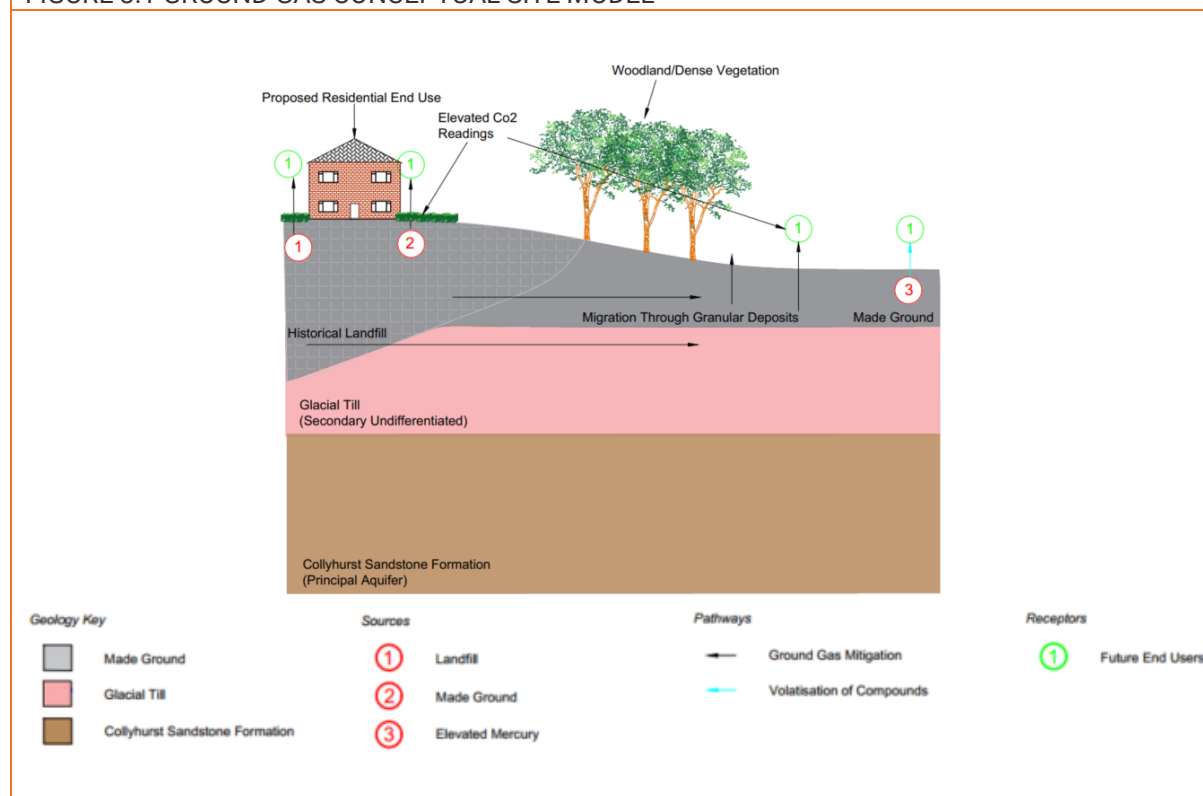
- ✳ The southern part of the site forms part of a larger historical landfill and deep Made Ground (up to 7.10m bgl in CP102), with degradable inclusions of wood and timber observed. Other degradable organic materials may be present at intervening locations and cannot be discounted.
- ✳ Ground gas monitoring indicates that within the vicinity of WS101 (south-western corner of the site) and WS105 (northern tip of the site) can be classified as CS1, as there have been no elevated readings of ground gas recorded in these locations.
- ✳ WS102 and WS103 in the south of the site within the area of the former landfill, have recorded carbon dioxide above 5% v/v threshold on multiple occasions, however, the GSV is noted to be within a CS1 classification due to the absence of flow.



- WS104 and WS106 in the centre of the site have also recorded carbon dioxide above 5% v/v threshold on multiple occasions, however, the GSV is noted to be within a CS1 classification due to the absence of flow. These locations are not noted to be within the mapped landfill area. WS104 is installed in Made Ground and WS106 is installed in natural deposits, as such a viable migration pathway is considered to be through granular interbedding northwards from the landfilled area in the south of the site.
- No elevated methane readings have been recorded across the site during the nine monitoring visits.
- Further works are required in the position of TP101 where elevated total mercury has been encountered in Made Ground deposits at 1.20 m bgl, this contamination presents a potential volatilisation to indoor air risk. Mercury speciation was not undertaken as part of the Phase II GSA as it was outside of the scope of the investigation. The material is deemed to have a potential vapour risk and may require hotspot removal, during a process of cut-and-fill enabling works.
- Given the presence of the recorded historical landfill, that encroaches on the south of the site, and the elevated carbon dioxide concentrations recorded, it is recommended that allowances are to be made for CS2 gas protection measures across the site.
- Proposed new structures will require ground gas protection measures to provide protection with a score of 3.5, in accordance with Table 4 of BS8485 (see Section 3.5).

It is recommended that this ground gas assessment and recommended protection measures (if applicable) are agreed upon with the local authority prior to their adoption on-site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.

FIGURE 3.1 GROUND GAS CONCEPTUAL SITE MODEL



3.5. RESIDENTIAL BUILDING GAS RISK MITIGATION

3.5.1. BRITISH STANDARD BS8485 (2015)+A1 (2019)

British Standard BS8485:2015+A1:2019 provides two types of residential property that require assessment. These building types are:

- ✳ **Type A Building** – Private ownership with no building management controls on alterations to the internal structure, the use of rooms, the ventilation of rooms or the structural fabric of the building. Some small rooms are present. Probably conventional building construction (rather than civil engineering). Examples include private housing and some retail premises.
- ✳ **Type B Building** – Private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium-sized rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels.

Based on the ground gas risk assessment and the proposed Type A Building, it is envisaged that a point score of 3.5 will be required for affected properties, as summarised in Table 3.4.

TABLE 3.4 BS8485 (2015)+A1(2019) POINTS REQUIRED FOR TYPE A AND TYPE B BUILDINGS

CHARACTERISTIC SITUATION	MINIMUM GAS PROTECTION SCORE (POINTS)	
	HIGH SENSITIVITY	
	TYPE A BUILDING	TYPE B BUILDING
1	0	0
2	3.5	3.5
3	4.5	4
4	6.5 ^{A)}	5.5 ^{A)}
5	— ^{B)}	6
6	— ^{B)}	— ^{B)}

BS8485 (2015)+A1(2019) Notes

A) Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations.

B) The gas hazard is too high for this empirical method to be used to define the gas protection measures.

Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, for example, high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system such as in institutional and/or fully serviced contractual situations.



TABLE 3.5 SUMMARY OF GROUND GAS MITIGATION MEASURES – BS8485 (2015)+A1(2019)

GAS PROTECTION SCORES FOR THE STRUCTURAL BARRIER	SCORE ^A
Floor and Substructure Design	
Precast Suspended Segmental Subfloor (Beam and Block)	0
Cast in Situ Ground Bearing Floor Slab (With Only Nominal Mesh Reinforcement)	0.5
Cast in Situ Monolithic Reinforced Ground Bearing Raft or Reinforced Cast in Situ Suspended Floor Slab With Minimal Penetrations	1 or 1.5 ^B
Basement Floor and Walls Conforming to BS 8102:2009, Grade 2 Waterproofing^{C,D}	2
Basement Floor and Walls Conforming to BS 8102:2009, Grade 3 Waterproofing^{C,D}	2.5
Notes A) The scores are conditional on breaches of floor slabs, etc., being effectively sealed. B) To achieve a score of 1.5 the raft or suspended slab should be well reinforced to control cracking and have minimal penetrations cast in (see A.2.2.2). C) The score is conditional on the waterproofing being provided by a suitable structural barrier with the design and detailing of the walls and floor meeting the requirements for Type B protection. The score cannot be assigned for Type A (waterproof membrane) or Type C (drained cavity wall). D) If a membrane is installed beneath and around the basement to provide Type A waterproofing (BS 8102:2009), it can be assigned a gas protection score in accordance with Table 7, if it meets all the criteria for a gas resistant membrane in that table. When practical, utilities should enter the building above floor level with any conduit or meter housing being properly vented outside of the building.	

PROTECTION ELEMENT SYSTEM		SCORE	COMMENTS
Gas protection scores for ventilation protection measures			
(a) Pressure Relief Pathway – Usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building.		0.5	Whenever possible a pressure relief pathway (as a minimum) should be installed in all gas protection measures systems. If the layer has a low permeability and/or is not terminated in a venting trench (or similar), then the score is 0.
(b) Passive Subfloor Dispersal Layer – Media used to provide the dispersal layer are:  Clear void;  Polystyrene void former blanket;  Geocomposite void former blanket;  No fines gravel layer with gas drains; and  No fines gravel layer.	Very good performance	2.5	The ventilation effectiveness of different media depends on a number of different factors including the transmissivity of the medium, the width of the building, the side ventilation spacing and type and the thickness of the layer. The selected score should be assigned taking into account the recommendations in Annex B of BS 8485 (2015). Passive ventilation should be designed to meet at least “good performance”.
	Good performance	1.5	



PROTECTION ELEMENT SYSTEM	SCORE	COMMENTS
(c) Active Dispersal Layer – Usually comprising fans with active abstraction (suction) from a subfloor dilution layer with roof level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers.	1.5 to 2.5	This system relies on continued serviceability of the pumps, therefore alarm and response systems should be in place. There should be robust management systems in place to ensure the continued maintenance of the system, including pumps and vents. Active ventilation should always be designed to meet at least “good performance”.
(d) Active Positive Pressurisation – Provided by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket.	1.5 to 2.5	This system relies on continued operation of the pumps, therefore alarm and response systems should be in place. The score assigned should be based on the efficient “coverage” of the building footprint and the redundancy of the system. Active ventilation should always be designed to meet at least “good performance”.
(e) Ventilated Car Park – Floor slab of occupied part of the building under consideration is underlain by a basement or undercroft car park.	4	Assumes that the car park is vented to deal with car exhaust fumes, designed to Buildings Regulations 2000, Approved Document F [9].



PROTECTION ELEMENT SYSTEM	SCORE	COMMENTS
Gas Protection Score for the Gas Resistant Membrane		
Gas resistant membrane meeting all of the following criteria: ✳ Sufficiently impervious to the gases with a methane gas transmission rate < 40 ml/day/m²/atm (average) for sheet and joints (tested in accordance with BS ISO 151051 manometric method); ✳ Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; ✳ Sufficiently strong to withstand in service stresses (e.g. settlement if placed below a floor slab); ✳ Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools); ✳ Capable, after installation, of providing a complete barrier to the entry of the relevant gas; and ✳ Verified in accordance with CIRIA C735.	2	The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation and integrity of joints. If a membrane is installed that does not meet all the criteria opposite then the score is zero.
A) Membrane with a methane gas transmission rate < 40.0 ml/day/m²/atm (average) for sheets and joints (tested in accordance with BS ISO 151051:2007 manometric method) is regarded as sufficiently impervious. B) For example, reinforced LDPE (virgin polymer) membranes having a minimum mass per unit area of 370 g/m² and not significantly less than 0.4 mm thickness between the reinforcement scrim (tested in accordance with Procedure D (2 mm diameter tip) of BS EN ISO 98631:2016) installed above floor slabs are considered sufficiently strong to meet the performance criteria (see also C.3). Thicker and more robust membranes or an additional membrane protection layer should be installed directly beneath cast in situ floor slabs.		

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	Vibronaceae 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



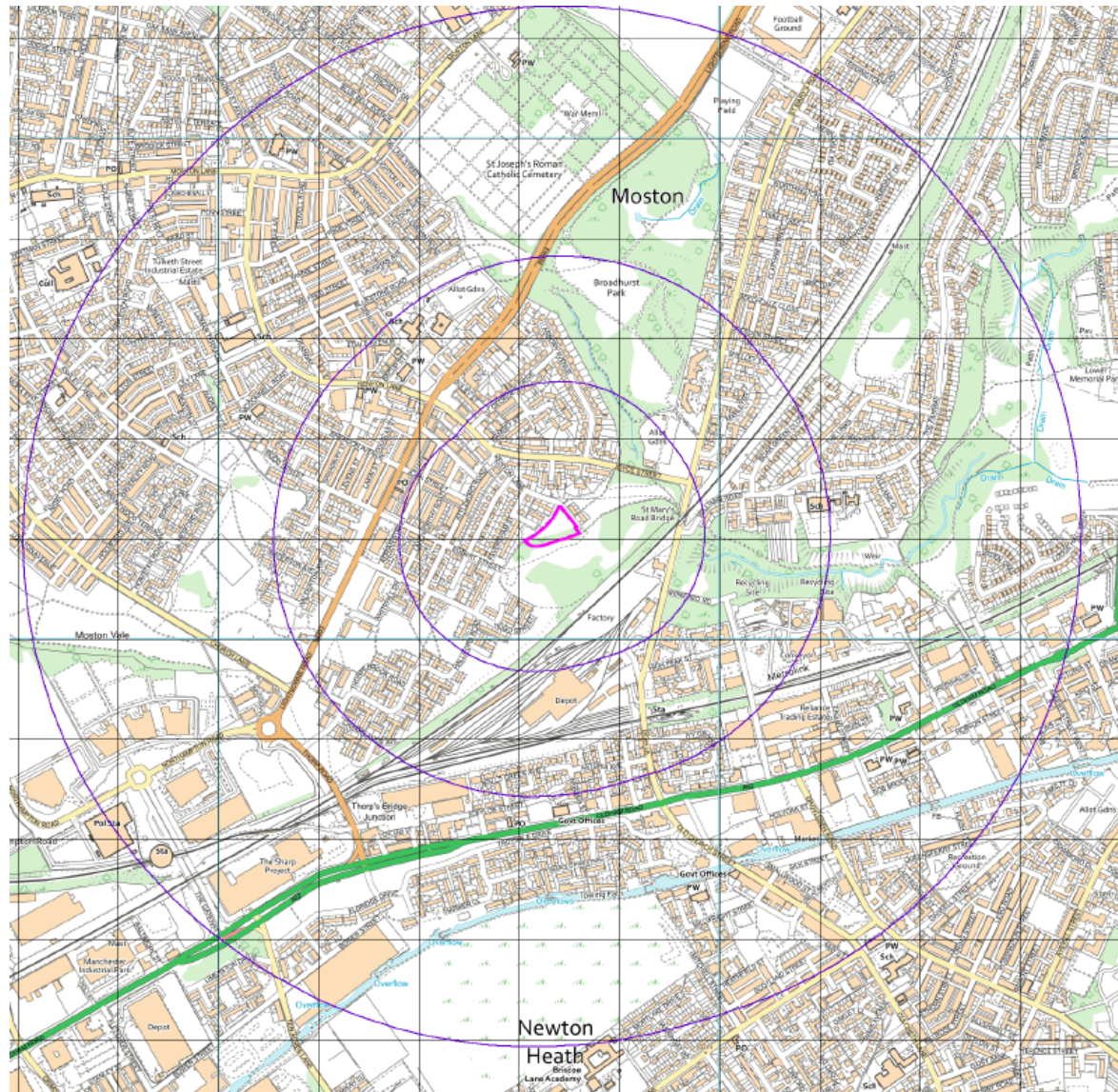
MIBK	Methyl isobutyl ketone	WTE	Water table elevation
m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	kN/m²	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

DRAWING 16-717-001 – SITE LOCATION PLAN





Historical Features Former Buildings Dense Vegetation Former Earthworking/Excavation	Notes:					Client:		Job No:		Date:		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																				
						Jigsaw Homes		Drawing No:		Scale:																						
						003		NTS@ A3																								
<table><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td>P1</td><td>REVB</td><td>11.09.2023</td><td>OW</td><td>JS</td></tr><tr><td>P1</td><td>REVA</td><td>24.08.2023</td><td>OW</td><td>EC</td></tr><tr><td>Phase</td><td>Issue</td><td>Date</td><td>Drawn</td><td>Checked</td></tr></table>											P1	REVB	11.09.2023	OW	JS	P1	REVA	24.08.2023	OW	EC	Phase	Issue	Date	Drawn	Checked	Job Title:		Drawing Title:				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.
P1	REVB	11.09.2023	OW	JS																												
P1	REVA	24.08.2023	OW	EC																												
Phase	Issue	Date	Drawn	Checked																												
					Kenyon Lane, Failsworth		Historical Features Plan																									



Site Features

- Mature Trees
- Grass
- Mature Trees/Woodland
- Footpath
- Field Gate
- Electric Box
- Manholes

Notes:

P1	REVC	14.09.2023	OW	JS
P1	REVB	12.09.2023	OW	JS
P1	REVA	24.08.2023	OW	EC
Phase	Issue	Date	Drawn	Checked

Client:

Jigsaw Homes

Job Title:

Kenyon Lane, Failsworth

Job No:

16-718

Drawing No:

004

Date:

14.09.2023

Scale:

NTS@ A3



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Location Symbols

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

Notes:

P1	REVC	11.08.2023	OW	JS
P1	REVB	01.08.2023	EB	EC
P1	REVA	27.06.2023	OW	EC
Phase	Issue	Date	Drawn	Checked

Client:	
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Jigsaw Homes

	<i>Job Title:</i>
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Kenyon Lane, Failsworth

Job No:

16-718

Drawing No:

005

Date:

11.09.2023

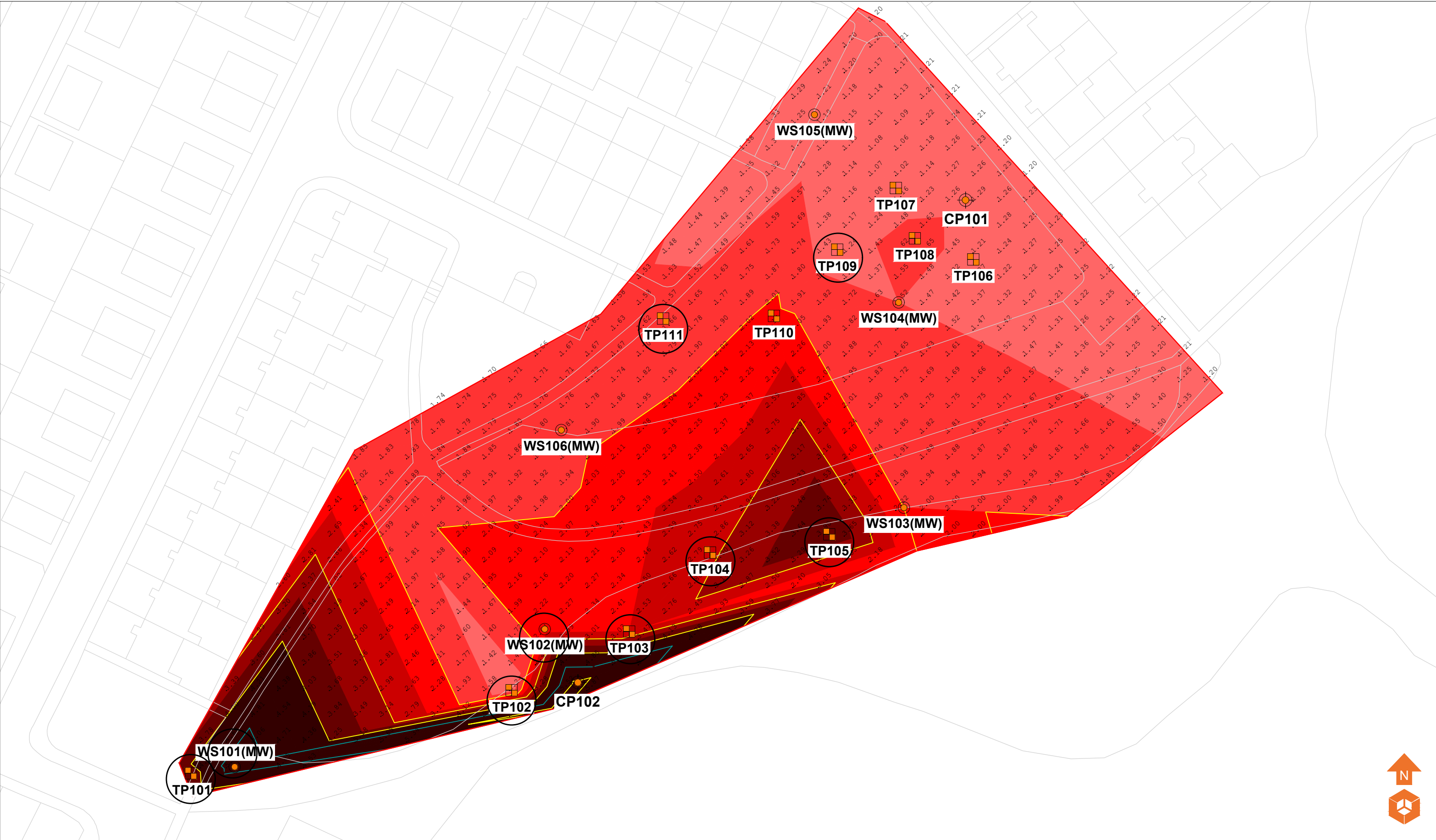
Scale:

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Location Symbols

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

Made Ground Depth (m)

- Depth of Made Ground 1.00 - 1.49m
- Depth of Made Ground 1.50 - 1.99m
- Depth of Made Ground 2.00 - 2.49m
- Depth of Made Ground 2.50 - 2.99m
- Depth of Made Ground 3.00 - 3.49m
- Depth of Made Ground 3.50 - 3.99m
- Depth of Made Ground >4.00m

Notes:

P1	REVB	07.08.2023	EB	EC
P1	REVA	01.08.2023	EB	EC
Phase	Issue	Date	Drawn	Checked

Client:

AJP

Job Title:

Kenyon Lane, Failsworth

Job No:

16-718

Drawing No:

006

Date:

07.08.2023

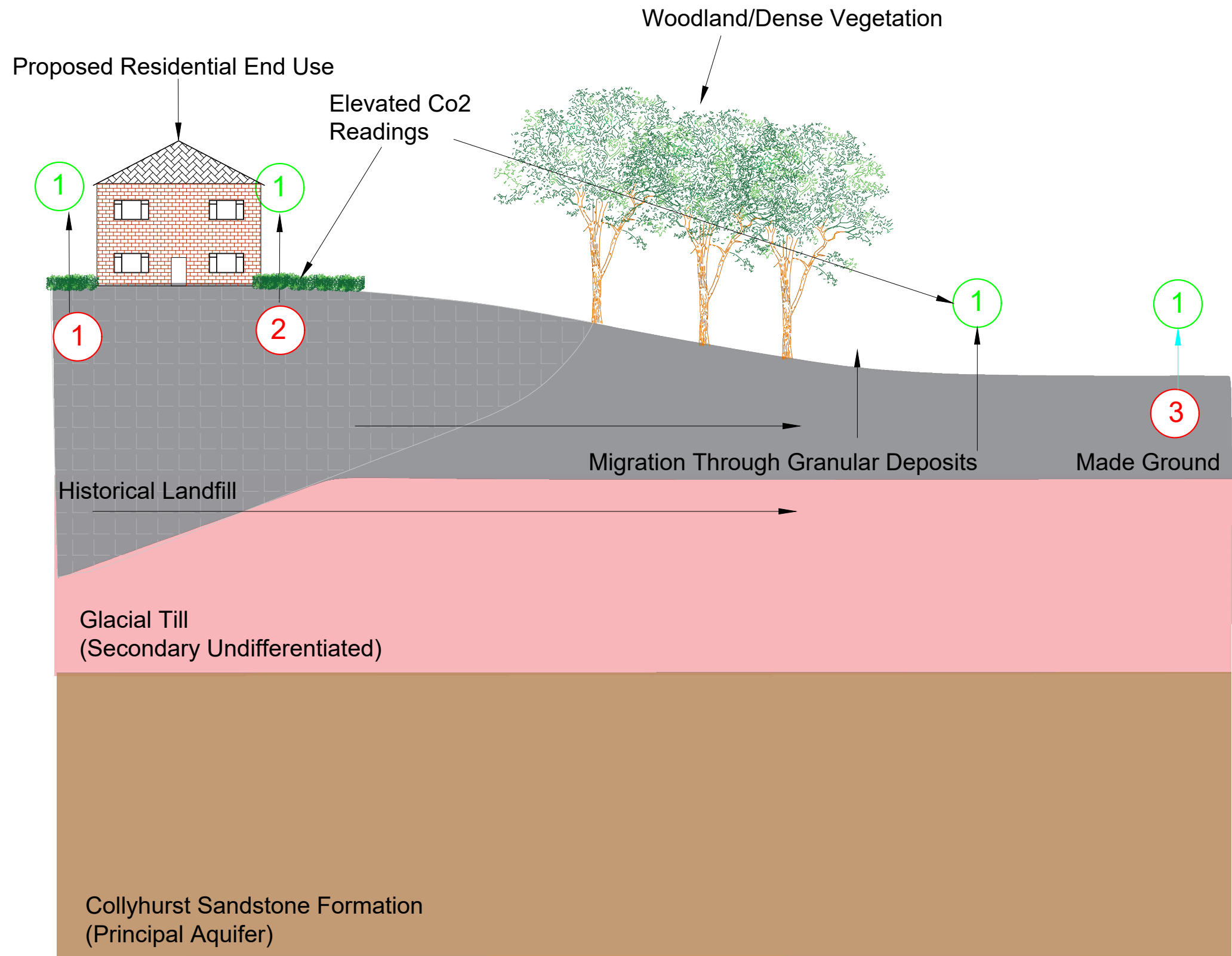
Scale:

NTS@ A3



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Geology Key		Sources		Pathways		Receptors	
	Made Ground		Landfill		Ground Gas Mitigation		Future End Users
	Glacial Till		Made Ground		Volatilisation of Compounds		
	Collyhurst Sandstone Formation		Elevated Mercury				

Notes:				
P1	REVB	20.11.2023	EB	MJ
P1	REVA	10.10.2023	OW	LC
Phase	Issue	Date	Drawn	Checked

Client:		Jigsaw Homes	
Job Title:		Kenyon Lane, Failsworth	

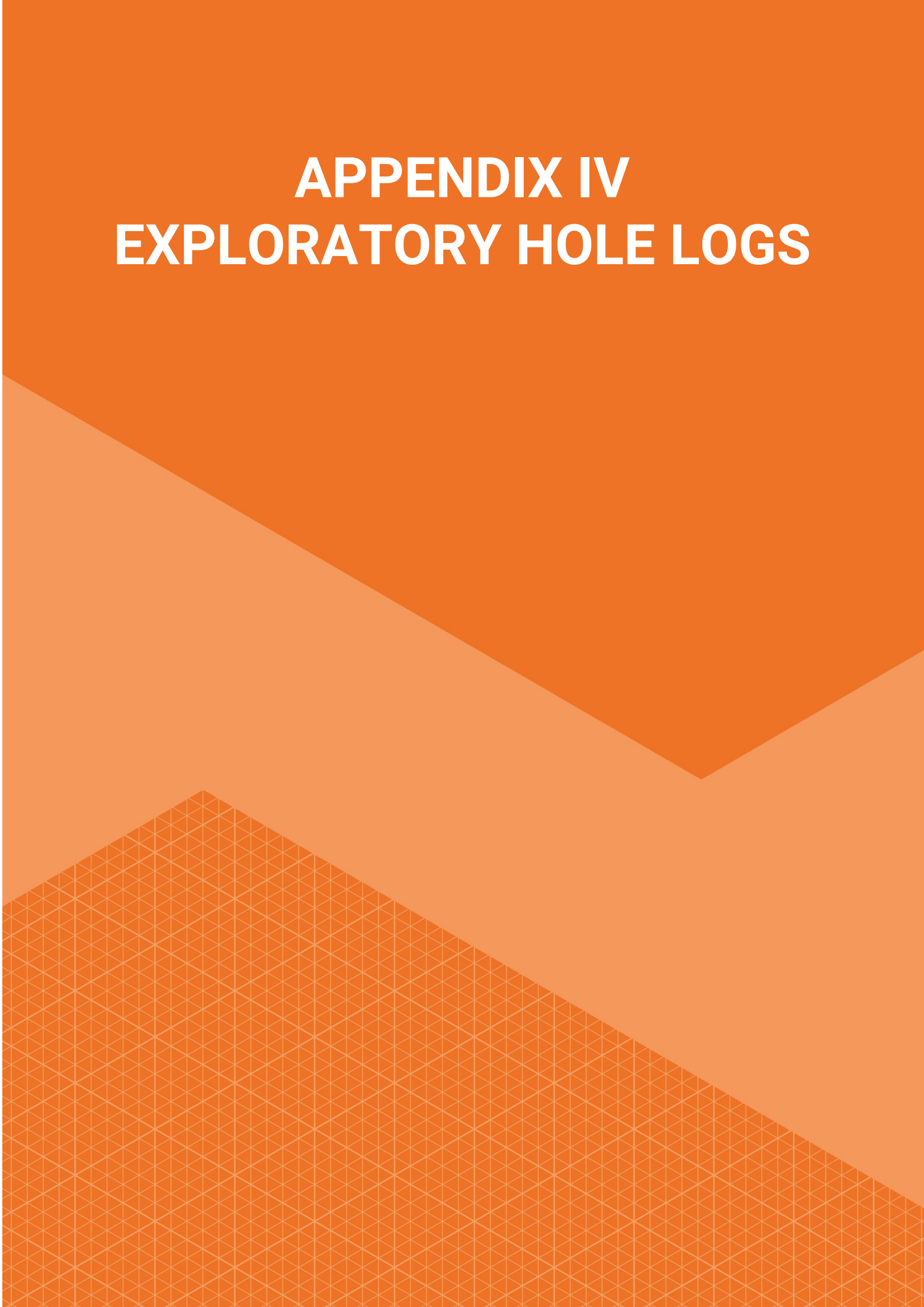
Job No:	16-717	Date:	20.11.2023
Drawing No:	022	Scale:	NTS
Drawing Title:		Ground Gas Conceptual Site Model	

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

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APPENDIX IV

EXPLORATORY HOLE LOGS

The background of the page is composed of several geometric shapes. A large, dark orange shape occupies the top right and extends down the right side. A lighter orange shape is on the left, meeting the dark one at a diagonal line. At the bottom left, there is a triangular area filled with a fine, light-colored grid pattern. The overall design is modern and minimalist.

Project Name: Kenyon Lane	Project No. 16717	Co-ords: 387579.00 - 401148.00 Level:	Date 22/06/2023
Location: Failsworth	Dimensions (m): 2.00 Depth 3.60		Scale 1:30
Client: AJP			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
							MADE GROUND: Brown sandy reworked clay.	
	1.20	ES		0.90			MADE GROUND: Light grey slightly gravelly clayey fine to medium sand with pockets of orangish pink silty clay. Gravel is fine to medium subangular to angular of brick and clinker.	1
	2.00	B						2
				3.40				3
				3.60			MADE GROUND: Orangish greyish brown slightly gravelly silty clay. Gravel is fine to medium subangular to angular of ash, wood, and organic matter. End of Pit at 3.60m	4

Trial Pit Photographs



Trial Pit 101



Trial Pit 101 Spoil

Remarks: 1. Complete. 2. Depth of Made Ground unproven.

Stability: Stable.

Date
22/06/2023

Scale
1:30

Logged
E. Canham

Trial Pit Photographs



Trial Pit 102 Spoil



Stability: Stable.

Project Name: Kenyon Lane	Project No. 16717	Co-ords: 387648.00 - 401171.00 Level:	Date 22/06/2023
Location: Failsworth	Dimensions (m): 2.20 Depth 2.50		Scale 1:30
Client: AJP			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.25			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
	2.00	ES					MADE GROUND: Greyish brown clayey gravelly medium to coarse sand with frequent cobbles. Gravel is fine to coarse subangular to subrounded of mudstone, glass and brick. Cobbles are subangular to angular of bricks, metal, plastic and wood.	1
				2.50			End of Pit at 2.50m	2
								3
								4

Trial Pit Photographs



Trial Pit 103



Trial Pit 103 Spoil

Remarks: 1. Terminated at 2.50 m bgl due to large concrete blocks restricting excavation. 2. Slight organic odour encountered within Made Ground.

Stability: Stable.

Project Name: Kenyon Lane	Project No. 16717	Co-ords: 387661.00 - 401182.00 Level:	Date 22/06/2023
Location: Failsworth	Dimensions (m): 2.20 Depth 2.90		Scale 1:30
Client: AJP			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.25			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
	0.80	ES					MADE GROUND: Greyish brown clayey gravelly medium to coarse sand with pockets of dense black fine to medium sand and frequent cobbles. Gravel is fine to coarse subangular to subrounded of brick, plastic, asphalt, slate, clinker, metal, glass and cloth. Cobbles are subangular to angular of concrete and intact bricks.	1
				2.90			End of Pit at 2.90m	2
								3
								4

Trial Pit Photographs



Trial Pit 104

Trial Pit 104 Spoil

Remarks: 1. Complete. 2. Large concrete block encountered within the northern wall. 3 Depth of Made Ground unproven. 4. Slight hydrocarbon odour encountered.

Stability: Stable.

Project Name: Kenyon Lane	Project No. 16717	Co-ords: 387680.00 - 401186.00 Level:	Date 22/06/2023
Location: Failsworth		Dimensions (m): 2.00 0.00	Scale 1:30
Client: AJP		Depth 4.00	Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
	1.00	ES					MADE GROUND: Greyish brown clayey gravelly medium to coarse sand with frequent cobbles. Gravel is fine to coarse subangular to subrounded of mudstone, brick and glass. Cobbles are subangular to angular of concrete flagstones, intact bricks, metal, plastic, wood and rope.	1
	1.50	B						2
				3.20			MADE GROUND: Greyish brown slightly gravelly silty reworked clay with occasional cobbles and rare large boulder. Cobbles are angular bricks and boulder is subrounded mudstone.	3
				4.00			End of Pit at 4.00m	4

Trial Pit Photographs



Remarks: 1. Complete. 2. Frequent concrete flagstones encountered to 2.00 m bgl. 3 Depth of Made Ground unproven.

Stability: Stable.

Project Name: Kenyon Lane	Project No. 16717	Co-ords: 387703.00 - 401230.00 Level:	Date 22/06/2023
Location: Failsworth	Dimensions (m): 2.00 0.60		Scale 1:30
Client: AJP	Depth 3.50		Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.35	ES		0.40			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick, rare plastic and mudstone. (Topsoil)	
				1.20			MADE GROUND: Greyish brown clayey gravelly medium to coarse sand with pockets of black gravel and frequent cobbles. Gravel is fine to coarse subangular to subrounded of mudstone, brick and ash. Cobbles are subangular to angular of bricks and concrete.	1
	1.50	ES					Brown slightly silty SAND with occasional black streaks.	
	2.00	B		2.20			Orangish brown medium to coarse SAND.	2
				3.00			Greyish brown SILT.	3
				3.50			End of Pit at 3.50m	4

Trial Pit Photographs



Trial Pit 106



Trial Pit 106 Spoil

Remarks: 1. Complete.

Stability: Stable.

Project Name: Kenyon Lane	Project No. 16717	Co-ords: 387691.00 - 401241.00 Level:	Date 22/06/2023
Location: Failsworth	Dimensions (m): 1.80 0.60		Scale 1:30
Client: AJP	Depth 3.00		Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.25			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
				1.00			MADE GROUND: Greyish brown clayey gravelly fine to medium sand. Gravel is fine to coarse subangular to subrounded of mudstone, brick, cloth and plastic.	
				1.40			Brown slightly sandy CLAY.	1
				1.80			Orange slightly clayey medium to coarse SAND.	
				2.70			Light brown medium to coarse SAND.	2
				3.00			Greyish brown clayey SILT.	
	3.00	ES		3.00			End of Pit at 3.00m	3
								4

Trial Pit Photographs



Trial Pit 107



Trial Pit 107 Spoil

Remarks: 1. Complete.

Stability: Stable.

Project Name: Kenyon Lane	Project No. 16717	Co-ords: 387694.00 - 401233.00 Level:	Date 22/06/2023
Location: Failsworth	Dimensions (m): Depth 2.80		Scale 1:30
Client: AJP			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.00	ES		0.25			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
				1.80			MADE GROUND: Greyish brown clayey gravelly fine to medium sand with frequent cobbles. Gravel is fine to coarse subangular to subrounded of mudstone and brick. Cobbles are subangular bricks.	
				2.00			Orange silty SAND.	
				2.40			Greyish brown silty SAND.	
				2.80			Greyish brown clayey SILT with black traces.	
							End of Pit at 2.80m	

Trial Pit Photographs



Trial Pit 108



Trial Pit 108 Spoil

Remarks: 1. Complete.

Stability: Stable.

Project Name: Kenyon Lane

Project No.
16717

Co-ords: 387681.00 - 401231.00
Level:

Date
22/06/2023

Location: Failsworth

Dimensions (m): 1.80

Scale
1:30

Client: AJP

Depth
1.20

Logged
E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.30			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
				1.20			MADE GROUND: Greyish brown sandy gravelly reworked clay with frequent cobbles. Gravel is fine to coarse subangular to subrounded of mudstone, brick and ceramic. Cobbles are subangular to angular of brick, mudstone, asphalt and plastic.	1
							End of Pit at 1.20m	2
								3
								4

Trial Pit Photographs



Trial Pit 109



Trial Pit 109 Spoil

Remarks: 1. Terminated at 1.20 m bgl due to concrete slab.

Stability: Stable.

Project Name: Kenyon Lane	Project No. 16717	Co-ords: 387671.00 - 401220.00 Level:	Date 22/06/2023
Location: Failsworth		Dimensions (m): 2.00 Depth 3.00	Scale 1:30
Client: AJP			Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.60	ES		0.30			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
				1.70			MADE GROUND: Greyish brown clayey gravelly fine to medium sand with occasional cobbles. Gravel is fine to coarse subangular to subrounded of mudstone, metal and brick. Cobbles are subangular intact bricks.	1
				2.10			MADE GROUND: Black slightly gravelly clayey fine to medium sand. (Slight hydrocarbon odour)	2
				2.70			Firm greyish brown silty sandy CLAY with black streaks.	
	2.80	ES		2.80			Orange medium to coarse SAND.	
				3.00			Greyish brown sandy SILT.	3
							End of Pit at 3.00m	4

Trial Pit Photographs



Trial Pit 110



Trial Pit 110 Spoil

Remarks: 1. Complete.

Stability: Stable.

Project Name: Kenyon Lane	Project No. 16717	Co-ords: 387654.00 - 401220.00 Level:	Date 22/06/2023
Location: Failsworth		Dimensions (m): 2.10 0.60	Scale 1:30
Client: AJP		Depth 1.60	Logged E. Canham

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.10	ES		0.35			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
				1.00			MADE GROUND: Greyish brown clayey gravelly fine to medium sand with frequent cobbles. Gravel is fine to coarse subangular to subrounded of mudstone, ceramic and brick. Cobbles are subangular intact bricks and concrete.	1
				1.20			MADE GROUND: Black slightly silty reworked clay with wood fragments.	
				1.60			MADE GROUND: Brown sandy clay with ceramic drain encountered in western wall.	
							End of Pit at 1.60m	2
								3
								4

Trial Pit Photographs



Trial Pit 111

Trial Pit 111 Spoil

Remarks: 1. Terminated at 1.60 m bgl due to potential drain. 2. Concrete obstruction encountered in western wall of trial pit at 1.20 m bgl.

Stability: Stable.

Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: Kenyon Lane

Project No.
16717

Co-ords: 387586.00 - 401149.00

Hole Type
WS

Location: Failsworth

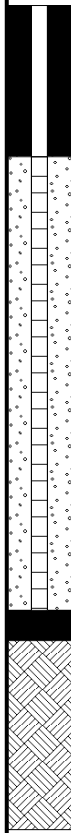
Level:

Scale
1:50

Client: AJP

Dates: 22/06/2023 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
		1.00		N=6 (2,2/1,1,2,2)	1.00			MADE GROUND: Brown clayey gravelly fine to medium sand. Gravel is fine to coarse subangular to angular of concrete.	1
					1.50			MADE GROUND: Black gravelly fine to medium sand. Gravel is fine to medium subangular to angular of ash and clinker.	
		2.00		N=5 (2,2/1,1,2,1)	2.00			MADE GROUND: Grey sandy gravel. Gravel is fine to coarse subangular to angular of concrete and clinker.	2
					2.45			MADE GROUND: Black gravelly fine to medium sand. Gravel is fine to medium subangular to angular of ash and clinker.	
		3.00		N=4 (1,1/1,1,1,1)				MADE GROUND: Grey sandy clayey gravel with black bands. Gravel is fine to coarse subangular to angular of concrete and clinker.	3
		4.00		N=3 (1,0/1,1,0,1)					4
		5.00		N=4 (1,2/1,1,1,1)	4.95			MADE GROUND: Soft orangish brown sandy clay.	5
					5.45			End of borehole at 5.45 m	

Remarks

1. Complete. 2. Monitoring well installed- response zone (1.00 m to 4.00 m bgl).

Borehole Log

Borehole No.

WS102

Sheet 1 of 1

Project Name: Kenyon Lane

Project No.
16717

Co-ords: 387635.00 - 401171.00

Hole Type
WS

Location: Failsworth

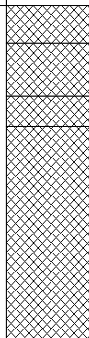
Level:

Scale
1:50

Client: AJP

Dates: 22/06/2023 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.25	ES	N=15 (3,4/3,4,4,4)	0.25			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	1
		0.70			0.60			MADE GROUND: Brown slightly sandy gravelly reworked clay. Gravel is fine to coarse subangular to angular of brick, coal and mudstone.	
		1.00			0.80			MADE GROUND: Black clayey gravelly fine to medium sand. Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and brick.	
		2.00			2.26			MADE GROUND: Greyish brown slightly silty gravelly reworked clay with frequent cobbles. Gravel is fine to coarse subangular to angular of brick and mudstone. Cobbles are subangular of concrete and brick.	
								End of borehole at 2.26 m	
									3
									4
									5
									6
									7
									8
									9
									10

Remarks

1. Refusal within Made Ground on 2.26 m bgl. 2. Monitoring well installed- response zone (1.00 m to 2.00 m bgl).

Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: Kenyon Lane

Project No.
16717

Co-ords: 387692.00 - 401189.00

Hole Type
WS

Location: Failsworth

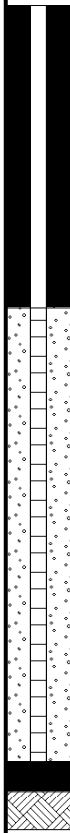
Level:

Scale
1:50

Client: AJP

Dates: 22/06/2023 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30			0.30			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets with rare cobble. Gravel is fine to coarse subangular to angular of brick and mudstone. Cobble is subangular of concrete. (Topsoil)	
		1.00		N=10 (2,3/3,2,2,3)				MADE GROUND: Greyish brown sandy gravelly reworked clay becoming silty from 1.50 m bgl, with cobble encountered at 0.90 m to 1.00 m bgl. Gravel is fine to coarse subangular to angular of brick, concrete and coal. Cobbles is subangular of clinker.	1
		2.00 2.00	SPT	N=2 (1,0/1,0,1,0)	2.00			No recovery.	2
		3.00 3.00	SPT	N=12 (1,0/2,3,3,4)	3.00			Stiff medium strength greyish brown silty CLAY.	3
		4.00 4.00	SPT	N=12 (1,2/2,2,3,5)					4
		5.00 5.00	SPT	N=13 (1,2/3,3,4,3)					5
					5.45			End of borehole at 5.45 m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Monitoring well installed- response zone (2.00 m to 5.00 m bgl).

Borehole Log

Borehole No.

WS104

Sheet 1 of 1

Project Name: Kenyon Lane

Project No.
16717

Co-ords: 387692.00 - 401223.00

Hole Type
WS

Location: Failsworth

Level:

Scale
1:50

Client: AJP

Dates: 22/06/2023 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES	N=40 (3,6/9,10,8,13)	0.20			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
					0.40			MADE GROUND: Brown gravelly reworked clay with rare cobble.	
		1.00			1.00			MADE GROUND: Brick fill.	1
					1.20			MADE GROUND: Black slightly gravelly sandy clay. Gravel is fine to medium subangular to angular of ash, brick and concrete.	
					1.50			MADE GROUND: Brown gravelly sandy reworked clay with rare cobble. Gravel is fine to coarse subangular to angular of brick and concrete. Cobbles is subangular of clinker.	
		2.00	N=11 (4,3/3,3,3,2)		1.60			Orange medium to coarse SAND.	2
								Stiff medium strength brown sandy SILT.	
					2.70			Brown slightly silty fine to medium SAND.	
		3.00	N=5 (1,0/0,1,2,2)		2.80			Firm low strength greyish brown SILT. Becoming stiff medium strength from 4.00 m bgl.	3
									
		4.00	N=11 (2,2/2,3,3,3)						4
					4.80				
		5.00							
		5.00	SPT	N=13 (2,3/3,3,3,4)					5
					5.45				
								End of borehole at 5.45 m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Monitoring well installed- response zone (0.50 m to 2.00 m bgl). 3. Water strike encountered at 3.00 m bgl.

Borehole Log

Borehole No.

WS105

Sheet 1 of 1

Project Name: Kenyon Lane

Project No.
16717

Co-ords: 387678.00 - 401252.00

Hole Type
WS

Location: Failsworth

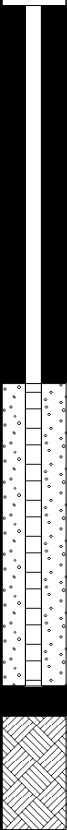
Level:

Scale
1:50

Client: AJP

Dates: 22/06/2023 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.35			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
					0.60			MADE GROUND: Greyish brown sandy gravelly clay. Gravel is fine to coarse subangular to angular of brick and mudstone.	
		0.90	ES	N=6 (1,2/1,2,1,2)	0.70			MADE GROUND: Orangish brown fine to medium sand with brick cobble.	1
		1.00			1.20			MADE GROUND: Greyish brown reworked clay with black band of concrete and bitumen from 0.80 m to 0.95 m bgl.	
					1.45			Loose light greyish brown fine to medium SAND.	
					1.50			Orange mottled black SAND.	
		2.00	B	N=6 (1,2/1,1,2,2)				Loose greyish brown silty fine to medium SAND.	2
		2.00 - 5.00			2.50			Firm low strength greyish brown sandy SILT. Becoming stiff medium strength from 4.00 m bgl.	
					3.00				3
					4.00				4
			5.00				5		
			5.45						
End of borehole at 5.45 m									6
								7	
								8	
								9	
								10	

Remarks

1. Complete. 2. Monitoring well installed- response zone (2.50 m to 4.50 m bgl). 3. Slight hydrocarbon odour encountered from 0.70 m to 1.00 m bgl.

Borehole Log

Borehole No.

WS106

Sheet 1 of 1

Project Name: Kenyon Lane

Project No.
16717

Co-ords: 387638.00 - 401203.00

Hole Type
WS

Location: Failsworth

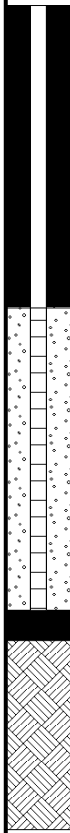
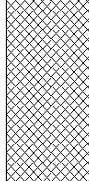
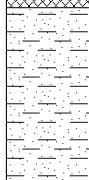
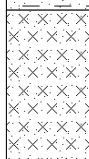
Level:

Scale
1:50

Client: AJP

Dates: 22/06/2023 -

Logged By
E. Canham

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.25			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of glass, brick and ash. (Topsoil)	1
		1.00		N=9 (2,1/2,3,2,2)				MADE GROUND: Greyish brown slightly sandy gravelly reworked clay. Gravel is fine to coarse subangular to angular of brick, ash and concrete.	
		1.90 2.00 2.00	ES SPT		1.80			Firm low strength orangish brown sandy CLAY with occasional black sandy streaks.	2
		3.00		N=9 (2,3/2,2,2,3)	3.00			Firm low strength orangish brown sandy SILT with black streaks from 3.80 m to 4.00 m bgl.	3
		4.00		N=11 (1,2/2,2,3,4)	4.00			Stiff medium strength greyish brown SILT.	4
		5.00		N=12 (2,2/3,3,3,3)	5.45			End of borehole at 5.45 m	5
									6
									7
									8
									9
									10

Remarks

1. Complete. 2. Monitoring well installed- response zone (2.00 m to 4.00 m bgl). 3. Water strike encountered at 3.60 m bgl.

Borehole Log

Borehole No.

CP101

Sheet 1 of 1

Project Name: Kenyon Lane

Project No.
16717

Co-ords: 387699.00 - 401236.00

Hole Type
CP

Location: Failsworth

Level:

Scale
1:50

Client: AJP

Dates: 04/07/2023 -

Logged By
DP Drilling

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
		1.00		N=10 (1,2/2,3,2,3)	1.30			MADE GROUND: Brown gravelly sandy reworked clay. Gravel is fine to coarse subangular to angular of brick and concrete.	1
		2.00		N=7 (1,2/2,1,2,2)				Firm low strength brown sandy SILT with CLAY bands. Becoming stiff medium strength from 3.00 m bgl.	2
		3.00 3.00	SPT	N=14 (2,2/3,3,4,4)					3
		4.00 4.00	SPT	N=15 (3,3/3,4,4,4)					4
		5.00 5.00	SPT	N=18 (3,3/4,4,5,5)					5
		6.00			6.00				6
		6.50 6.50 6.50	B SPT	50 (4,5/50 for 230mm)				Very stiff very high strength brown sandy boulder CLAY.	7
		8.00 8.00	SPT	50 (7,10/50 for 260mm)	8.41				8
								End of borehole at 8.41 m	9
									10

Remarks

1. Refusal within stiff brown boulder clay at 8.41 m bgl.



Borehole Log

Borehole No.

CP102

Sheet 1 of 2

Project Name: Kenyon Lane

Project No.
16717

Co-ords: 387639.00 - 401164.00

Hole Type
CP

Location: Failsworth

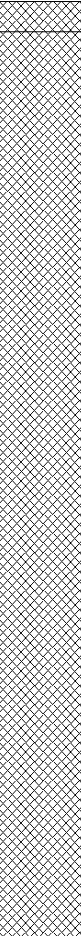
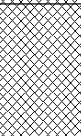
Level:

Scale
1:50

Client: AJP

Dates: 03/07/2023 -

Logged By
DP Drilling

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			MADE GROUND: Brown slightly gravelly clayey medium to coarse sand with frequent roots and rootlets. Gravel is fine to coarse subangular to angular of brick and mudstone. (Topsoil)	
		1.00		N=12 (1,2/2,5,3,2)				MADE GROUND: Greyish brown slightly silty gravelly reworked clay with frequent cobbles. Gravel is fine to coarse subangular to angular of brick and mudstone. Cobbles are subangular of concrete and brick.	1
		2.00 2.00	B	N=12 (2,2/3,2,3,4)					2
		3.00		N=17 (2,3/2,4,8,3)					3
		4.00		N=13 (2,2/3,3,4,3)					4
		5.00		N=14 (2,2/3,4,3,4)					5
		6.20			6.20			MADE GROUND: Black silty fine to medium sand with clay bands.	6
		6.50 6.50	B	N=10 (2,2/2,3,2,3)					7
		7.10			7.10			Medium dense grey silty SAND with CLAY bands.	8
		8.00 8.00	SPT	N=16 (3,3/4,3,4,5)					9
		9.95	SPT						10

Continued on next sheet

Remarks

1. Refusal within dense sandy gravel at 12.35 m bgl.





Borehole Log

Borehole No.

CP102

Sheet 2 of 2

Project Name: Kenyon Lane

Project No.
16717

Co-ords: 387639.00 - 401164.00

Hole Type
CP

Location: Failsworth

Level:

Scale
1:50

Client: AJP

Dates: 03/07/2023 -

Logged By
DP Drilling

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		9.95	B	N=16 (2,3/4,4,4,4)				Very stiff very high strength brown CLAY.	11
		11.00 11.00		50 (3,4/50 for 270mm)	10.90				
					11.60				
		12.00		50 (4,5/50 for 200mm)	12.35			Dense brown sandy GRAVEL.	12
								End of borehole at 12.35 m	13
									14
									15
									16
									17
									18
									19
									20

Remarks

1. Refusal within dense sandy gravel at 12.35 m bgl.

