A-squared Studio

Renaissance Manchester

Supplementary Geo-environmental Assessment Report

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1. Introduction

A-squared Studio Engineers Ltd (A-squared) has been appointed by Property Alliance Group Ltd to take forward the geo-environmental assessments (land contamination assessments) for the proposed redevelopment at Blackfriars Street, Manchester (herein called the 'site' – see Figure 1.1). The geo-environmental assessments included herein are to support discharge of planning conditions related to land contamination for the specific area of the site known as Land To The North Of Renaissance Hotel, Blackfriars Street, Manchester, M3 2EQ (herein called the 'application boundary'). The application boundary is shown on Figure 1.1 and Figure 2.3 as per planning application number *132088/FO/2021*. This report is to assist in the discharge of condition 6a associated with planning application 132088/FO/2021.

This Supplementary Geo-environmental Assessment Report (Revision 01) is based on the findings of site investigations undertaken specifically for the proposed development, including recent supplementary ground investigation undertaken by A2 Site Investigation Ltd (A2SI) and previous investigations by E3P. An updated Generic Quantitative Risk Assessment (GQRA) and conceptual site model (CSM) for the proposed development are presented herein. A Foundation Works Risk Assessment (FWRA) is also presented.

The first issue (Revision 00) of this A-squared Supplementary Geo-environmental Assessment Report (3199-A2S-XX-XX-RP-Y-0001-00) was submitted to the Environment Agency (EA) and Local Planning Authority for review. The comments are summarised as follows and are addressed within this report (Revision 01):

1. Environment Agency: further groundwater sampling and narrative required in order to recommend discharge of the relevant planning condition (Condition 6a) with respect to the proximity of the adjacent River Irwell and its connectivity to the site;
2. Local Planning Authority: further explanation and testing required with respect to elevated concentrations of sulphate identified in an initial groundwater sample;
3. Local Planning Authority: further information required with respect to how the identified asbestos in soil should be delineated and managed.

Following these comments, additional groundwater and surface water sampling and analysis was undertaken (as detailed in Section 5). The latest groundwater monitoring results are detailed in Section 6.6 and the findings are incorporated in the supplementary GQRA (Section 7): Section 7.5 with respect to Comment 1 above; Section 7.5.4 with respect to Comment 2 above; and Section 7.2.1 in response to Comment 3 above.

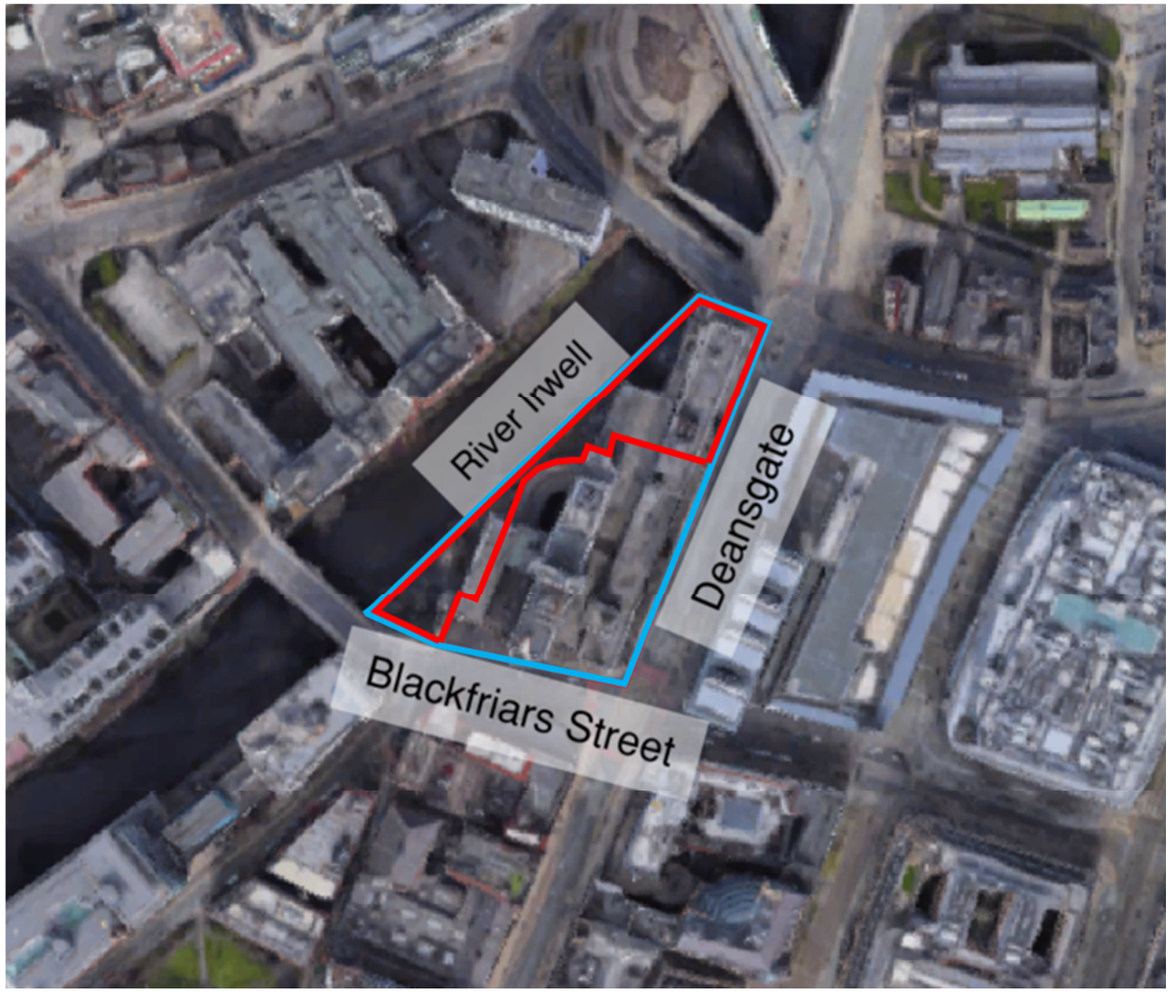


Image source: Google Maps [accessed June 2021]

Figure 1.1 Site location plan with application boundary (red) and site boundary (blue)

This report has been prepared in accordance with the principles set out in *Land Contamination Risk Management* (LCRM) guidance, published by the Environment Agency on the UK Government website, and in the context of the *National Planning Policy Framework* (NPPF) and *The Building Regulations 2010, Approved Document C - Site preparation and resistance to contaminants and moisture (2004 Edition incorporating 2010 and 2013 amendments)*. The objective is to identify whether there are unacceptable risks (ref. *LCRM*) which require further assessment or remediation to enable the proposed development.

Previous geo-environmental studies for the proposed development undertaken by E3P include:

- *E3P, Phase 1 Geoenvironmental Site Assessment, Renaissance, Manchester, Reference: 14-261-R1-1, dated September 2020* (the 'E3P Desk Study')
- *E3P, Phase II Geoenvironmental Site Assessment, Renaissance, Manchester, Reference:14-261-R2-1, dated 21st May 2021* (the 'E3P Phase 2 Assessment').

This report addresses the recommendations in the E3P reporting. The content of all previous E3P interpretive studies is not fully reproduced herein, so the E3P reports should be read in conjunction with this report. However, the E3P Phase 2 Assessment is provided as Appendix A for easy reference. The A2SI Factual Report (2022) for the supplementary ground investigation is included as Appendix B and A2SI Groundwater Factual Report (2024) as Appendix C.

The FWRA is presented in two parts, one for the Deansgate level and one for other areas of the site.

This report does not include any geotechnical interpretation or assessment.

2. The Site and Proposed Development

2.1. Site Location and Setting

The application boundary forms part of a wider site redevelopment associated with an existing hotel. The wider site is located within the Central Retail District of Manchester City Centre. The site is roughly triangular in shape with Deansgate to the east, River Irwell to the west, Victoria Bridge Street to the north and Blackfriars Street to the south.

The site is currently occupied by a 13-storey hotel, four-storey office building and multi-storey car park. There is an approximately 9.5 m difference in level across the site between Deansgate and the River Irwell, with an existing retaining wall along the Deansgate side.

The River Irwell is situated within man-made river walls.

2.2. Proposed Development for the Application Boundary

The current office building and hotel are proposed to be partially demolished to enable the construction of a part ground and 26 storey, part ground and 13 storey building to form 300 no. residential apartments and ground floor retail/leisure floorspace, together with private amenity space for residents, new public realm to include riverside walkway and leisure/food and beverage space, new landscaping, parking, cycle parking spaces, servicing, supporting infrastructure and associated works. Further details are available on the local authority planning portal under reference number *132088/FO/2021*.

Architectural drawings for the proposed development are shown in Figure 2.1 to Figure 2.5.



Figure 2.1 Proposed development scheme image 1



Figure 2.2 Proposed development scheme image 2



Figure 2.3 Application boundary (in red) and site boundary (in blue)

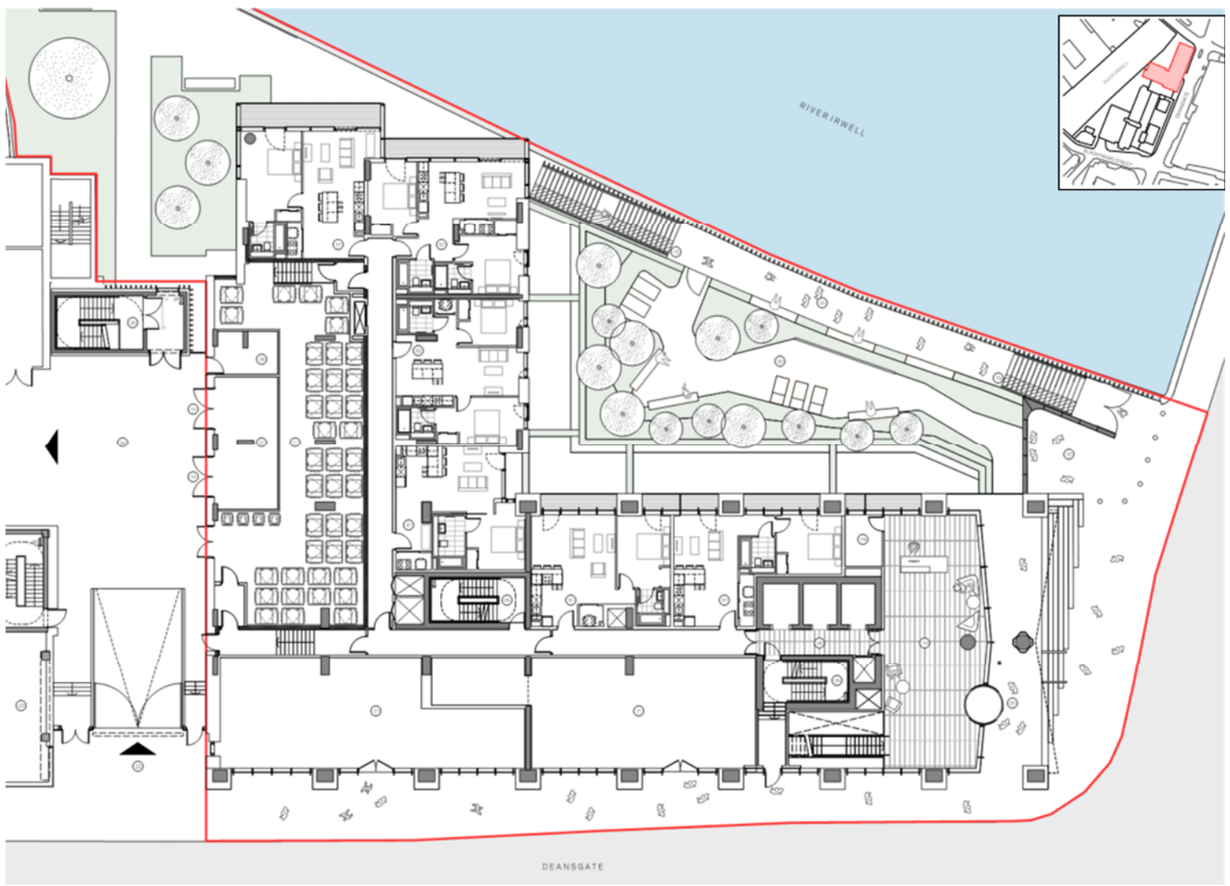


Figure 2.4 Plan of proposed ground floor

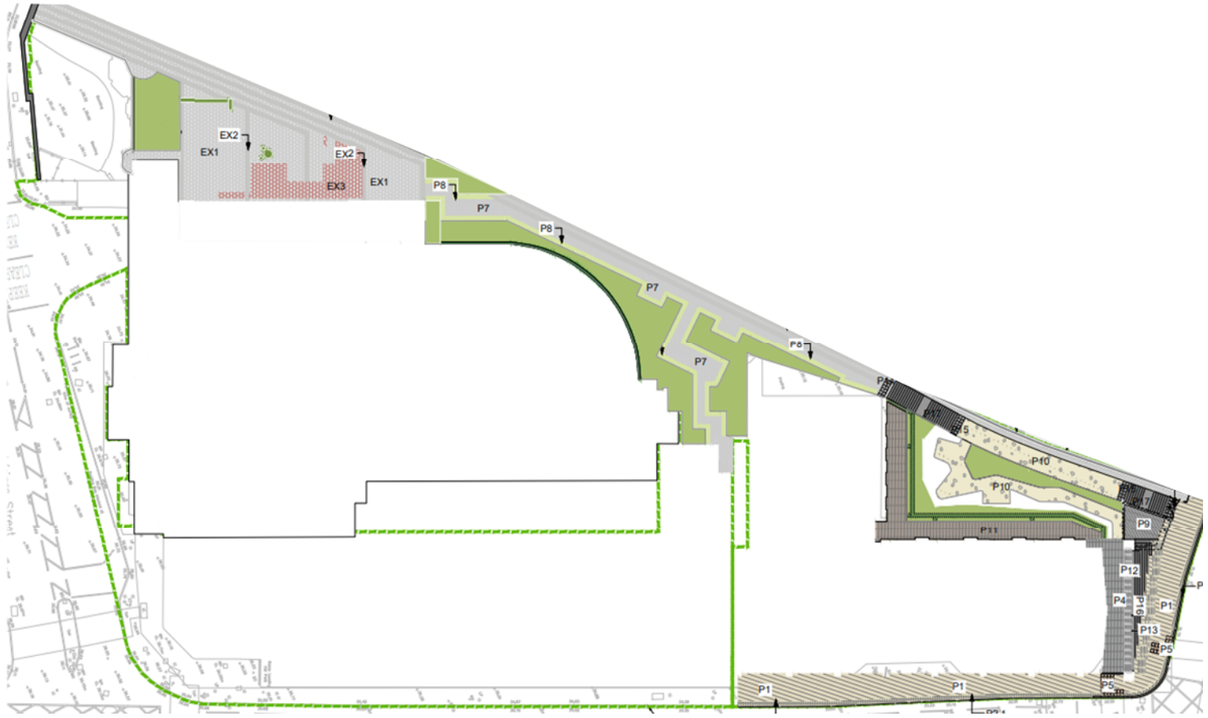


Figure 2.5 Plan of proposed soft landscaping

2.3. Site Environmental Context

The historical, environmental and geological/hydrogeology/hydrological setting of the site is detailed within the E3P Phase 1 Geoenvironmental Site Assessment (Reference: 14-261-R1-1, dated September 2020), however, for ease of reference a summary is provided below, supplemented with a review of publicly available records completed by A-squared.

The site is located immediately adjacent to the River Irwell, which flows from the north-east to the south-west. With reference to Environment Agency mapping, the section of the River Irwell adjacent to the site forms part of the Irwell / Manchester Ship Canal Water Body (ID GB112069061452), with the recognised start of the Manchester Ship Canal at Woden Street Footbridge located approximately 1.7km to the south-east of the site. The upstream River Irwell (and tributary River Irk) approximately 250m north of the site are designated Statutory Main River(s), and benefit from weirs which manage water levels. The river quality is E as defined by the Environment Agency as being poor with biology restricted to pollution tolerant species and low-grade abstraction for industry.

The site has been subject to a significant period of historical development, with development shown on the 1772 plan of Manchester and Salford by J Fothergill. Historical Ordnance Survey maps from the 1840s to 1860s indicate well established industrial land uses on the site and surrounding area. Within the site boundary, this included *Mills*, a *Cotton Finishing Works*, a *Copper Roller Works* and various other small buildings of unknown use; this coincides with the extending of the navigable River Irwell by the Navigation Company towards Hunt's Bank (north of the present Victoria Bridge located immediately north of the site. Based on these records, the section of the River Irwell adjacent to the site boundary is effectively a canal.

The historical development continued through the 19th and 20th Century, seemingly with a steady reduction in industrial land uses (hotels are noted at the turn of the 20th Century) before post WWII redevelopment of the wider site corresponding to the most recent structures (hotel and car park).

The geological records indicate that the site is underlain by the bedrock geology of the Chester Formation (Sandstone, faulted to the south of the site), overlain by the Glaciofluvial superficial deposits (sand and gravel) constrained within a small infilled glacial channel (trending in a north-east to south-westerly direction). Artificial deposits are not mapped on the site, however, Made Ground is expected based on the historical development at the site, particularly adjacent to the River Irwell where ground would have been raised above the original river bank to facilitate wharfs.

With reference to Environment Agency mapping, the Chester Formation is designated as a principal aquifer and the Glaciofluvial Deposits as a Secondary A Aquifer. The nearest groundwater monitoring station (The Soapworks, SJ8161996701) located approximately 3km south-west of the site, indicates a water level of approximately 21mOD. The site is not located within a groundwater Source Protection Zone (SPZ) or Drinking Water Safeguard Zone (groundwater or surface water). The nearest groundwater abstraction point is located approximately 65m north-west of the site for 'general cooling' purposes.

3. E3P (2021) Summary

3.1. General

The initial site-specific ground investigation works for this scheme were undertaken between the 19th and 26th February 2021. The works were undertaken by E3P.

The fieldwork, factual ground investigation information and interpretive findings are presented in the E3P Phase 2 Assessment, provided in Appendix A.

The exploratory hole location plan is presented in Figure 3.1.

The scope of works for the ground investigation relevant to geo-environmental assessment comprised the following:

- 4no. mechanically excavated trial pits (TP101 to TP104) to depths ranging between 0.70m and 0.80m.
- 6no. rotary boreholes (RB101 to RB106) to approximately 10m below existing carpark level.
- Installation of 6no. combined groundwater and ground gas monitoring standpipes within the rotary boreholes (RB101 to RB106).
- Engineer logging of the soils encountered.
- Collection of soil samples for laboratory analysis.
- Collection of groundwater samples for laboratory analysis.
- Monitoring and sampling of the well installations.

GQRA was undertaken by E3P based on the results of the investigative works.

The E3P ground investigation results are summarised below in Section 3.2 – 3.4. Section 3.5 summarises the findings of the GQRA and CSM presented by E3P.

3.2. Intrusive Works

Table 3.1 and 3.2 summarise the depths of all the E3P borehole and trial pit investigation locations. All the works were conducted within the site boundary. It is to note that all the boreholes were conducted from the existing public car park level of +25.25m above Ordnance Datum (OD), and therefore the ground directly beneath the Deansgate level where a new contiguous pile wall is proposed in the north-east of the site was not investigated.



Figure 3.1 E3P (2021) Exploratory Hole Location Plan. Red line highlights the former E3P site boundary.

Table 3.1 Summary of E3P (2021) borehole locations

Borehole ID	Ground Level (mOD)	Depth (mbgl)	Location Relevant to Proposed Buildings
RBH101	25.25	10.0	Residential Block
RBH102	25.25	10.0	Residential Block
RBH103	25.25	10.0	Residential Block
RBH104	25.25	10.0	Premier House
RBH105	25.25	10.0	Premier House
RBH106	25.25	10.0	Premier House

Table 3.2 Summary of E3P (2021) trial pit locations

Borehole ID	Ground Level (mOD)	Depth (mbgl)	Location Relevant to Proposed Buildings
TP101	25.25	0.80	Premier House
TP102	25.25	0.70	Premier House
TP103	25.25	0.80	Premier House
TP104	25.25	0.80	Premier House

3.3. Return Monitoring

Six groundwater and ground gas monitoring standpipes (RBH101 – RBH106) were installed as part of the ground investigation works. Return monitoring visits were completed on the 9th March and 23rd March 2021.

Table 3.3 summarises the boreholes and depths of installations of groundwater and ground gas standpipes. A total of 6 no. of standpipes were installed on the site. The standpipes were installed with response zones targeting the Made Ground and Chester Formation.

Groundwater level monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product if present. The most elevated shallow groundwater level recorded was 23.85mOD, with an average shallow groundwater elevation of 23.08mOD calculated. No free-phase product was recorded.

Table 3.3 Summary of E3P (2021) groundwater monitoring

Well ID	Response Zone (mbgl)	Screened Stratum	Groundwater depth range (mbgl)	Groundwater level range (mOD)
RBH101	2.0 to 10.0	Chester Formation	2.20 to 2.85	23.05 to 22.40
RBH102	0.5 to 1.5	Made Ground	1.40 to 1.40	23.85 to 23.85
RBH103	2.0 to 10.0	Chester Formation	3.20 to 3.68	22.05 to 21.57
RBH104	2.0 to 10.0	Chester Formation	2.00 to 2.15	23.25 to 23.10
RBH105	2.0 to 10.0	Chester Formation	1.75 to 1.80	23.50 to 23.45
RBH106	2.0 to 10.0	Chester Formation	1.75 to 1.81	23.50 to 23.44

The return monitoring visits included ground gas monitoring at the six installed boreholes (RBH101 through to RBH106). Concentrations of methane (CH4), carbon dioxide (CO2) and oxygen (O2) were measured using a calibrated infra-red gas analyser (GFM435) with gas flow rates measured using an integrated flow meter. A summary of the ground gas monitoring results taken from E3P Phase 2 Assessment is reproduced as Table 3.4.

Table 3.4 Summary of E3P (2021) ground gas monitoring results

WELL	DATE	CH_4 INITIAL (%V/V)	CH_4 STEADY (%V/V)	CH_4 GSV (l/hr)	CO_2 INITIAL (%V/V)	CO_2 STEADY (%V/V)	CO_2 GSV (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
RBH101	09/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1013	Falling	0.1	2.0–10.0	6.70	2.20
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	20.1	1017	Falling	0.1		6.40	2.85
RBH102	09/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	19.3	1013	Falling	0.1	0.5–1.5	1.40	1.40
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	20.3	1017	Falling	0.1		1.40	1.40
RBH103	09/03/21	-0.1	-0.1	-0.0031	-0.1	-0.1	-0.0031	19.8	1013	Falling	3.1	2.0–10.0	7.45	3.20
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	19.9	1017	Falling	0.1		7.45	3.68
RBH104	09/03/21	-0.2	-0.2	-0.0044	-0.1	-0.1	-0.0022	16.8	1013	Falling	2.2	2.0–10.0	5.62	2.00
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	19.5	1017	Falling	0.1		5.62	2.15
RBH105	09/03/21	-0.1	-0.1	-0.0001	-0.1	-0.1	-0.0001	20.3	1013	Falling	0.1	2.0–10.0	5.40	1.75
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	20.1	1017	Falling	0.1		5.40	1.80
RBH106	09/03/21	-0.1	-0.1	-0.0001	-0.1	-0.1	-0.0001	19.6	1010	Falling	0.1	2.0–10.0	4.90	1.75
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	1017	Falling	0.1		4.90	1.81

3.4. Geo-environmental Sampling and Testing

A series laboratory geo-environmental tests were performed on soil and groundwater as part of the previous E3P investigative efforts, including the following:

Geo-environmental Laboratory Testing (Soil):

- 13no. Asbestos ID (with quantification of asbestos if detected).
- 13no. Heavy metals and metalloids suite (including hexavalent chromium).
- 13no. Speciated Polycyclic Aromatic Hydrocarbons (PAH).
- 13no. Speciated Total Petroleum Hydrocarbons (TPH).
- 13no. Water soluble sulphate.
- 13no. Total sulphur.
- 13no. Acid soluble sulphate (SO4).
- 13no. pH.
- 13no. Total Cyanide.
- 13no. Total Phenols.
- 4no. Heavy metals and metalloids leachate suite.
- 12no. Water soluble sulphate leachate suite.

Geo-environmental Laboratory Testing (Groundwater):

- 3no. pH.
- 3no. Total phenols.
- 3no. Total cyanides.
- 3no. Dissolved organic carbon (DOC).
- 3no. Heavy metals and metalloids.
- 3no. Speciated Total Petroleum Hydrocarbons (TPH).
- 3no. Speciated Volatile Organic Compounds (VOC).
- 3no. Speciated Semi Volatile Organic Compounds (SVOC).

3.5. E3P GQRA and CSM

This Section 3.5 summarises the GQRA and CSM presented by E3P, based on the results of the investigative works summarised above.

3.5.1. CSM Summary

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL1 PL2	Heavy Metals, non-volatile PAH (Made Ground, Former Works and Mills, Infilled Quarry)	Dermal contact. Dermal contact and ingestion.	Future site users. Off-site receptors.	Low Likelihood	Low	LOW
Assessment: No exceedances have been identified in the chemical testing completed. **Recommendation:** Due to the presence of Made Ground, construction works should be completed with PPE and provision of welfare. A clean cover system should be installed in areas of soft landscaping to prevent direct exposure to the underlying Made Ground.						
PL3	ACM in Made Ground	Inhalation of dust.	Future site users. Buildings. Off-site land users.	Likely	High	LOW
Assessment: Asbestos in the form of loose chrysotile fibres has been identified in the granular Made Ground in TP104 at <0.001 %. **Recommendation:** Asbestos impacted soils should be managed in accordance with the asbestos CSM, A cover system to landscaped areas will prevent exposure to future site users. Construction works completed with PPE and provision of welfare.						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL4	Volatile contaminants such as hydrocarbons, (Made Ground, Former Works and Mills)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off-site receptors.	Low Likelihood	Low	LOW
Assessment: No exceedances have been identified in the chemical testing completed. **Recommendation:** Due to the presence of Made Ground, construction works should be completed with PPE and provision of welfare. If any unidentified contamination is uncovered during remediation and enabling works, the soils may require localised excavation and validation.						
PL4	Methane, carbon dioxide (Made Ground, Infilled Quarry, Former Works and Mills)	Inhalation of gas. Migration through permeable strata and preferential pathways. Explosion in confined spaces.	Future site users. Buildings. Off-site land users.	Low likelihood	Low	LOW
Assessment: Monitoring completed to date suggests CS1. **Recommendation:** Completion of ground gas monitoring.						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL5	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds (Made Ground, Infilled Quarry, Former Works and Mills)	Surface runoff. Migration through permeable strata and preferential pathways. Perched waters migration.	Groundwater (Principal aquifer in bedrock). Surface water (River Irwell).	Low Likelihood	Low	TBC
Assessment: Leachate and groundwater analysis has identified exceedances of the EQS for chromium, copper, mercury, trichloromethane and pH. Historically, the site has been occupied by a Cotton Finishing Works, Copper Roller Works and Mills. The initial soil analysis has not identified a risk to controlled waters. The site is underlain by shallow sandstone bedrock which is classified as a principal aquifer. However, the majority of the identified inorganic compounds are of low solubility. The sensitivity of the principal aquifer in the bedrock is reduced given the closest potable groundwater abstraction is located 507 m north. Tricholormethane has been recorded above the limit of detection in all three groundwater samples from the rotary boreholes which have monitoring wells set within the sandstone bedrock. All other VOCs are less than the limit of detection. It is unlikely that this relates to residual contamination from the former works and mills located on site as these land uses were historical and the compounds would have degraged. It is considered possible that this compound may have migrated from commercial sites further afield. The site is topographically lower than the land to the east, therefore it is likely that groundwater will flow towards the site and towards the River Irwell. The results of the groundwater analysis indicate a higher concentration of trichloromethane at RBH101 in the north east as opposed to RBH105 located in the south west. The site is encapsulated in hardstanding, therefore infiltration will be limited. **Recommendation:** An additional round of groundwater sampling and surface water analysis is recommended to further assess the risk to controlled waters. The results will be issued in an addendum report						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL6	Sulphate (potential ash within Made Ground)	Sulphate attack on concrete.	Building structure.	Low likelihood	Low	LOW
Assessment: The soils at the site meet class DS-1, AC-1s. **Recommendation:** Concrete should be designed in accordance with the chemical testing results.						
PL7	Organic contaminants such as hydrocarbons, solvents (Made Ground, Former Works and Mills)	Ingestion of tainted water supply.	Future site users. Water pipes.	Low likelihood	Low	LOW
Assessment: Low likelihood as no significant contamination anticipated at pipeline depth across the site (0.75–1.35 m). Current chemical analysis indicates that PE pipe will be suitable for the site. **Recommendation:** A pipeline risk assessment should be completed following a process of remediation and enabling works. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation.						
PL8	Phytotoxic contaminants (Made Ground, Former Works and Mills)	Direct Contact (plant uptake).	Flora.	Low Likelihood	Low	LOW
Assessment: No exceedances have been identified in the chemical testing completed. **Recommendation** Due to the presence of Made Ground impacted by asbestos, a clean cover system should be installed in areas of proposed planting/soft landscaping.						

3.5.2. E3P GQRA Summary

Human Health	The Tier I assessment identified a single exceedance for asbestos. Loose chrysotile fibres were identified in the granular Made Ground in TP104 at <0.001 %. No visual signs of ACM were encountered during the ground investigation; it is therefore likely that only trace fibres are present. Impacted soils should be managed according to the asbestos risk mitigation conceptual site model. The installation of a suitable cover system in all landscaping and public open space will remove any potential for direct exposure to impacted soils. The specific design and installation process for the appropriate cover systems should be defined within a site remediation and enabling works strategy. Chemical analysis of the natural granular deposits has identified these soils to be acceptable for use as subsoil within the proposed landscaped areas; however, further chemical validation samples will be required to confirm this. There are no suitable sources of topsoil available on the site. Further post-demolition investigations are required to confirm the findings of this initial assessment as and when full and unrestricted access is available.
Controlled Waters	Leachate and groundwater analysis has identified exceedances of the EQS for chromium, copper, mercury, tricholomethane and pH. Historically, the site has been occupied by a Cotton Finishing Works, Copper Roller Works and Mills which are potential sources of mobile contamination. However, the initial soil analysis has not identified a risk to controlled waters. The site is underlain by shallow sandstone bedrock which is classified as a principal aquifer. However, the majority of the identified inorganic compounds are of low solubility. The sensitivity of the principal aquifer in the bedrock is reduced given the closest potable groundwater abstraction is located 507 m north. Tricholormethane has been recorded above the limit of detection in all three groundwater samples from the rotary boreholes which have monitoring wells set within the sandstone bedrock. All other VOCs are less than the limit of detection. It is unlikely that this relates to residual contamination from the former works and mills located on site as these land uses were historical and the compounds would have degraged. It is considered possible that this compound may have migrated from commercial sites further afield. The site is topographically lower than the land to the east, therefore it is likely that groundwater will flow towards the site and towards the River Irwell. The results of the groundwater analysis indicate a higher concentration of trichloromethane at RBH101 in the north east as opposed to RBH105 located in the south west.
Controlled Waters	The site is encapsulated in hardstanding, therefore infiltration will be limited. An additional round of groundwater sampling and surface water analysis is recommended to further assess the risk to controlled waters. The results will be issued in an addendum report.
Ground Gas	Characteristic Situation 1 (pending completion of gas monitoring).
Potable Water	This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation. Current indications suggest that PE pipe may be suitable.

4. A2SI (2022) Summary

4.1. General

Supplementary site specific ground investigation works were undertaken by A2SI on 22-23rd February 2022. The works were supervised by A-squared.

The fieldwork and factual ground investigation information are presented in the A2SI Factual Report (2022), provided in Appendix B, referred to therein as ground investigation phase 2.

The exploratory hole location plan for ground investigation phase 2 is presented in Figure 4.1.

The scope of works comprised the following:

- Window sampler holes (WS08 - WS13) to a maximum depth of approximately 6mbgl.
- Engineer logging and photographing of the soils encountered.
- Installation of 2no. combined groundwater and ground gas monitoring standpipes within WS09A and WS13.
- Collection of soil samples for laboratory analysis.
- Collection of groundwater samples for laboratory analysis.
- Monitoring and sampling of the well installations.
- In-situ testing including soil sample head-space testing using a PID.

Note – Locations for WS07 and WS08 are presented in the A2SI Factual Report but these were not actually advanced.

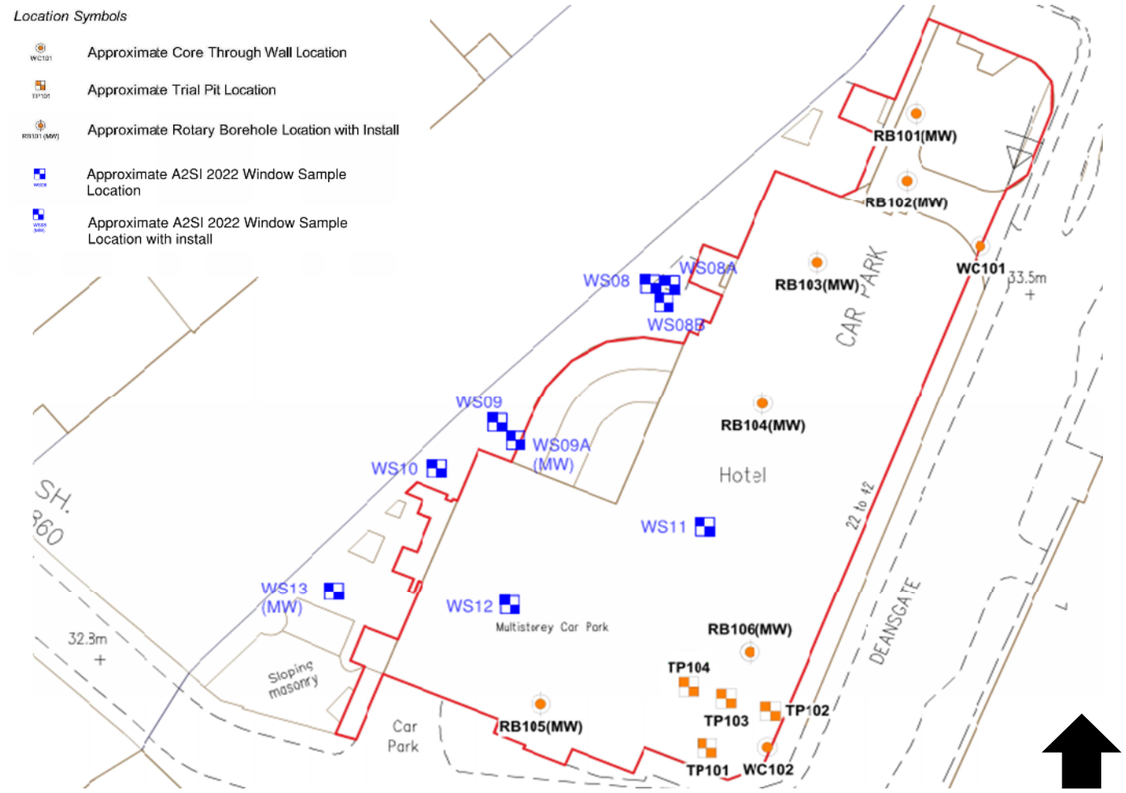


Figure 4.1 Exploratory hole location plan for A2SI (2022) and E3P (2021)

4.2. Intrusive Works

Table 4.1 summarises the depths of all the investigation locations undertaken during the works. All the works were carried out within the site boundary.

Table 4.1 Summary of A2SI (2022) exploratory locations

Borehole ID	Ground Level (mOD)	Depth (mbgl)
WS08	25.16	0.95
WS08A	25.16	0.70
WS08B	25.16	1.20
WS09	25.06	0.80
WS09A	25.16	4.00
WS10	25.11	6.00
WS11	25.26	0.80
WS12	25.26	0.80
WS13	25.80	6.00

4.3. Return Monitoring

Two groundwater and ground gas monitoring standpipes (WS09A and WS13) were installed as part of the ground investigation works. A single return monitoring visit was undertaken on the 14th and 15th March 2022. The return monitoring visit included use of the newly installed wells by A2SI and also the previously installed wells by E3P, although RB102 and RB101 were not accessible due to other works being carried out on-site at the time.

Groundwater level monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product if present.

Table 4.2 summarises the exploratory locations and installation details for the wells installed by A2SI.

Table 4.2 Summary of A2SI (2022) monitoring well installations

Location Ref.	Base of Borehole (mbgl)	Standpipe Internal Diameter (mbgl)	Top of Response Zone (mbgl)	Base of Response Zone (mbgl)	Screened Stratum
WS09A	4.00	50mm	3.5	2.0	Made Ground
WS13	6.00	50mm	4.0	2.0	Made Ground

Table 4.3 summarises the groundwater levels measured in each of the monitoring wells on the return monitoring visit. The most elevated shallow groundwater level recorded was 23.15mOD, with an average shallow groundwater level of 22.45mOD calculated. No free-phase product was recorded.

Table 4.3 Summary of A2SI (2022) groundwater monitoring

Borehole ID	Response Zone (mbgl)	Screened Stratum	Groundwater depth (mbgl)	Groundwater level (mOD)
RBH103	2.0 to 10.0	Chester Formation	3.32	21.93
RBH104	2.0 to 10.0	Chester Formation	2.12	23.13
RBH105	2.0 to 10.0	Chester Formation	2.17	23.08
RBH106	2.0 to 10.0	Chester Formation	2.10	23.15
WS09A	2.0 to 3.5	Made Ground	3.41	21.75
WS13	2.0 to 4.0	Made Ground	3.41	21.67

The return monitoring visits included ground gas and soil vapour monitoring. Concentrations of methane (CH_4), carbon dioxide (CO_2) and oxygen (O_2) were measured using a calibrated infra-red gas analyser (GFM435) with gas flow rates measured using an integrated flow meter. Soil vapour concentrations were measured using a calibrated photoionisation detector (PGM6208)

A summary of the ground gas and soil vapour monitoring results recorded by A2SI is provided as Table 4.4.

Table 4.4 Summary of A2SI (2022) ground gas and soil vapour monitoring results

Exploratory Hole Reference	Date	Minimum O_2 (%)	Maximum CO_2 (%l)	Maximum CH_4 (%)	Maximum H_2S (ppm)	Maximum CO (ppm)	Maximum PID (ppm)	Steady-state Flow Rate (l/hr)	Barometric Pressure (mb)
RBH03	14/03/22	19.3	0.7	<0.1	<1	<1	<1	0.0	1016
RBH04	14/03/22	18.1	1.7	<0.1	<1	<1	<1	0.0	1016
RBH05	14/03/22	19.7	<0.1	<0.1	<1	<1	<1	0.0	1016
RBH06	14/03/22	20.3	<0.1	<0.1	<1	<1	<1	0.0	1014
WS09A	14/03/22	20.2	0.5	<0.1	<1	<1	<1	0.0	1016
WS13	14/03/22	19.7	0.6	<0.1	<1	<1	<1	0.0	1016

4.4. Geo-environmental Sampling and Testing

A series laboratory geo-environmental tests were performed on soil and groundwater as part of the A2SI investigative efforts, including those detailed below. The following determinants for analysis were selected based on the findings of the previous E3P reporting:

Geo-environmental Laboratory Testing (Soil) -

- 9 no. Asbestos.
- 6no. Speciated PAH suite.
- 6no. Speciated TPH suite.
- 2no. Speciated VOC suite.

Geo-environmental Laboratory Testing (Groundwater) -

- 6no. pH.
- 6no. Total phenols.
- 6no. Total cyanides.
- 6no. DOC.
- 6no. Heavy metals and metalloids.
- 6no. Speciated PAH suite.
- 6no. Speciate TPH suite.
- 6no. Speciated VOC suite.
- 6no. SVOC suite.

5. A2SI (2024) Summary

5.1. General

Following the submission and review of the first A-squared Supplementary Geo-environmental Assessment Report (3199-A2S-XX-XX-RP-Y-0001-00) the Environment Agency and Local Planning Authority provided comment, summarised as:

1. Environment Agency: further groundwater sampling and narrative required in order to recommend discharge of the relevant planning condition (Condition 6a) with respect to the proximity of the adjacent River Irwell and its connectivity to the site;
2. Local Planning Authority: further explanation and testing required with respect to elevated concentrations of sulphate identified in an initial groundwater sample.

Following these comments, a supplementary groundwater sampling and monitoring in addition to surface water sampling was undertaken by A2SI on 5th and 13th June 2024. The fieldwork and factual ground investigation information are presented in the A2SI Groundwater Factual Report (2024), provided in Appendix C.

The scope of works comprised the following:

- Collection of groundwater samples for laboratory analysis and monitoring of groundwater levels utilising the existing monitoring installations.
- Collection of surface water samples from the River Irwell, from both upstream and downstream of the site.

The location of the upstream and downstream sample can be observed in Figure 5.1.

It was noted that the monitoring wells located within boreholes RB101 to RB103 could not located following construction works prior to the additional sampling rounds being undertaken. However, the available monitoring wells are sufficient to complete the additional works in response to the regulatory comments.

5.2. Return Monitoring

Two return monitoring visits were undertaken on the 5th and 13th June 2024. The return monitoring visit included use of the previously installed wells by both A2SI and E3P, although RB101 to RB103 were not accessible.

Groundwater level monitoring was undertaken using an interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product if present.

Table 5.1 summarises the groundwater levels measured in each of the monitoring wells on the return monitoring visit. Groundwater level recorded within the natural strata of the Chester Formation ranged from 22.23mOD to 22.84mOD and within the Made Ground ranged from 21.61mOD to 21.73mOD. No free-phase product was recorded.

Table 5.1 Summary of A2SI (2024) groundwater monitoring

Borehole ID	Response Zone (mbgl)	Screened Stratum	Groundwater depth (mbgl)		Groundwater level (mOD)	
			Round 1 (05/06/24)	Round 2 (13/06/24)	Round 1 (05/06/24)	Round 2 (13/06/24)
RBH104	2.0 to 10.0	Chester Formation	2.41	2.43	22.84	22.82
RBH105	2.0 to 10.0	Chester Formation	3.01	3.02	22.24	22.23
RBH106	2.0 to 10.0	Chester Formation	2.86	2.83	22.39	22.42
WS09A	2.0 to 3.5	Made Ground	3.43	3.49	21.73	21.67
WS13	2.0 to 4.0	Made Ground	3.41	3.47	21.67	21.61

5.3. Geo-environmental Sampling and Testing

A series laboratory geo-environmental tests were performed on groundwater and surface water as part of the A2SI investigative efforts, including those detailed below. The following determinants for analysis were selected based on the findings of the previous E3P and A2S reporting:

Geo-environmental Laboratory Testing (Groundwater) -

- 10no. pH.
- 10no Suspended Solids
- 10no Total Organic Carbon (TOC)
- 10no DOC
- 10no. Phenolics by HPLC.
- 10no. Total and free cyanides.
- 10no. Heavy metals and metalloids.
- 10no. Speciated PAH suite.
- 10no. TPH Criteria Working Group (CWG) including Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) plus Methyl tert-butyl ether (MTBE).
- 10no. Speciated VOC suite.
- 10no. SVOC suite.
- 10no Calcium

Geo-environmental Laboratory Testing (Surface water) -

- 4no. pH.
- 4no Suspended Solids
- 4no Total Organic Carbon
- 4no DOC
- 4no. Phenolics by HPLC.
- 4no. Total and free cyanides.
- 4no. Heavy metals and metalloids.
- 4no. PAH.
- 4no. TPH CWG including BTEX and MTBE.
- 4no. VOC.
- 4no. SVOC.
- 4no Calcium

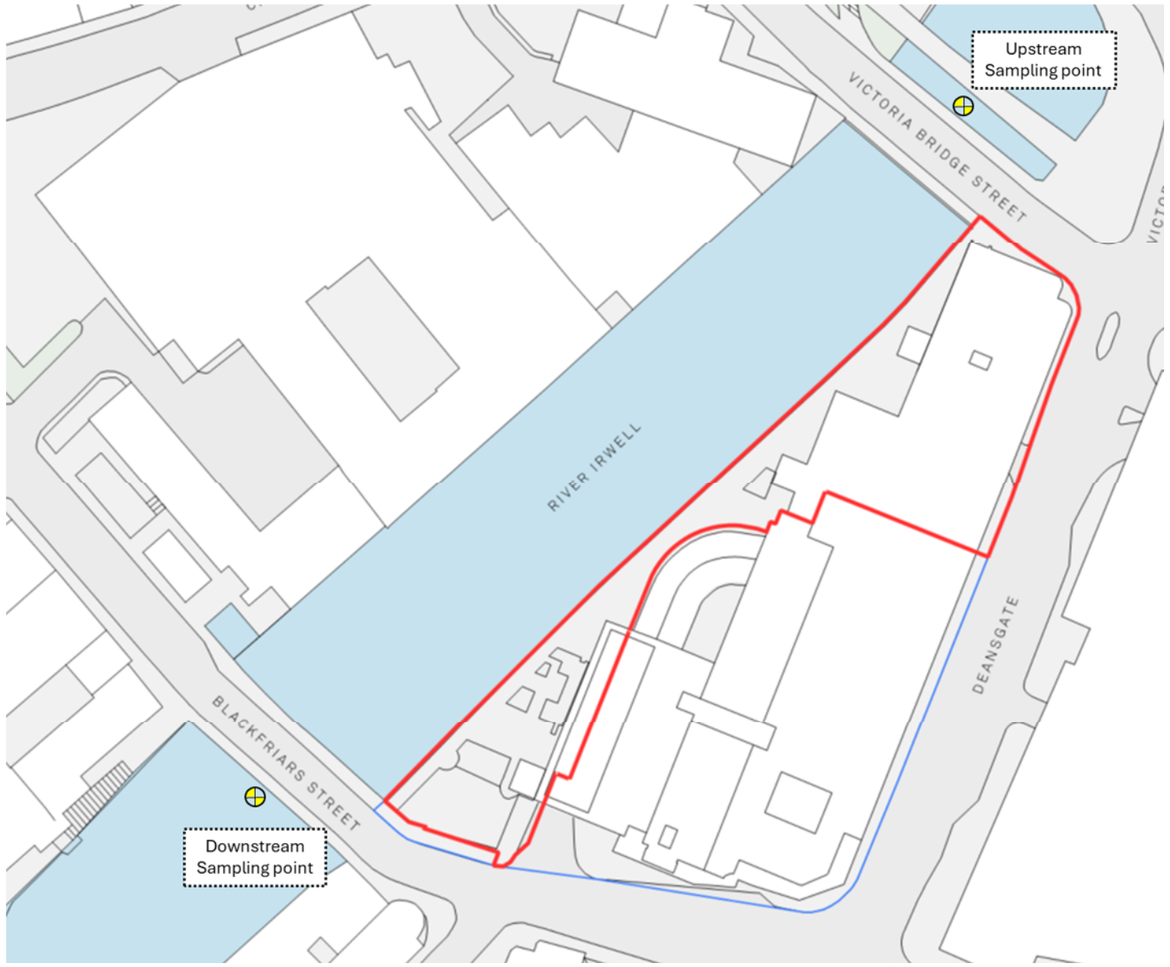


Figure 5.1 Surface water location plan. Application boundary (in red) and site boundary (in blue)

6. Ground Conditions and Groundwater

6.1. Introduction

The purpose of this section is to describe the salient physical properties of the main geological units that were encountered during the ground investigation works by E3P and A2SI, summarised in Section 3 and Section 4.

The information reviewed in this chapter includes stratigraphy (i.e. the absolute position of each unit within the soil column and their relationship relative to one another) in conjunction with basic physical characteristics and records of visual / olfactory evidence of contamination (if present).

6.2. Summary of Encountered Geology

The geological sequence encountered for the entire site used for further assessment can be summarised as follows:

- Made Ground (of variable thickness).
- Glaciofluvial Sheet Deposits (localised – not encountered across the entire site).
- Chester Formation.

The location of the site within the context of a regional geological map is illustrated in Figure 6.1.

The Made Ground material encountered was of variable thickness and is anticipated to be mainly backfill material placed during the construction of the original building, including car park subgrade material.

Glaciofluvial Sheet Deposits are mapped across the site footprint but were only encountered at one exploratory location (WS09A).

Sandstone (Chester Formation) was encountered between 0.35mbgl and 10mbgl (maximum depth of investigation).

Table 6.1 provides a summary of the indicative levels and thicknesses of the geological units encountered.



Approximate site boundary shown by the red line. Image source: BGS Maps [accessed June 2021]

Figure 6.1 Geological context of the site

Table 6.1 Indicative ground model

GL (mOD)	Stratum	Depth Top (mbgl)	Elevation Top (mOD)	Thickness (m)
+25.25	Made Ground	0.00	+25.25	0.35 to >6.00
	Glaciofluvial Sheet Deposits (*only encountered at WS09A*)	3.00	+22.25	>1.00
	Chester Formation	0.35 - >6.00	+24.90 to +19.45	>9.30

6.3. Made Ground

Made Ground comprises an initial layer of concrete, approximately 0.3m thick, overlaying a mixture of materials with different properties. The visual description of this soil generally varies between:

- Reddish brown medium SAND (possibly weathered bedrock).
- Grey slightly sandy GRAVEL.

A Made Ground thickness plan is included as Figure 6.2.

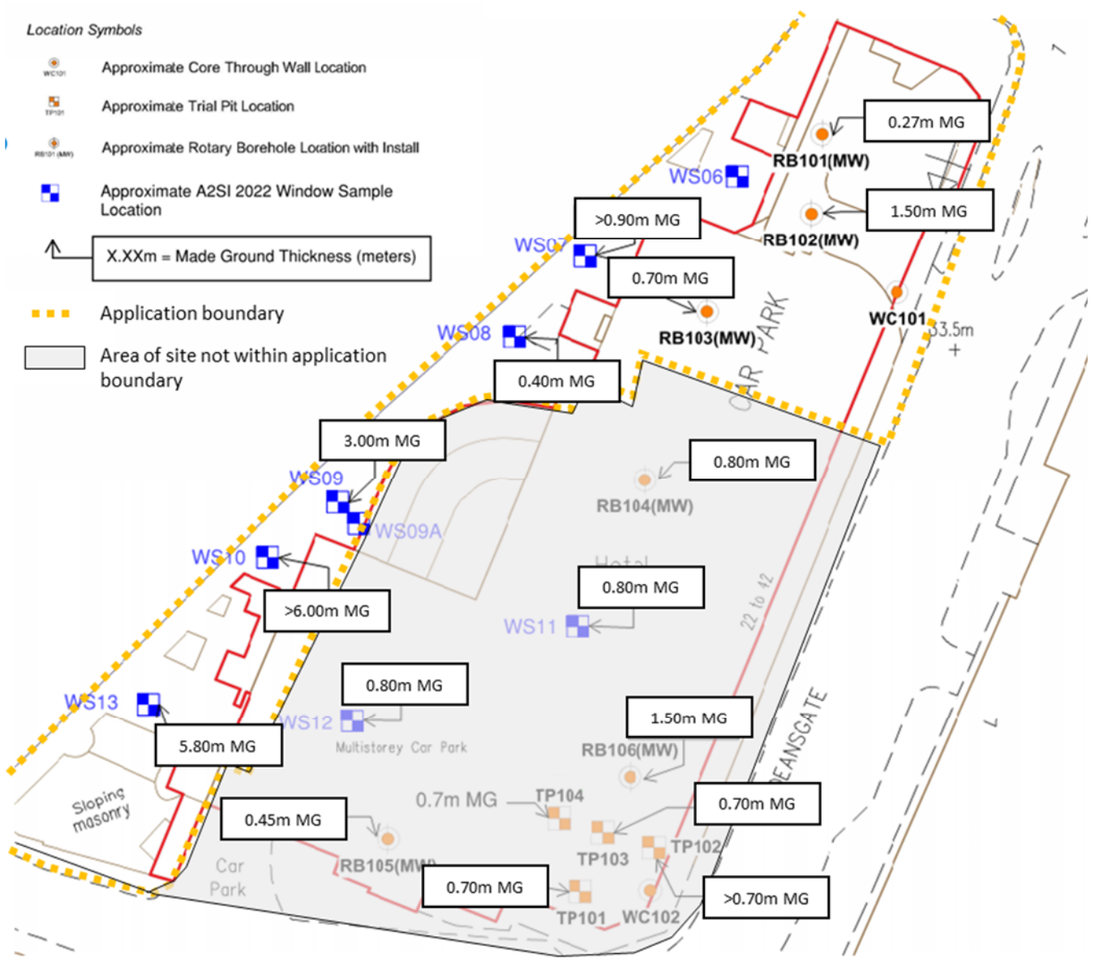


Figure 6.2 Made Ground Thickness Plan

6.4. Glaciofluvial Sheet Deposits

Glaciofluvial Sheet Deposits were found to underlie the Made Ground at WS09A only. The deposits are described as:

- Medium dense reddish brown slightly gravelly fine to coarse SAND. With the gravel being angular, fine to coarse of sandstone.

Due to the description presented on the engineer logs, A-squared consider that it is possible that this strata was actually weathered sandstone bedrock of the Chester Formation.

6.5. Chester Formation

The Chester Formation sandstone underlies the Made Ground. The visual description of the sandstone generally varies between:

- Very weak medium bedded reddish brown fine SANDSTONE with occasional lenses of extremely weak sandstone.
- Medium strong (becoming very strong) medium bedded reddish brown coarse SANDSTONE with occasional interbeds of weak sandstone. Bedding 0-10 degrees, widely to medium spaced, planar rough.

The thickness of the sandstone was not proven by the exploratory locations. The depth to the top of the sandstone may have been altered immediately beneath the site during the original construction of the buildings currently present on site.

6.6. Groundwater

Groundwater strikes were recorded during the intrusive investigation in boreholes WS09A and WS13 at depths of 2.9mbgl and 3.5mbgl, respectively.

Groundwater level gauging was carried out on a total of five occasions; on the 9th and 23rd March 2021 (by E3P), on the 14th March 2022 (by A2SI) and on the 5th and 13th June 2024 (by A2SI). A summary of the groundwater level monitoring results is shown below in Table 6.2, which also addresses typographical errors in the first issue of the report (Revision 00).

Table 6.2 Groundwater levels recorded

Location	Screened Strata	Well response zone (mbgl)	Groundwater Reading - mbgl (mOD)				
			09/03/2021	23/03/2021	14/03/2022	05/06/2024	13/05/2024
RBH101	Chester Formation	2.0 to 10	2.20 (23.05)	2.85 (22.40)	Not accessible	Not accessible	Not accessible
RBH102	Chester Formation	0.5 to 1.6	1.40 (23.85)	1.40 (23.85)	Not accessible	Not accessible	Not accessible
RBH103	Chester Formation	2.0 to 10	3.20 (22.05)	3.68 (21.57)	3.33 (21.92)	Not accessible	Not accessible
RBH104	Chester Formation	2.0 to 10	2.00 (23.25)	2.15 (23.10)	2.13 (23.12)	2.41 (22.84)	2.43 (22.82)
RBH105	Chester Formation	2.0 to 10	1.75 (23.50)	1.80 (23.45)	2.21 (23.04)	3.01 (22.24)	3.02 (22.23)
RBH106	Chester Formation	2.0 to 10	1.75 (23.50)	1.81 (23.44)	2.10 (23.15)	2.86 (22.39)	2.83 (22.42)
WS09A	Made Ground & Possible Glaciofluvial Deposits (at 3.0mbgl)	2.0 to 3.5	Not yet installed	Not yet installed	3.41 (21.75)	3.43 (21.73)	3.49 (21.67)
WS13	Made Ground	2.0 to 4.0	Not yet installed	Not yet installed	3.41 (21.67)	3.41 (21.67)	3.47 (21.61)

Groundwater levels from the monitoring are plotted as Figure 6.3 to Figure 6.7.

Monitoring round one
09/03/2021

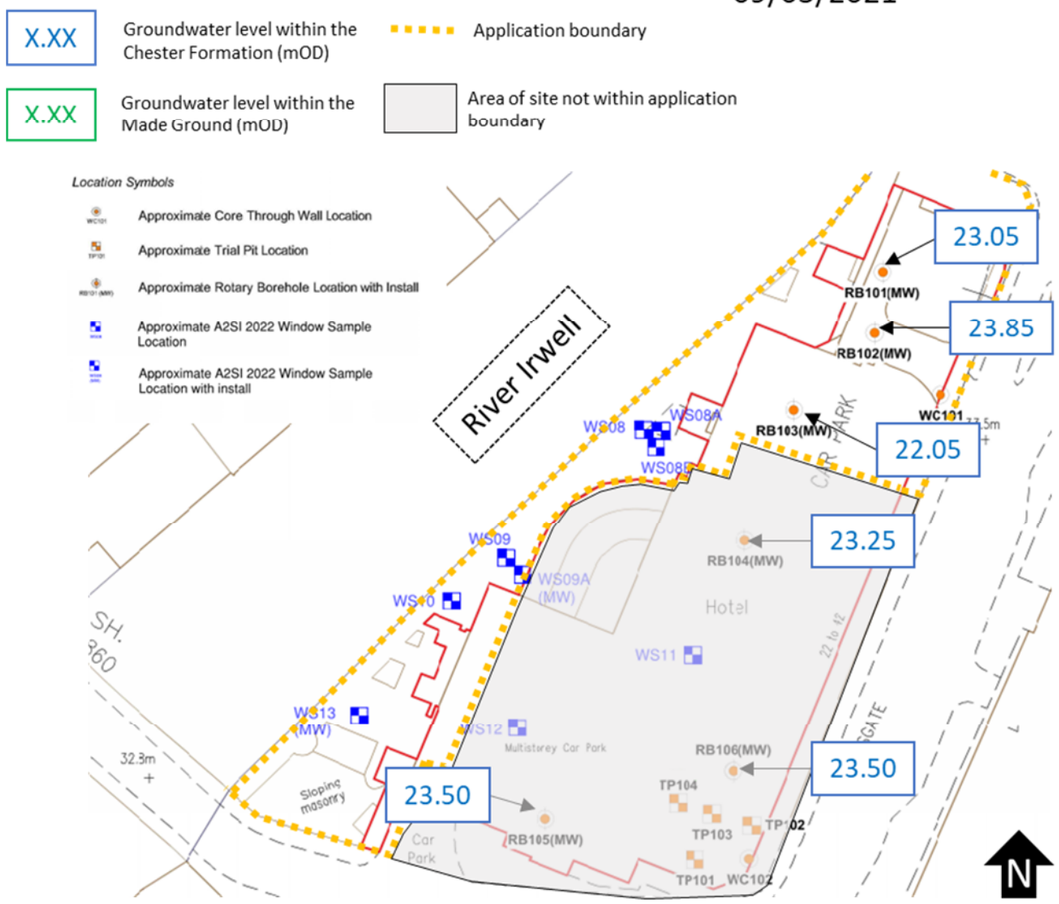


Figure 6.3 Shallow groundwater elevation plots during first monitoring round (E3P round)

Monitoring round two
23/03/2021

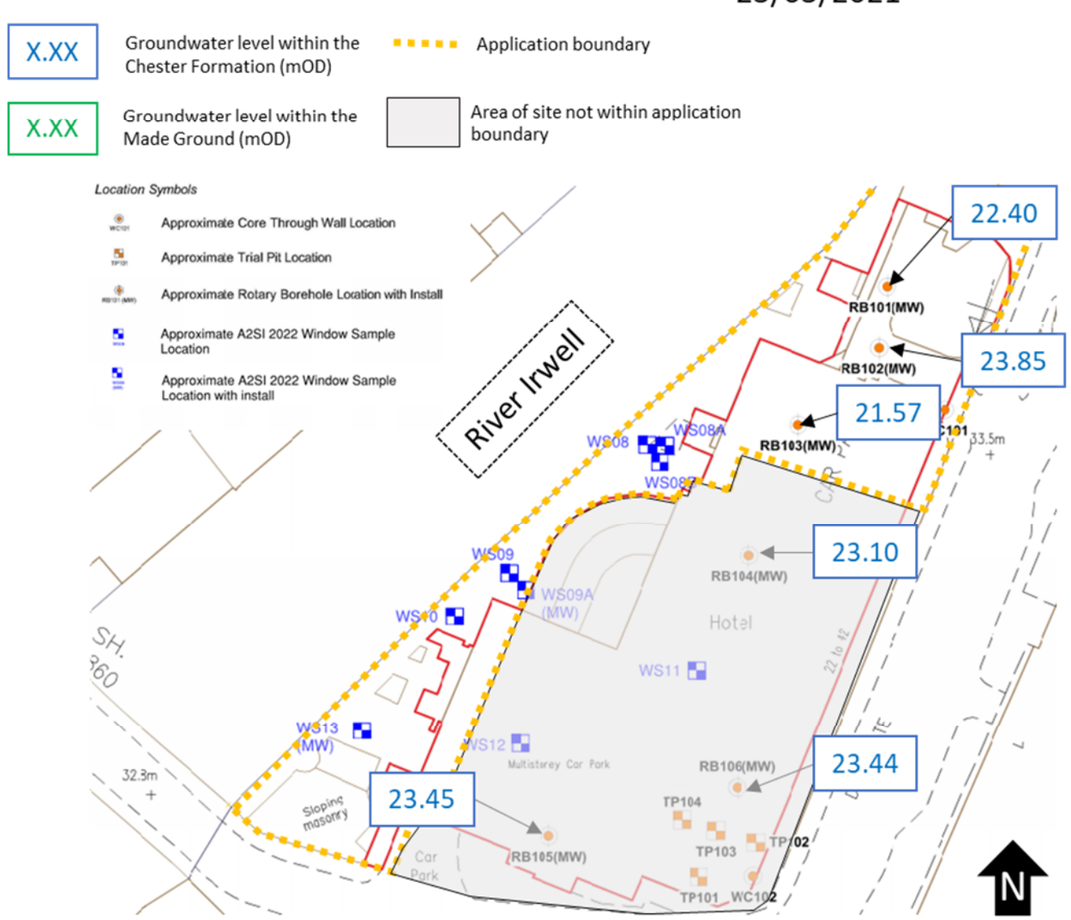


Figure 6.4 Shallow groundwater elevation plots during second monitoring round (E3P round)

Monitoring round three
14/03/2022

X.XX Groundwater level within the Chester Formation (mOD)

X.XX Groundwater level within the Made Ground (mOD)

Application boundary

Area of site not within application boundary

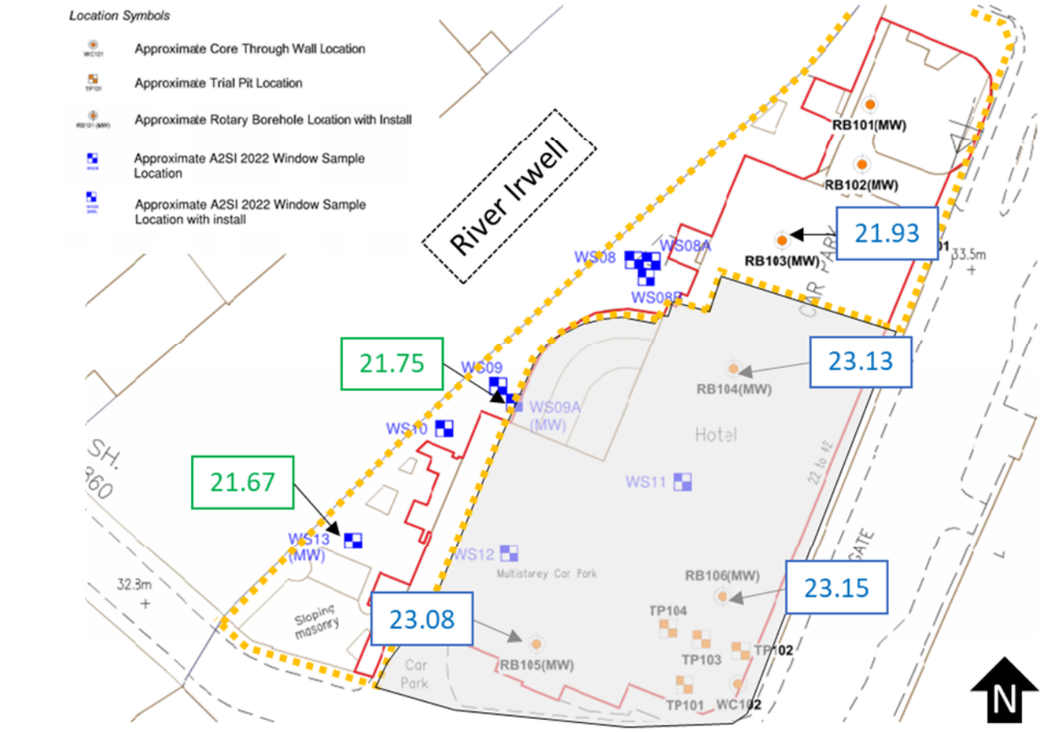


Figure 6.5 Shallow groundwater elevation plots during third monitoring round (A2SI 2020 round)

Monitoring round four
05/06/2024

X.XX Groundwater level within the Chester Formation (mAOD)

X.XX Groundwater level within the Made Ground (mAOD)

Application boundary

Area of site not within application boundary

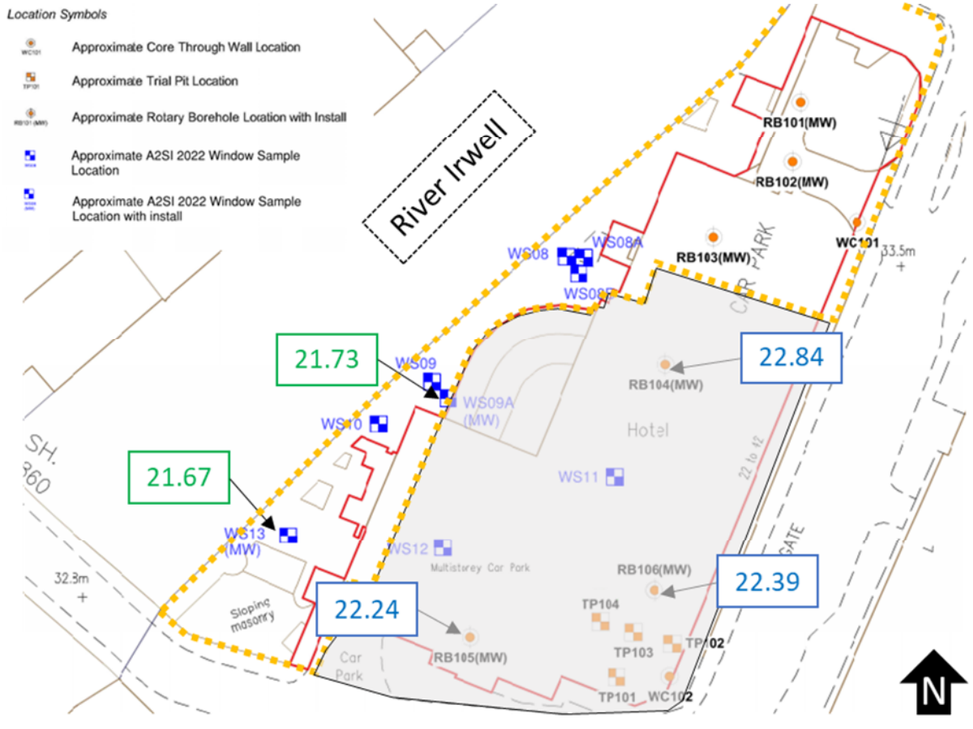


Figure 6.6 Shallow groundwater elevation plots during fourth monitoring round (A2SI 2024 round)

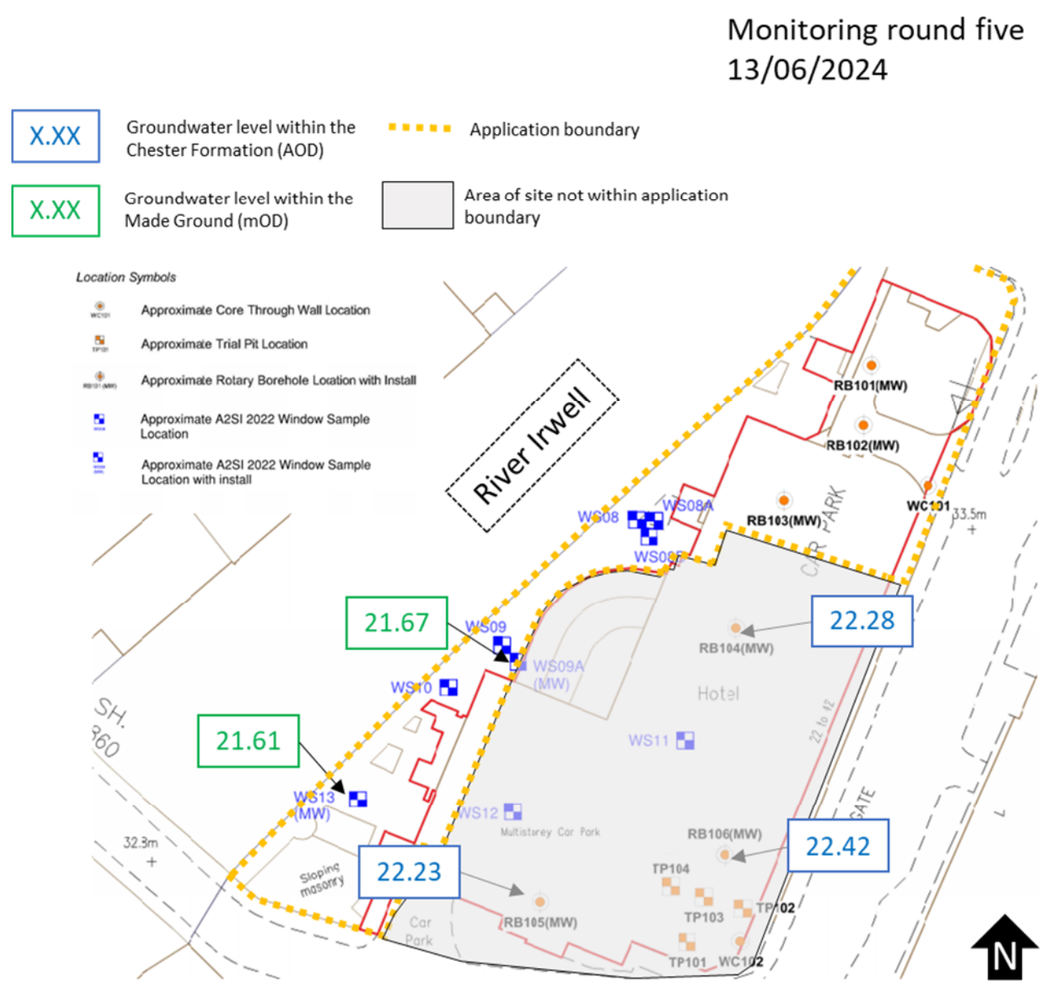


Figure 6.7 Shallow groundwater elevation plots during fifth monitoring round (A2SI 2024 round)

It is noted that the recent monitoring in June 2024 recorded groundwater levels that are relatively consistent with the results of the previous monitoring rounds completed in March 2021 and 2022.

The plots do not show a clear shallow groundwater flow direction, although groundwater levels do reduce from around 22.2mOD to 22.4mOD in the eastern/central area of wider site to around 21.6mOD adjacent to the river.

Notably, the groundwater level recorded in the boreholes adjacent to the navigable River Irwell (WS09A and WS13) correspond to 3.4mbgl to 3.5mbgl, which is significantly deeper than the resting level in the navigable River Irwell. On this basis, there is doubt that groundwater beneath the site and the River Irwell are in direct hydraulic continuity.

6.7. Visual / Olfactory Evidence of Contamination

Visual / olfactory evidences of contamination was not identified in soil during the multiple phases of intrusive investigation undertaken. In addition, no evidence of contamination was found during the return monitoring visits (such as evidence of groundwater contamination).

Within the Made Ground widespread inert materials were found to be present. Brick and concrete were encountered across much of the site as well as glass and ceramic identified in WS10.

In-situ soil sample VOC head-space testing using a PID returned no values over <0.1ppm.

7. Supplementary Generic Quantitative Risk Assessment

7.1. Introduction

Section 7 provides a supplementary geo-environmental assessment using the available information, including data gathered from the recent E3P (2021), A2SI (2022) and A2SI (2024) ground investigations and sampling rounds, as summarised in Section 3, Section 4 and Section5 respectively. GQRA is presented and screening tables are included as Appendix D. Based on the results, the CSM and geo-environmental risk assessment for the proposed development is updated from what is presented in the E3P Phase 2 Assessment.

The E3P Phase 2 Assessment recommends that the following be undertaken to enable the GQRA for the proposed development to be finalised:

- Post-demolition site investigation to provide additional coverage;
- A further round of groundwater sampling to enable further assessment of controlled waters risks;
- Further ground gas monitoring to enable further assessment of human health risks and proposed buildings and structures risks; and
- Assessment of the available information in the form of a water supply pipes risk assessment.

The supplementary GQRA presented in this report addresses the E3P recommendations using the additional ground investigation data collected by A2SI. The supplementary GQRA includes:

- Water supply pipes risk assessment (see Section 7.3).
- Ground gas and soil vapour risk assessment with regards to human health and proposed buildings and structures (see Section 7.4).
- Controlled waters risk assessment based on an additional round of groundwater sampling (see Section 7.5).
- Comment on human health risks associated with the presence of asbestos in soils (see Section 7.2).

Note - Although the A2SI (2022) ground investigation was undertaken prior to completion of all demolition, it is assessed that the coverage which has been achieved is appropriate to satisfy the recommendations of the E3P Phase 2 Assessment.

Please be aware that the GQRA relates to the wider site boundary including the application boundary. The site boundary extends beyond the application boundary.

Risks to site workers and the environment during the construction phase of the proposed redevelopment can be appropriately managed by successful implementation of construction phase risk assessments and method statements (RAMS). Therefore, the associated construction phase land contamination risks are not considered further in this document but should be appropriately considered and mitigated by the Principal Contractor in their preparation and implementation of construction phase RAMS and Construction Phase Plan (CPP).

7.2. Human Health Risk Assessment

The potential risks to human health receptors associated with contaminant concentrations in the shallow soils have been previously assessed and the screening tables comparing the laboratory analytical results for soils to the selected human health GAC are provided in Appendix D. Contaminant concentrations are below the relevant GAC, although the E3P human health risk assessment for soil particle inhalation, ingestion and dermal contact pathways indicates that a clean cover layer is required for soft-landscaping areas constructed as part of the proposed development. Asbestos fibres were identified by laboratory microscopy in one sample of the Made Ground (from trial pit TP104). The potential risks associated with asbestos fibres are assessed separately below.

7.2.1. Asbestos

Should the aforementioned mitigation measures be suitably implemented as part of a Remediation Strategy then the risks to proposed site users will be low. The presence of localised asbestos in Made Ground should also be suitably considered by the Principal Contractor in their preparation and implementation of construction phase RAMS and CPP.

No fragments of Asbestos Containing Material (ACM) visible to the naked eye were encountered during the ground investigations completed to date. Asbestos has previously been identified by E3P in the form of loose chrysotile fibres in Made Ground at trial pit TP104, at a concentration of <0.001% w/w.

There is no published human health GAC with respect to asbestos or asbestos containing materials (ACMs) in soil. Industry best practice document '*Asbestos in soil and made ground: a guide to understanding and managing risks', CIRIA C733, 2014*, identifies that soils containing asbestos concentrations of 0.001 % w/w may be able to liberate airborne fibre concentrations that exceed the contemporary occupational exposure limit for nuisance dust. However, as detailed in other research, including publications such as the *CAR-SOIL Industry Guidance (2016)*, in circumstances where very low concentrations of asbestos are identified in soils, the associated risks are considered low. In this assessment A-squared adopt an asbestos human health GAC of <0.001 % w/w i.e. mitigation or further assessment is required if asbestos in soil is detected at or above <0.001 % w/w.

A further nine soil samples were screen for asbestos as part of the A2SI (2022) investigation by laboratory microscopy. No asbestos was detected in the nine soil samples. Figure 7.1 shows the location of samples screened for asbestos by laboratory microscopy across the wider site, including the results from both the E3P (2021) investigation and the A2SI (2022) supplementary investigation.

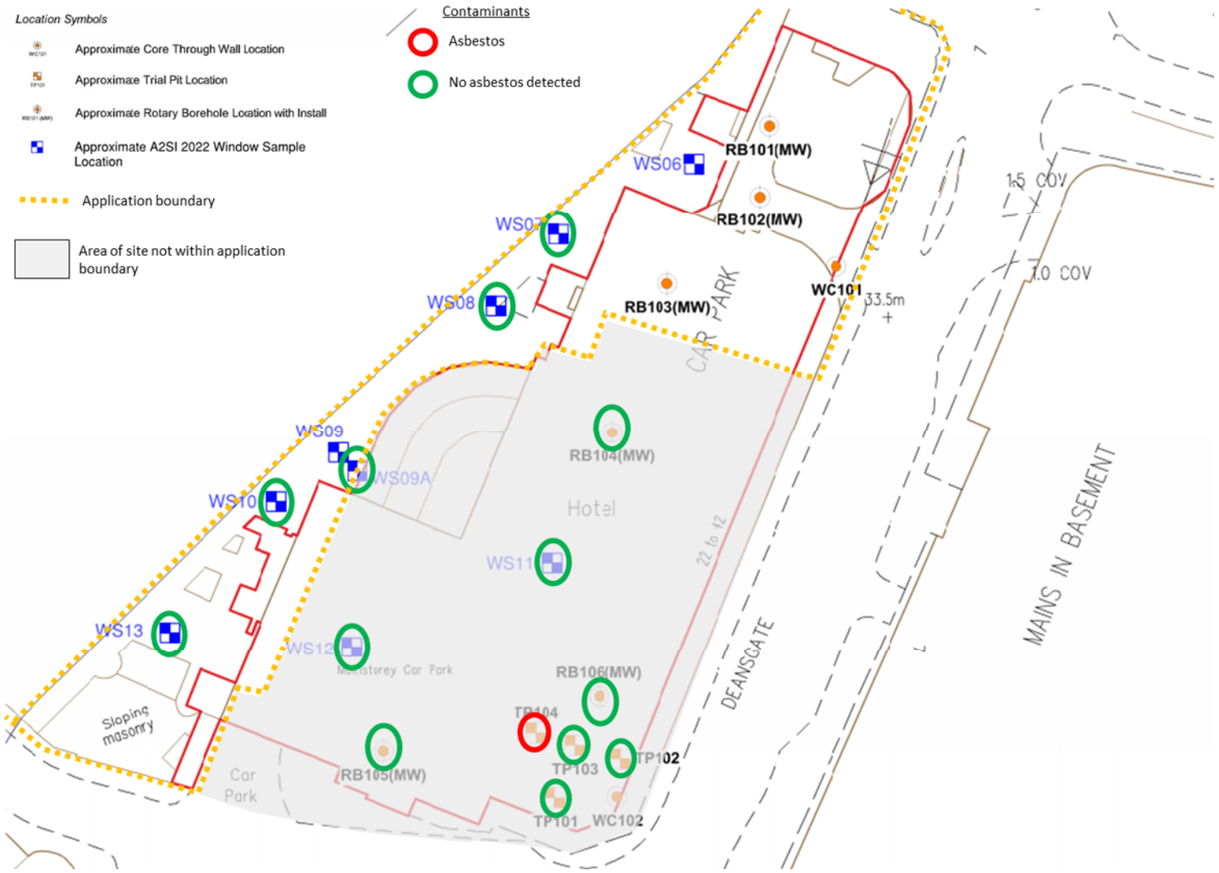


Figure 7.1 Asbestos detection plan for Made Ground

Asbestos was not detected in the soil samples from four exploratory holes, trial pits TP101, TP102 or TP103 and borehole RB106, located in close proximity to the east of trial pit TP104 where low concentrations (<0.001% w/w) was detected, or in exploratory hole located to the west (boreholes WS12 and RB105) and north (boreholes WS11 and RB104). Additionally, no asbestos was detected in the soil samples from the boreholes located within the application boundary (WS08, WS09A, WS10 and WS13).

Based on the available site investigation results, the presence of low concentrations of asbestos fibres in the Made Ground is isolated and sporadic. Whilst the presence of asbestos fibres in the shallow soils cannot be discounted in other areas, it does not represent a potential risk elevated above what would typically be expected for Made Ground (even in the event where asbestos is not positively identified); these potential risks may be mitigated with appropriate safe site practices during construction and breaking the potential pathway between the shallow soils and sensitive human health receptors in the long-term condition. On this basis, further delineated is not required with respect to assessment of potential risks to human health receptors. Notwithstanding this, the Principal Contractor should consider the potential for low concentrations of asbestos in soil for waste classification purposes.

The potential risks to human health receptors (onsite and offsite) associated with low concentrations of asbestos in soil may be mitigated with the following measures:

1. The Principal Contractor is to maintain an appropriate watching brief / discovery strategy with respect to ACM in soil;
2. Where the Made Ground centred on trial pit TP104 is to be exposed during demolition or construction works, the area is to be clearly demarcated with appropriate fencing / signage, and covered with a geotextile membrane and/or kept damped down, and unnecessary disturbance of the soils avoided to prevent to prevent the release of airborne asbestos fibres. Soils exposed during demolition and construction outside of the area of trial pit TP104 should nevertheless be damped down to prevent dust generation;
3. Made Ground excavated in the immediate area of trial pit TP104 should selectively excavated and segregated from other soils to prevent cross-contaminated. Made Ground contaminated with low concentrations of asbestos should either be placed immediately in a collection wagon and removed from site or be appropriately stored and managed on site prior to collection for off-site disposal or re-use in low sensitivity areas. On-site storage and management should include maintaining segregation of the excavated Made Ground by placing it on a membrane and covering with a suitable liner. The stockpile(s) should also be clearly marked using signage.
4. New underground services trenches should be backfilled with primary aggregate, and where located in the known areas where low concentrations of asbestos are present in the Made Ground (including TP104) should be installed in oversize clean service corridors;
5. Provision of a clean cover layer in areas of proposed soft landscaping.

Full details and verification requirements are to be included within a separate Remediation Method Statement.

Where materials are geotechnically or geo-environmentally unsuitable for reuse within the proposed redevelopment they shall be either sent to an off-site Waste Recovery Facility or to a suitably licensed waste disposal facility. During the construction phase, the Principal Contractor is responsible for characterising all wastes generated in accordance with the Landfill Directive, Landfill Regulations, Waste Regulations and the Hazardous Waste Regulations, current and applicable at the time of works. The Principal Contractor shall ensure that no mixing of generated wastes occurs and that no cross-contamination of waste streams occurs. Where practicable and cost effective, materials requiring off-site disposal should be selected and pre-treated to minimise waste volumes and to reduce the volume of Hazardous waste.

7.3. Human Health Risk Assessment (Drinking Water Supply Pipes)

The soil sample geo-environmental laboratory results have been compared to assessment criteria presented in *UKWIR Guidance for the selection of Water Supply Pipes to be used in Brownfield Sites (Ref. 10/WM/03/21).* Only relevant assessment criteria for the potential contaminants of concern identified in the E3P Desk Study have been used. The results are summarised in Table 7.1.

Table 7.1 Water Supply Pipes Assessment Summary

Determinant	Polyethylene (PE) Pipe Assessment Criteria (mg / kg)	Polyvinylchloride (PVC) Pipe Assessment Criteria (mg / kg)	Maximum Concentration Detected in Soil (mg / kg)
Total VOCs	0.5	0.125	0.066 (WS10 at 0.5mgl)
Total BTEX and MTBE	0.1	0.03	<0.01
Total Phenols	2	0.4	<0.1
Total C5-10 aliphatic / aromatic hydrocarbons	2	1.4	<1.00
Total C11-20 aliphatic / aromatic hydrocarbons	10	Pass	<4.00

Determinant	Polyethylene (PE) Pipe Assessment Criteria (mg / kg)	Polyvinylchloride (PVC) Pipe Assessment Criteria (mg / kg)	Maximum Concentration Detected in Soil (mg / kg)
Total C21-40 aliphatic / aromatic hydrocarbons	500	Pass	51 (RH102 at 0.6 mbgl)

No exceedances of either the PVC or the PE assessment criteria for water supply pipes have been identified. Therefore, either PE or PVC specification pipe may be suitable for the proposed development.

The final pipe specification to be installed at the site should be agreed with the utility provider.

The identified contamination does not appear to be in a form which will continue migrating through the ground at shallow depth on completion of the proposed development, so it is assessed that there is low risk to off-site drinking water supply pipes, including those at premises immediately adjacent to the site.

7.4. Human Health and Buildings and Structures Risk Assessment (Ground Gas / Soil Vapour)

7.4.1. Ground Gas

The primary potential on-site ground gas source is Made Ground. No notable potential off-site sources of ground gas are identified in the E3P Desk Study. Where Made Ground has been encountered at the site it is typically less than 1.0 m thick. The thickest Made Ground has been encountered in the southwest of the site immediately adjacent to the River Irwell river wall where it is locally greater than 1.0 m thick; WS10 (>6m thick) and WS13 (5.8m thick).

A Made Ground thickness summary plan is provided as Figure 7.2.

On-site Made Ground has generally been found to be of low thickness so that a typical ground gas assessment using monitoring wells is not possible as described in *CIRIA 665, 'Assessing risks posed by hazardous ground gases to buildings'* and *BS8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*. *BS8576 Guidance on investigations for ground gas – permanent gases and volatile organic compounds (VOCs)* indicates that typical ground gas monitoring wells have a screened section commencing at least 1mbgl, which is not possible to achieve across most of the site.

Therefore, A-squared has taken a qualitative approach to ground gas risk assessment in view of; the measured Made Ground thicknesses, the ground conditions recorded, and the specifics of the proposed development. A particularly pertinent detail is that construction of the new residential building in the north of the site will require shallow excavation (to circa 1 m bgl) of shallow soils including Made Ground down to top of bedrock level to enable construction of a raft foundation. The excavated Made Ground is proposed for off-site disposal.

The engineering logs do not indicate the presence of degradable organic materials in Made Ground and therefore the potential for ground gas generation is not elevated. Indeed, much of the Made Ground is logged as comprising mainly inert materials and non-degradable natural clasts such as brick and ceramic. No visual or olfactory evidence of contamination was identified within the Made Ground. These details indicate low risk with respect to ground gas. Furthermore, the excavation of Made Ground from across the proposed building footprint in the north of the site effectively removes the potential source of ground gas from this area. Therefore, the risks from ground gas are assessed as low (i.e. no unacceptable risk) and not requiring of ground gas monitoring or remediation.

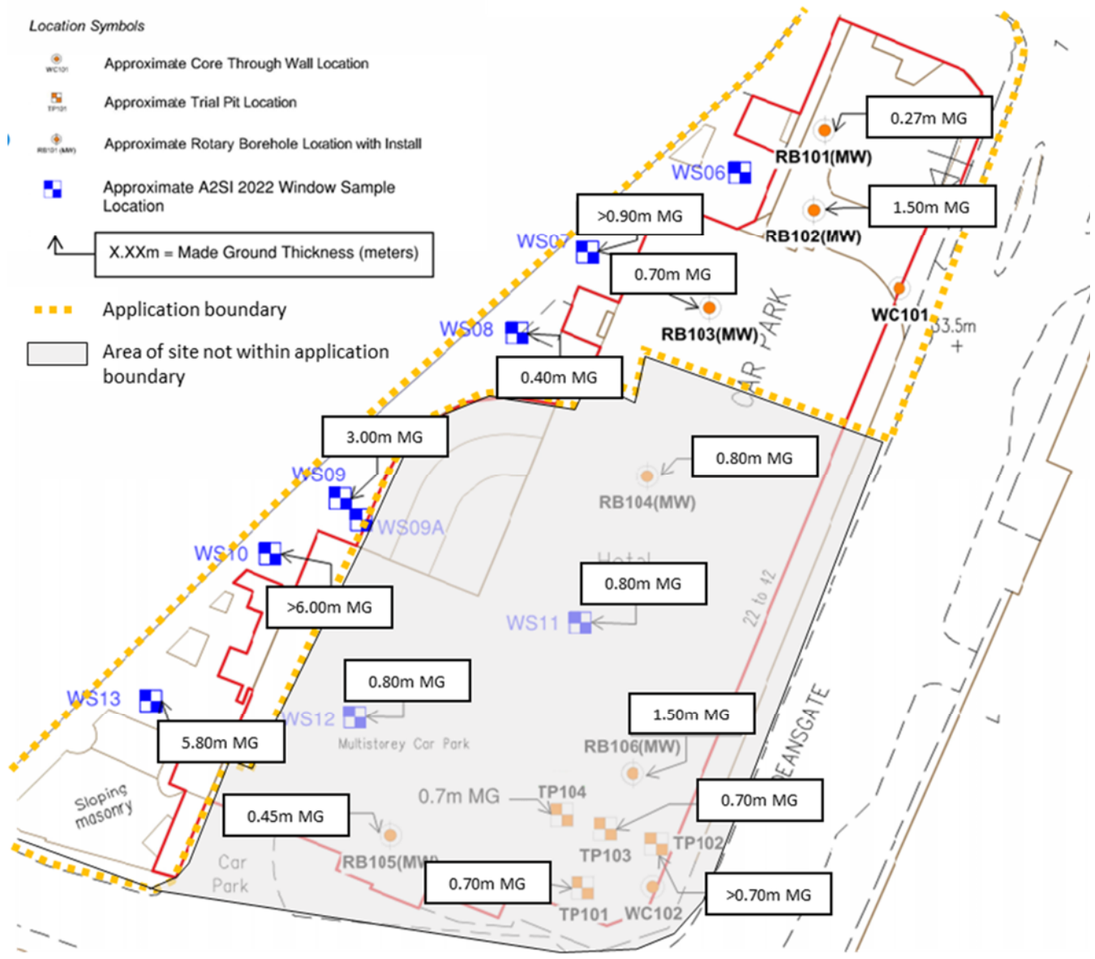


Figure 7.2 Made Ground thickness plan

The deeper Made Ground encountered in the southwest of the site at WS09, WS10 and WS13 does require some further consideration, however. The thicker Made Ground is considered to be localised fill behind the existing river wall. The fill has been identified as not extensive. The fill is not present across a widespread area which may represent an elevated ground gas risk. The area is also located where soft-landscaping is proposed with no building footprint directly above, so the potential of any ground gas generated to impact buildings is reduced by the preferential migration of ground gas to atmosphere via open ground.

The deeper Made Ground encountered in the southwest of the site at WS09, WS10 and WS13 should also be considered in view of *Ciria C795 Retrofitting hazardous ground gas protection measures in existing or refurbished buildings, 2020.* The proposed redevelopment in this area of the site includes a refurbishment of the existing building structure rather than construction of new buildings. There will be very limited and possibly no groundworks undertaken in this area of the site. It is understood that there is no existing ground gas protection system and there are no known issues of gas ingress to the existing building or nearby buildings. The proposed development also maintains the current human health end-use in this area of the site (i.e. commercial end-use) and does not introduce a more sensitive receptor. This being the case, *Ciria C795 (2020)* indicates that the proposed refurbishment works in the southwest of the site would not require fitting of ground gas protection.

On the basis of the above further considerations, the deeper Made Ground encountered in the southwest of the site at WS09, WS10 and WS13 represents a low risk to the proposed development (i.e. no unacceptable risk) and not requiring of ground gas monitoring or remediation.

Despite the ground gas assessments above, A-squared has taken a precautionary approach and supplemented the assessment with a limited scope of ground gas monitoring to verify the conclusions. Ground gas monitoring data is available from three return monitoring visits undertaken at the site. Assessment of the available data has been undertaken in general accordance with guidance contained within *CIRIA 665, 'Assessing risks posed by hazardous ground gases to buildings'* and *BS8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*. The method requires use of both gas concentrations and ground gas well flow rates to calculate a gas screening value (GSV). The GSV is calculated as follows:

$$GSV = \frac{Analyte\ Concentration\ (\%)\ \times Flow\ rate\ (L/hr)}{100}$$

The calculation is carried out for methane (CH_4) and carbon dioxide (CO_2).

The summary results of the ground gas monitoring from the E3P investigation and from the A2SI (2022) investigation are presented in Table 7.2 below.

Table 7.2 Ground Gas Monitoring Summary Data

Exploratory Hole Reference	Date	Minimum O_2 (%)	Maximum CO_2 (%l)	Maximum CH_4 (%)	Maximum H_2S (ppm)	Maximum CO (ppm)	Maximum PID (ppm)	Steady-state Flow Rate (l/hr)	Barometric Pressure (mb)
RBH01	09/03/21	20.5	0.1	0.1	-	-	-	0.1	1013
	23/03/21	20.1	0.1	0.1	-	-	-	0.1	1017
RBH02	09/03/21	19.3	0.1	0.1	-	-	-	0.1	1013
	23/03/21	20.3	0.1	0.1	-	-	-	0.1	1017
RBH03	09/03/21	19.8	0.1	-0.1	-	-	-	3.1	1013
	23/03/21	19.9	0.1	0.1	-	-	-	0.1	1017
	14/03/22	19.3	0.7	<0.1	<1	<1	<1	0.0	1016
RBH04	09/03/21	16.8	0.1	-0.2	-	-	-	2.2	1013
	23/03/21	19.5	0.1	0.1	-	-	-	0.1	1017
	14/03/22	18.1	1.7	<0.1	<1	<1	<1	0.0	1016
RBH05	09/03/21	20.3	0.1	-0.1	-	-	-	0.1	1013
	23/03/21	20.1	0.1	0.1	-	-	-	0.1	1017
	14/03/22	19.7	<0.1	<0.1	<1	<1	<1	0.0	1016
RBH06	09/03/21	19.6	0.1	-0.1	-	-	-	0.1	1013
	23/03/21	20.6	0.1	0.1	-	-	-	0.1	1017
	14/03/22	20.3	<0.1	<0.1	<1	<1	<1	0.0	1014
WS09A	14/03/22	20.2	0.5	<0.1	<1	<1	<1	0.0	1016
WS13	14/03/22	19.7	0.6	<0.1	<1	<1	<1	0.0	1016

BS8485 utilises the GSV and categorises the ground gas risk into 6 no. different hazard potentials, referred to as Characteristic Situations (CS1 – CS6). These are summarised in Figure 7.3.

CS	Hazard potential	Site characteristic GSV [A)] L/h	Additional factors
CS1	Very low	<0.07	Typically <1% methane concentration and <5% carbon dioxide concentration (otherwise consider an increase to CS2)
CS2	Low	0.07 to <0.7	Typical measured flow rate <70 L/h (otherwise consider an increase to CS3)
CS3	Moderate	0.7 to <3.5	–
CS4	Moderate to high	3.5 to <15	–
CS5	High	15 to <70	–
CS6	Very high	>70	–

[A)] The figures used in this column are empirical.

NOTE The CS is equivalent to the characteristic GSV in CIRIA C665 [6].

Figure 7.3 CS vs. GSV (ref. *BS8485*)

GSV have been calculated to define the gas regime at the site as per *BS8485*. The measured worst-case parameters across all wells have been adopted for the calculation on a conservative basis. The GSV for carbon dioxide and methane have been calculated using the maximum concentrations of carbon dioxide (1.7%) and methane (0.1%) detected during the return monitoring visits. The maximum detected steady gas flow rate (3.1 l/hr) has also been used in the calculation. Where parameter values are recorded below the equipment detection limit then the limit of detection has been assumed for the calculation. The calculated GSV for CO_2 and CH_4 are:

- Carbon dioxide: 0.0527 l/hr
- Methane: 0.0031 l/hr

On the basis of the calculated GSV the site could be classified as characteristic situation 1 (CS1) – 'very low risk'.

The results of the ground gas monitoring provide verification for the qualitative assessments presented earlier. It is therefore considered that no further ground gas monitoring is required. Ground gas represents low risk (i.e. no unacceptable risk) to the proposed development. No ground gas protection is required for the proposed development.

7.4.2. Soil Vapour

The soil sample laboratory analytical results have been compared to human health generic assessment criteria (GAC) appropriate for assessing risks for the specifically proposed development. The selected human health GAC include the LQM/CIEH 'Suitable 4 Use Levels' (S4ULs). The S4ULs are based on Health Criteria Values that represent minimal or tolerable levels of risks to health as described in the Environment Agency's SR2 guidance, ensuring that the resulting assessment criteria are 'suitable for use' under Planning.

For each chemical substance, S4ULs include individual GAC for 6 no. generic land-uses (residential with home grown produce, residential without home grown produce, allotments, commercial and 2 no. public open space land uses) and a range of Soil Organic Matter (SOM) contents. All toxicological and physical-chemical parameters used in the derivation of the S4ULs are presented and discussed in the source publication.

In some instances, selected human health GAC used in this report have been applied from the DEFRA 'Category 4 Screening Levels' (C4SLs), CL:AIRE GAC, Environment Agency (EA) Soil Guideline Values (SGVs) and Atkins AtRisk Soil Screening Values (SSVs). The human health GAC source reference used for each chemical determinant is presented in the GQRA screening tables included as Appendix D. C4SLs have been used preferentially where available.

The proposed development includes two areas of the site with differing end uses, a residential premises without gardens in the north of the site and commercial development in the south including Premier House. Therefore, a human health GAC has been applied to each chemical determinant based on the 'residential without home grown produce' generic land-use scenario and the 'commercial' generic land-use scenario. The human health GAC for mercury assumes the presence of methyl mercury as a reasonable conservative worst case assumption based on the site history.

The chemical laboratory results for soils indicate that there are no exceedances of the selected human health GAC for volatile contaminants. This is consistent with the soil sample in-situ VOC head space readings which are all recorded as <0.1 ppm (see Section 6.7). The results indicate low risk to the proposed development due to potential soil vapour sourced from the unsaturated zone.

Groundwater samples have been collected from the on-site monitoring wells on five occasions. Dissolved phase VOC concentrations in groundwater have been tested via laboratory analysis and the results have been screened against 'residential' and 'commercial' assessment criteria presented in SoBRA document '*Development of generic assessment criteria for assessing vapour risks to human health from volatile contaminants in groundwater'* produced in 2017. A screening table is included as Appendix D. No exceedances of the 'commercial' criteria have been identified. Where exceedance of the SoBRA assessment criteria for 'residential' end use have been identified these are summarised in Table 7.3 and Figure 7.4. Exceedances were identified from the second round of groundwater sampling only. The SoBRA assessment criteria for mercury has not been used given that the worst-case form has been assumed to be methyl mercury rather than elemental mercury.

Concentrations of mercury within groundwater samples collected from RB104 (second monitoring round) and WS13 (fifth monitoring round) exceed the SoBRA residential criteria for elementary mercury. However, as stated above, the mercury on site is likely methylmercury based on the site history and therefore, these groundwater concentrations are not assessed further as potential risks.

Table 7.3 Exceedances of the SoBRA GAC for residential end use

Determinant	Maximum Concentration Detected (ug/l)	Location of Maximum Concentration	Number of exceedances	SoBRA Residential GAC (ug/l)
Trichloroethylene	27	RB103	1 of 6	5.7
Tetrachloroethylene	79	RB103	1 of 6	34

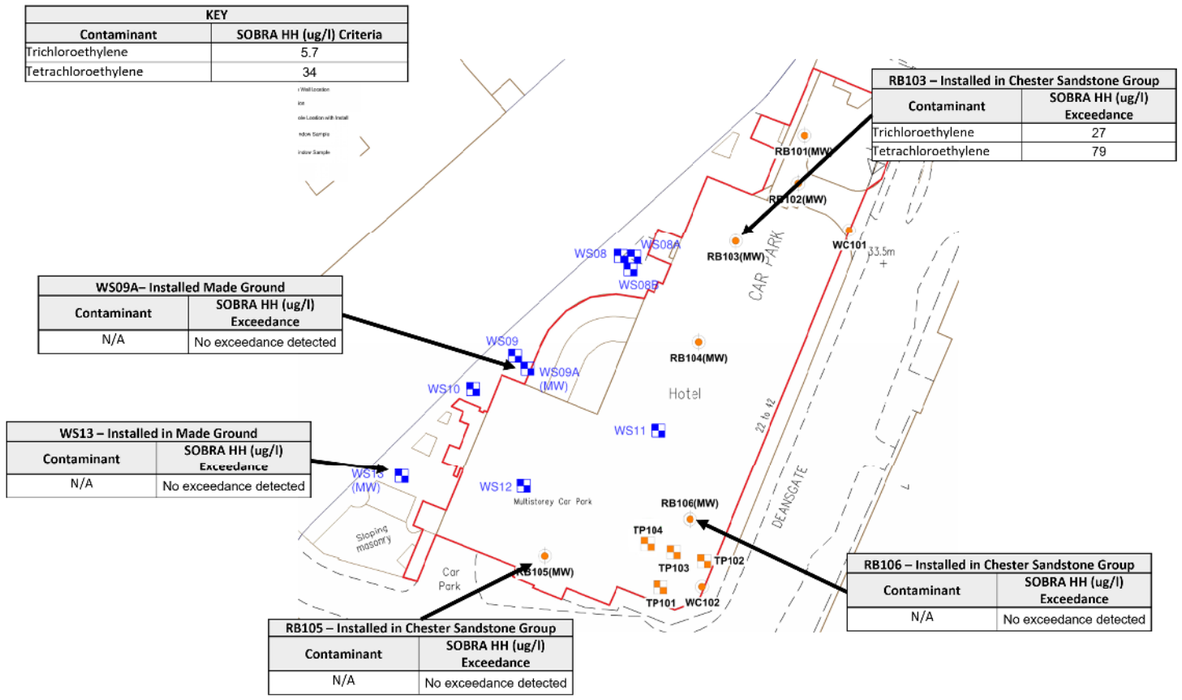


Figure 7.4 Human health exceedances plan for volatile determinants in groundwater (SOBRA 'residential' criteria)

Monitoring well RB103 (where exceedances of the SOBRA assessment criteria have been identified) is located in the northern area of the site proposed for residential use. The exceedances of the SoBRA assessment criteria therefore require further consideration, as provided below.

In the northern areas of the site, where residential development is proposed and where exceedances of the SoBRA 'residential' assessment criteria have been detected, residential apartments are located at proposed level -01 and upwards. Level -01 is effectively the first floor. The proposed floor to be constructed at the ground level across most of the site is called level -02. The level numbers are negative as they are in relation to the ground level at Deansgate which is higher than ground levels across most of the site.

Proposed level -02 (i.e. the ground floor) comprises car parking space, plant rooms, stairwells and lift pits. The car parking is open to the river side and is also assumed to be afforded ventilation appropriate to modern car park standards. Proposed floor plans for levels -02 and -01 are included as Appendix F.

The proposed land uses at the ground floor level (level -02) are low sensitivity since there is no residential accommodation or communal space located at this level, and since the car park is open to the river side so there will be a high level of natural ventilation. These characteristics mean that the ground floor level is not characteristic of typical residential use and the level of natural ventilation is also much greater than considered in the derivation of the SoBRA 'residential' assessment criteria. For both these reasons, the minor exceedances of the SoBRA 'residential' criteria identified for trichloroethylene and tetrachloroethylene detected in groundwater at RB103 are not considered significant for level -02. The ventilation provided at ground floor level (level -02) also provides appropriate mitigation for residential apartments on the levels above. An exception where lift shafts and stairwells are proposed at level -02 and these structures should be provided with appropriate soil vapour protection for trichloroethylene and tetrachloroethylene, and also for the breakdown products cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, 1,1-dichloroethylene and vinyl chloride. A soil vapour protection specification for the proposed lift shafts and stairwells should be provided in a Remediation Strategy for the proposed development. The Remediation Strategy should also include appropriate verification protocols.

Should the aforementioned soil vapour mitigation measures be suitably implemented as part of a Remediation Strategy then the risks to proposed site users will be low.

The soil vapour risks to proposed buildings and structures are low regardless of the soil vapour protection recommended for human health purposes since trichloroethylene and tetrachloroethylene have very low flashpoint values.

7.5. Controlled Waters Risk Assessment

Groundwater laboratory analytical results have been compared to generic assessment criteria (GAC) considered appropriate for assessing controlled waters risks. Controlled waters GAC have been selected to assess risks to drinking water quality and the aquatic environment in surface waters.

The selected drinking water GAC are based on Drinking Water Standards (DWS) published by the UK and EU, as well as Guidance Values (GVs) published by the World Health Organisation (WHO). The DWS and GVs are used as values indicative of low risk to drinking water quality and have been selected given the aquifer status of the Chester Formation sandstone beneath the site (Principal Aquifer).

The selected environmental quality GAC are based on freshwater Environmental Quality Standards (EQS) published by the UK and EU, and also operational targets published by the Environment Agency (EA). The EQS and operational targets are used as values indicative of low risk to the aquatic environment and have been selected given the proximity of the River Irwell to the site.

The environmental quality GAC and drinking water GAC used in this assessment are generally considered to be highly conservative for the manner used in this report, but technically robust for a GQRA.

The River Irwell is situated with a man-made river wall between the river and the site. The river wall will likely limit connectivity between the river and shallow groundwater beneath the site (as evidenced by the difference in groundwater and surface water levels – see Section 6.6). Therefore, the reduced availability of a viable pathway between shallow groundwater beneath the site and the River Irwell is accounted for in the controlled waters risk assessment presented below. The controlled waters risk assessment also takes into account that the majority of the redeveloped site will be covered by building footprint and external hardstanding so infiltration of water through shallow soils will be greatly restricted.

The groundwater laboratory analytical results are presented in a screening table comparing the detected chemical concentrations to the selected GAC in Appendix D. The results generally indicate low risk to controlled waters with concentrations not exceeding the selected GAC. Where exceedance of the GAC are identified they are summarised in Table 7.4 – 7.9 and spatially orientated on Figure 7.5 and 7.6.

In addition, as part of the A2SI (2024) groundwater sampling rounds, two sets of surface water samples were collected from the adjacent River Irwell. Of these, two samples were collected from upstream and two from downstream. The location of these samples can be observed in Figure 5.1. These samples underwent laboratory analysis and were screened against the environmental quality GAC. Where exceedance of the GAC are identified they are summarised in Table 7.10 and spatially orientated on Figure 7.7.

Table 7.4 Exceedances of the drinking water GAC (A2SI 2022 investigation)

Determinant	Maximum Concentration Detected (ug/l)	Location of Maximum Concentration	Number of exceedances	Drinking Water GAC (ug/l)
Trichloroethylene	27	RB103	1 of 6	10 (sum)
Tetrachloroethylene	79	RB103	2 of 6	
Benzo (b) fluoranthene	0.33	RB104	3 of 6	0.1 (sum)
Benzo (k) fluoranthene	0.42	WS13	3 of 6	
Benzo(ghi)perylene	0.08	RB103	3 of 6	
Indeno (1,2,3-cd) pyrene	0.08	RB103	3 of 6	
Benzo (a) pyrene	0.09	WS13	3 of 6	0.01

Table 7.5 Exceedances of the environmental quality GAC (A2SI 2022 investigation)

Determinant	Maximum Concentration Detected (ug/l)	Location of Maximum Concentration	Number of exceedances	Environmental Quality GAC (ug/l)
Trichloroethylene	27	RB103	1 of 6	5.7
Tetrachloroethylene	79	RB103	2 of 6	34
chloroform	8.0	RB101	1 of 6	2.5
>C21-C35 Aromatic	69.8	RB104	1 of 6	20
Fluoranthene	0.12	WS13	4 of 6	0.0063
Benzo (a) pyrene	0.09	WS13	4 of 6	0.0002
Copper	7.4	RB104	3 of 6	1
Nickel	8.3	RB104	1 of 6	4
Zinc	23.3	RB104	3 of 6	10.9
Lead	2.1	WS13	1 of 6	1.2
Sulphate	416	RB103	1 of 6	400

Table 7.6 Exceedances of the environmental quality GAC (E3P 2021 investigation)

Determinant	Maximum Concentration Detected (ug/l)	Location of Maximum Concentration	Number of exceedances	Environmental Quality GAC (ug/l)
Copper	8.4	RB103	3 of 3	1
Chloroform	18.8	RB101	3 of 3	2.5

Table 7.7 Exceedances of the drinking water GAC (E3P 2021 investigation)

Determinant	Maximum Concentration Detected (ug/l)	Location of Maximum Concentration	Number of exceedances	Drinking Water GAC (ug/l)
Mercury	1.22	RB104	1 of 3	1

Table 7.8 Exceedances of the drinking water GAC (A2SI 2024 investigation)

Determinant	Maximum Concentration Detected (ug/l)	Location of Maximum Concentration	Number of exceedances	Drinking Water GAC (ug/l)
Benzo (b) fluoranthene	0.94	WS13	1 of 10	0.1 (sum)
Benzo (k) fluoranthene	0.38	WS13	1 of 1	
Benzo(ghi)perylene	0.87	WS13	1 of 10	
Indeno (1,2,3-cd) pyrene	0.40	WS13	1 of 10	
Benzo (a) pyrene	0.52	WS13	1 of 10	0.01

Table 7.9 Exceedances of the environmental quality GAC (A2SI 2024 investigation)

Determinant	Maximum Concentration Detected (ug/l)	Location of Maximum Concentration	Number of exceedances	Environmental Quality GAC (ug/l)
Chromium	6.0	RB104	2 of 10	4.7
Hexavalent Chromium	6.4	RB104	1 of 10	3.4
Anthracene	0.13	WS13	1 of 10	0.1
Fluoranthene	1.3	WS13	1 of 10	0.0063
Benzo (a) pyrene	0.52	WS13	1 of 10	0.0002
Copper	5.4	WS109	9 of 10	1
Mercury	1.9	WS13	1 of 10	1.0
Nickel	11	WS09A	3 of 10	4.0
Zinc	23.3	RB104	3 of 6	10.9
Lead	2.3	WS13	2 of 10	1.2

Table 7.10 Exceedances of the environmental quality GAC for surface waters (A2SI 2024 investigation)

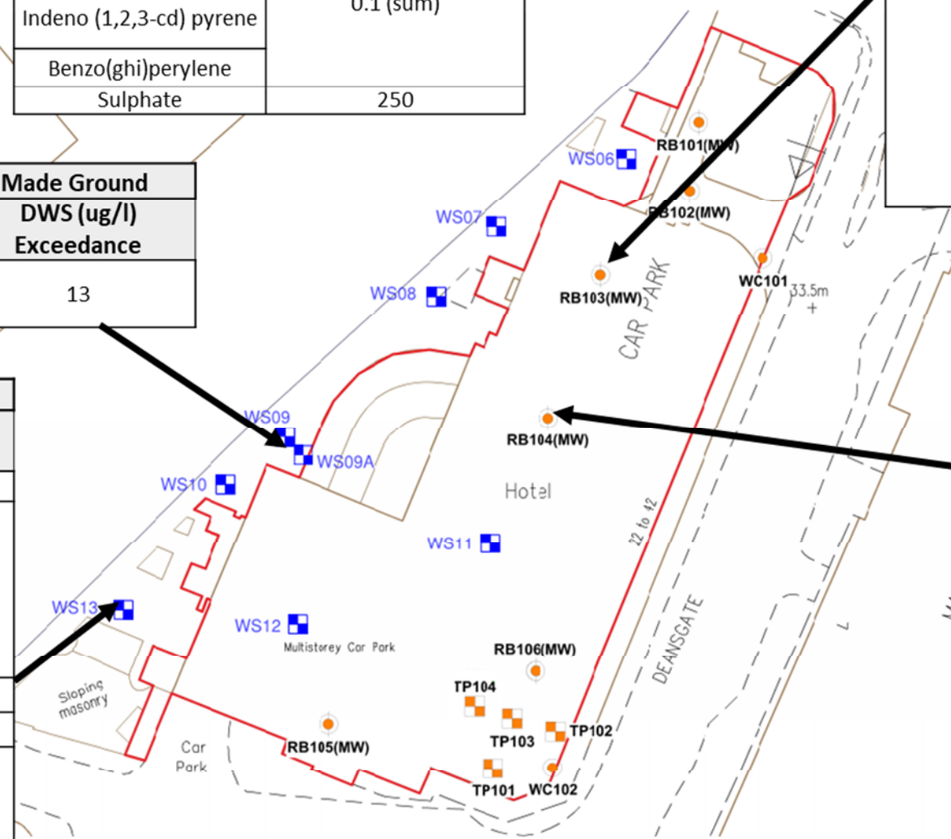
Determinant	Maximum Concentration Detected (ug/l)	Location of Maximum Concentration	Number of exceedances	Environmental Quality GAC (ug/l)
Copper	6.4	Upstream	4 of 4	1
Zinc	12.0	Downstream	2 of 4	10.9
Lead	3.0	Upstream	4 of 4	1.2

KEY	
Contaminant	**DWS (ug/l) Criteria**
Trichloroethylene	10 (sum)
Tetrachloroethylene	
Benzo(a)pyrene	0.01
Benzo (b) fluoranthene	0.1 (sum)
Benzo (k) fluoranthene	
Indeno (1,2,3-cd) pyrene	
Benzo(ghi)perylene	
Sulphate	250

RB103 – Installed in Chester Sandstone Group		
Sampling date	**Contaminant**	**DWS (ug/l) Exceedance**
15/03/22	Sulphate	416
	Benzo(a)pyrene	0.04
	Benzo (b) fluoranthene	0.23
	Benzo (k) fluoranthene	
	Indeno (1,2,3-cd) pyrene	
	Benzo(ghi)perylene	
	Trichloroethylene	106
	Tetrachloroethylene	

WS09A – Installed in Made Ground	
Contaminant	**DWS (ug/l) Exceedance**
Trichloroethylene	13
Tetrachloroethylene	

WS13 – Installed in Made Ground		
Sampling date	**Contaminant**	**DWS (ug/l) Exceedance**
15/03/22	Benzo(a)pyrene	0.09
	Benzo (b) fluoranthene	0.69
	Benzo (k) fluoranthene	
	Indeno (1,2,3-cd) pyrene	
	Benzo(ghi)perylene	
	Fluoranthene	0.12
13/06/2024	Benzo(a)pyrene	0.52
	Benzo (b) fluoranthene	2.59
	Benzo (k) fluoranthene	
	Indeno (1,2,3-cd) pyrene	
	Benzo(ghi)perylene	
	Fluoranthene	1.3
	Anthracene	0.13
	Mercury	1.9



RB104 – Installed in Chester Sandstone Group		
Sampling date	**Contaminant**	**DWS (ug/l) Exceedance**
13/04/21	Mercury	1.22
15/03/22	Benzo(a)pyrene	0.03
	Benzo (b) fluoranthene	0.64
	Benzo (k) fluoranthene	
	Indeno (1,2,3-cd) pyrene	
	Benzo(ghi)perylene	

Figure 7.5 Drinking water GAC exceedances plan

KEY	
Contaminant	**EQS (ug/l) Criteria**
Trichloroethylene	10
Tetrachloroethylene	10
>C21-C35 Aromatic	20
Fluoranthene	0.0063
Benzo(a)pyrene	0.0002
Copper	1
Zinc	10.9
Nickel	4
Lead	1.2
Sulphate	400
Hexavalent Chromium	3.4
Anthracene	0.1
Chloroform	2.5
Chromium	4.7

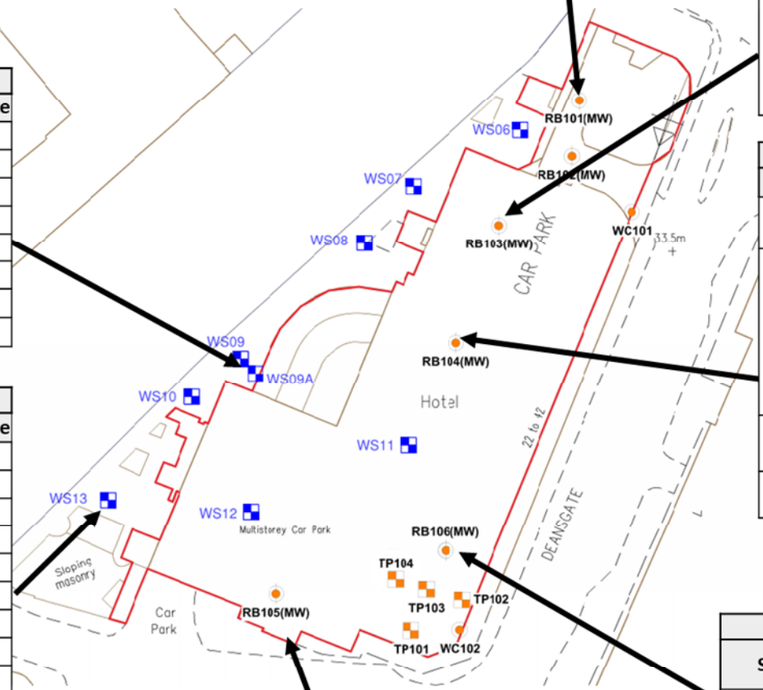
RB101 – Installed in Chester Sandstone Group		
Sampling date	**Contaminant**	**EQS (ug/l) Exceedance**
13/04/21	Copper	3.1
	Chloroform	18.8

RB103 – Installed in Chester Sandstone Group		
Sampling date	**Contaminant**	**EQS (ug/l) Exceedance**
15/03/22	Sulphate	416
	Fluoranthene	0.02
	Benzo (a) pyrene	0.04
	Trichloroethylene	27
	Tetrachloroethylene	79

RB104 – Installed in Chester Sandstone Group		
Sampling date	**Contaminant**	**EQS (ug/l) Exceedance**
13/03/21	Copper	8.4
	Chloroform	8.6
15/03/22	Copper	7.4
	Nickel	8.3
	Zinc	23.3
	Fluoranthene	0.06
	Benzo (a) pyrene	0.03
	>C21-C35 Aromatic	69.8
05/06/24	Hexavalent Chromium	6.4
	Copper	1.3
13/06/24	Chromium	6
	Copper	1.5

WS09A – Installed in Made Ground		
Sampling date	**Contaminant**	**EQS (ug/l) Exceedance**
15/03/22	Copper	3.4
	Fluoranthene	0.02
	Benzo (a) pyrene	0.01
	Tetrachloroethylene	13
05/06/24	Copper	5.4
	Nickel	11.0
13/06/24	Copper	3.1
	Nickel	8.9

WS13 – Installed in Made Ground		
Sampling date	**Contaminant**	**EQS (ug/l) Exceedance**
15/03/22	Copper	2.9
	Lead	2.1
	Zinc	13.8
	Fluoranthene	0.12
	Benzo(a)pyrene	0.09
05/06/24	Copper	2,3
	Nickel	4,4
	Lead	2.3
13/06/24	Lead	1.5
	Nickel	8.9
	Anthracene	0.13
	Fluoranthene	1.3
	Benzo(a)pyrene	0.52



RB105 – Installed in Chester Sandstone Group		
Sampling date	**Contaminant**	**EQS (ug/l) Exceedance**
13/03/21	Copper	2.9
	Chloroform	7.9
15/03/22	Chloroform	8.0
05/06/24	Copper	2.4
13/06/24	Copper	3.7

RB106 – Installed in Chester Sandstone Group		
Sampling date	**Contaminant**	**DWS (ug/l) Exceedance**
15/03/22	Zinc	16.8
05/06/24	Chromium	5.3
	Copper	3.9
13/06/24	Copper	1.8

Figure 7.6 Environmental quality GAC exceedances plan (ground water)

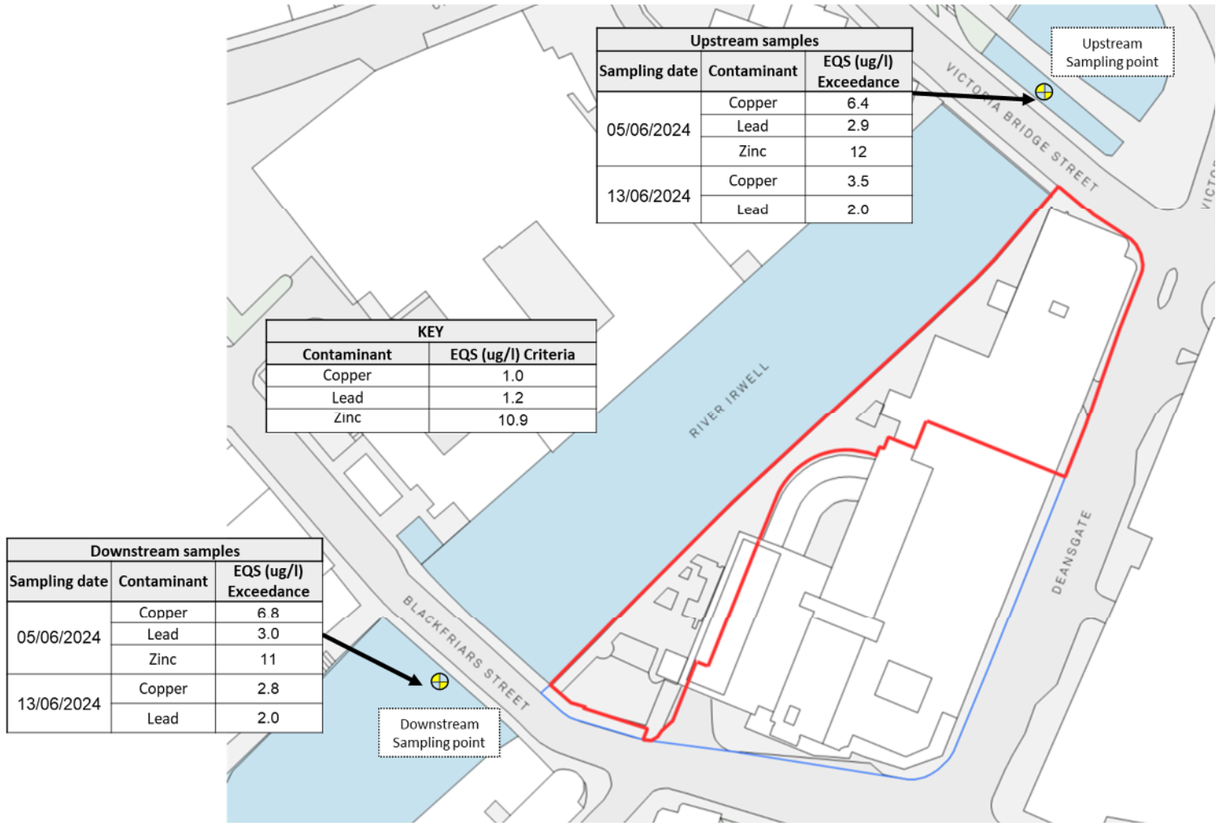


Figure 7.7 Environmental quality GAC exceedances plan (Surface water)

An assessment has been completed to qualitatively assess potential migration of dissolved phase contaminants in the groundwater beneath the site to the River Irwell. As an initial screen, the concentrations of sulphate and for contaminant groups including metals, PAHs, TPH, BTEX, VOCs, SVOCs and phenols are simply compared between the water bodies; with the exception of sulphate, this is based on the sum of individual / speciated contaminants for contaminant groups where EQS exist.

Table 7.11 Comparison of contaminants in groundwater and surface water

Contaminant	Contaminant concentrations (ug/l)			
	River Irwell Upstream	Chester Formation	Made Ground	River Irwell Downstream
Sulphate (mg/l)	54	416	69	54
Heavy Metals and Metalloids	80	273	133	80
PAHs	0	0	2	0
TPH	0	83	90	0
BTEX and MTBE	0	0	0	0
VOC	0	125	13	0
SVOC	13	0	0	37
Phenolics	0	6	0	0

With reference to Figure 7.7 and Table 7.11, it is noted that the concentrations of metals elevated above the EQS are recorded in the samples taken upstream and downstream of the site. Additionally, measurable concentrations (> laboratory limits of detection, LOD) of SVOCs are also recorded in the upstream and downstream samples, with no measurable concentrations (< LOD) of PAHs, TPH, BTEX, VOCs or Phenols.

In comparison, the groundwater samples indicate measurable concentrations of TPH, PAHs (Made Ground only), VOCs and phenols (Chester Formation only). In this regard, the contaminant profiles in groundwater and surface water are not in good agreement, indicating that dissolved phase contaminants in the groundwater are not significantly impacting the adjacent surface water. This is supported by the difference in levels between groundwater and the surface water (River Irwell), with groundwater significant deeper (see Section 6.6).

A hydrogeological conceptual site model (CSM) is included as Figure 7.8 and assessment of each contaminant group is detailed in the following sections of this report.

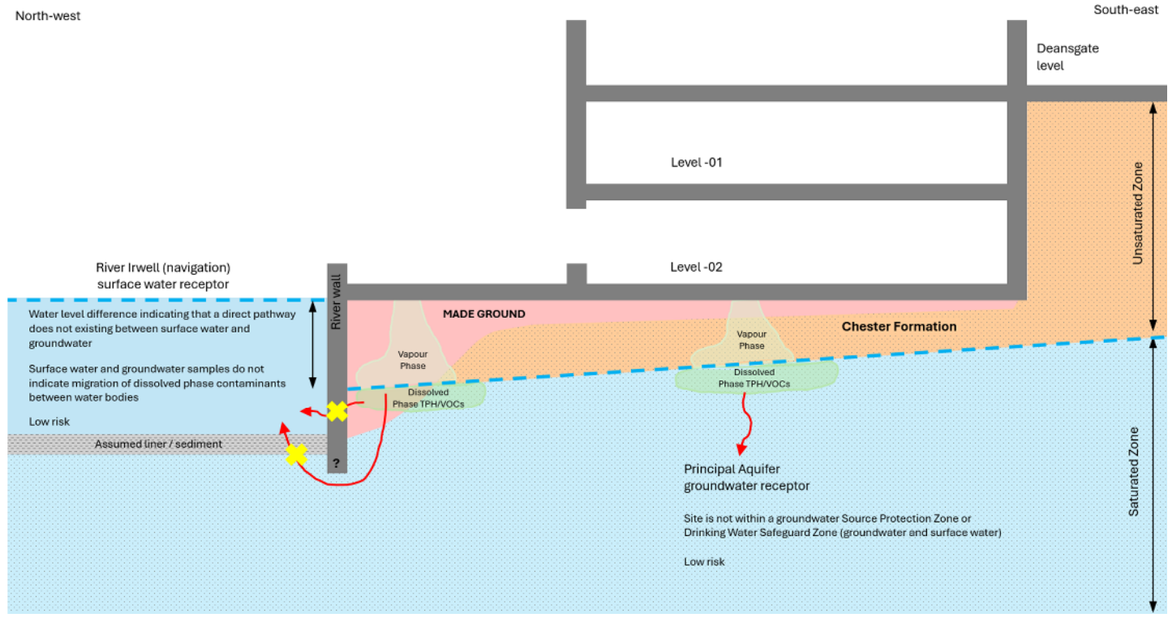


Figure 7.8 Hydrogeological CSM

7.5.1. VOCs

No visual / olfactory evidence of VOC contamination has been identified over the multiple phases of ground investigation undertaken. Also, the soil sample VOC head-space tests include no readings greater than instrument detection limit. Laboratory soil sample VOC analysis has been undertaken to provide an additional line of evidence and the results indicate VOC concentrations below laboratory method detection limit except 0.066mg/kg tetrachloroethylene at WS10 (0.5mbgl) i.e. very low concentrations which indicate that a viable active source of contamination in the unsaturated zone is not present.

VOC laboratory analysis has also been undertaken on shallow groundwater samples collected from the site over 5 no. monitoring rounds. Similar to soils, the majority of VOC concentrations detected in groundwater are below laboratory method detection limits. The exceptions are tetrachloroethylene, trichloroethylene and trichloromethane (chloroform) which have been detected at localised monitoring wells at concentrations slightly exceeding the selected environmental quality GAC and drinking water GAC. E3P has previously indicated that the nature of the VOC impacts in groundwater suggest an off-site source of contamination (see E3P Phase 2 Assessment) and, based on the additional data now available, this supplementary assessment concludes the same. This is because no free-phase product which would represent an ongoing source has been identified in the saturated zone, and as discussed, the soil data indicates that a viable active source in the unsaturated zone is also not present.

Surface water samples collected from the River Irwell also underwent analysis for tetrachloroethylene, trichloroethylene and chloroform. The laboratory analysis concentrations of the surface water samples (both upstream and downstream) collected during both rounds had concentrations of tetrachloroethylene, trichloroethylene and chloroform below laboratory detection limits (3.0ug/l).

Therefore, although there are localised VOC exceedances in groundwater the impacts do not appear to reflect a broad plume of contamination resulting from a significant on-site VOC source. On this basis, the ground investigation results indicate low risk (i.e. no unacceptable risk) to controlled waters and no remediation is required with respect to VOCs.

7.5.2. TPHs

The chemical laboratory analysis from the second round of monitoring recorded concentrations of TPH aromatic C21-C35 in boreholes WS13 (55ug/l) and RB104 (69.8ug/l) above the selected environmental quality GAC (20ug/l) in shallow groundwater collected at borehole during the second monitoring round. The groundwater samples from other monitoring rounds recorded concentrations of TPH aromatic C21-C35 below the laboratory detection limit (<1.0ug/l). The absence of a repeat elevated readings indicates that there is not a coherent plume of TPH contamination in the vicinity of boreholes RB104 or WS13. Furthermore, the TPH concentrations detected in the soil samples are all low and do not indicate a significant viable source of TPH contamination at the site. In addition, surface water samples from the adjacent River Irwell did not record any concentrations of aromatic C21-C35 compounds above the laboratory detection limit (1.0ug/l).

In consideration of these aspects and given the relatively low mobility of this heavier end TPH fraction, the identified exceedances of the environmental quality GAC for aromatic C21-C35 represents a low risk (i.e. no unacceptable risk) to controlled waters.

7.5.3. PAHs

Contaminant concentrations in groundwater samples were recorded above the environmental quality GAC for the following PAHs:

- Fluoranthene: exceedances have been identified in 5no of the 16no groundwater samples collected. The highest groundwater concentration was detected in borehole WS13 at 1.3 ug/l compared to the GAC of 0.0063ug/l;
- Anthracene: an exceedance has been identified in a single sample of the 16no groundwater water samples collected. The highest groundwater concentration was detected in borehole WS13 at 0.13 ug/l compared to the GAC of0.1ug/l;
- Benzo(a)pyrene: exceedances have been identified in 5no of the 16no groundwater samples collected on this site visit. The range of benzo(a)pyrene exceeding concentrations is from 0.01 ug/l (borehole WS09A) to 0.52 ug/l (borehole WS13) compared to the GAC of 0.0002ug/l.

The surface water samples taken from the River Irwell (both upstream and downstream) did not record concentrations of PAHs above the laboratory detection limit. Therefore, the concentrations of benzo(a)pyrene, anthracene and fluoranthene identified on site when compared to the surface water samples suggests that these PAH contaminants sourced from the site are not posing a significant risk (i.e. no unacceptable risk) to the River Irwell.

Contaminant concentrations in groundwater samples were recorded above the drinking water standards GAC for the following PAHs:

- PAHs (sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene): These exceedances were recorded in boreholes RB103, RB104 and WS13, with a maximum concentration of 1.74ug/l recorded at WS13 compared to the GAC of 0.1ug/l.
- Benzo(a)pyrene: exceedances have been identified in 4no of the 16no groundwater samples collected. The range of benzo(a)pyrene exceeding concentrations is from 0.03ug/l (borehole RB104) to 0.52ug/l (borehole WS13) compared to the GAC of 0.01ug/l.

PAH contaminants exceeding their respective drinking water standards GAC are not widespread across the site but instead are localised to boreholes RB103, RB104 and WS13 with the latter of the three (WS13) having its groundwater response zone installed within the Made Ground. In addition, the exceedances are only marginal and not consistent. For example, only a single sample of the 3no. samples collected from RB104 and tested for PAHs had concentrations of PAHs exceeding the GAC. The other samples collected from RB104 had PAH concentrations below the laboratory detection limit. In addition, of the 3no samples collected from WS13 one of them also had PAH concentrations below the laboratory limit of detection. Soil samples were also collected from the site and underwent PAH testing and of these results, only two samples had PAH concentrations above the laboratory limit of detection These were taken from WS13 (0.5mbgl) and RB103 (0.8mbgl) with a concentration of 1.9mg/kg and 1.82mg/kg, respectively. It is important to note that a deeper sample of Made Ground was also collected from WS13. This total PAH concentration in this sample was below the laboratory limit of detection. The absence of a repeat elevated readings indicates that there is not a coherent plume of PAH across the site. Furthermore, the PAH concentrations detected in the soil samples are all low and decrease with depth indicating that there is not a significant viable source of PAH contamination at the site.

In consideration of these aspects, the identified exceedance of the drinking water standards GAC for benzo(a)pyrene and the sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene reflect a low risk (i.e. no unacceptable risk) to the underlying aquifers.

7.5.4. Sulphate

Sulphate has been found to exceed the controlled waters GAC only in the groundwater sample taken from RB103 for both drinking water standards (250ug/l) and environmental quality 400(ug/l). No other exceedances have been registered across all other water samples. Soil samples collected from Made Ground taken across the site ranged in concentration from 340mg/kg (TP04) to 5,500mg/kg (RB102). Samples of the natural Chester Formation taken from RB101, RB103, RB104 and RB105 also underwent sulphate laboratory testing. The samples taken from RB101, RB104 and RB105 recorded a sulphate concentration range of 94mg/kg (RB101) to 140mg/kg (RB105) with the sample from RB103 overall having a greater natural sulphate concentration of 270mg/kg. It is likely that this natural bearing sulphate strata has influenced the elevated sulphate groundwater concentrations at RB103.

Surface water samples taken from the adjacent River Irwell also underwent laboratory analysis for sulphate. The concentrations of sulphate within these samples were all below the environmental quality ranging from 49.5mg/l to 53.9mg/l. In addition, concentrations of sulphate identified in the surface water samples during both rounds decreased downstream indicating that sulphate sourced from the site is not contributing to sulphate identified in the River Irwell.

Due to only one sample having a sulphate concentration exceeding the drinking water standards GAC, widespread contamination within shallow groundwater is unlikely. The elevated sulphate concentration is localised in the vicinity of RB103 and influenced by natural sulphate

bearing strata. Evidence of this localisation is provided with none of the samples collected from RB104 (approximately 20m south) exceeding the drinking water standards GAC. Therefore, sulphate represents a low risk (i.e. no unacceptable risk) to controlled waters.

7.5.5. Heavy Metals

The only metal to exceed the drinking water standards GAC from groundwater collected from site was mercury. Mercury concentrations exceeding the drinking water GAC (1ug/l) were only marginal with only 2no of the 19no groundwater samples collected having exceeding concentrations. These samples were collected from RB104 (during the first monitoring round) and WS13 (during the fifth monitoring round) with concentrations recorded at 1.22ug/l and 1.9ug/l, respectively. Mercury concentrations detected in the soil samples collected as part of the E3P site investigation were all below the laboratory detection limit (<0.3mg/kg). This indicates that the site is not currently a source of significant mercury contamination. Due to the groundwater exceedances identified only being marginal and infrequent in addition to the soil have low mercury concentrations, it has been assed that there is no significant risk (i.e. no unacceptable risk) to groundwater quality from mercury at the site.

A number of heavy metal contaminants exceed their relevant environmental quality GAC across the site. These contaminants include chromium (including hexavalent), copper, nickel, lead and zinc. Of all these heavy metal contaminants, only three were found to have concentrations exceeding the GAC within the surface water samples from the adjacent River Irwell. These contaminants were copper, lead and zinc. Concentrations of chromium (including hexavalent) from the surface water samples were recorded as being below the laboratory detection limit and the concentration of nickel decreased in concentration from the upstream to downstream sample during both rounds. For this reason, it has been assed that the site is not acting as a significant source of nickel or chromium (including hexavalent) and therefore, risks to the River Irwell from nickel and chromium (including hexavalent) sourced from the site are assessed as low (i.e. no unacceptable risk).

Concentrations of copper, lead and zinc exceeded the respective environmental quality GAC in both upstream and downstream samples collected. From groundwater collected on site, lead was only found to exceed the environmental quality GAC from samples collected from WS13, with concentrations ranging from 1.5ug/l to 2.3ug/l. Within the surface water samples taken from the River Irwell, concentrations of lead ranged from 2.0ug/l to 2.9ug/l in the upstream sample and from 3ug/l to 2ug/l in the downstream sample suggesting that the concentration of lead downstream is not significantly increasing (if at all). Therefore, the concentration of lead identified on site when compared to the surface water samples suggests that lead sourced from site is not posing a significant risk (i.e. no unacceptable risk) to the River Irwell.

The M-BAT assessment tool on the Water Framework Directive UK TAG website (ref. http://www.wfduk.org/resources/rivers-lakesmetal-bioavailability-assessment-tool-m-bat, accessed on the 4th July 2024) has been used to calculate a site specific EQS for copper and zinc. The input parameters used for the M-BAT assessment are average values calculated from the upstream and downstream surface water samples for each surface water sampling round. For the first surface water sampling round, the average parameters were as follows pH 7.8, 6.89 mg/l DOC and 43.5 mg/l Ca. For the second surface water sampling round the parameters were as follows; pH 7.75, 7.41 mg/l DOC and 40.0 mg/l Ca. The calculated site specific EQS for copper during the first and second sampling round was 26.87ug/l and 29.94ug/l respectively. The calculated site specific EQS for zinc during the first and second sampling round was 34.56ug/l and 36.08ug/l respectively.

No exceedances of the lowest calculated site specific EQS for either zinc or copper have been detected in the groundwater or surface water samples. The risk to controlled waters from zinc and copper at the site is therefore assessed as low (i.e. no unacceptable risk).

7.5.6. Piling Risk

If piling or other deep foundation solution is selected for the proposed development then preferential pathways are unlikely to be formed between shallow soils and the Chester Formation aquifer. The Chester Formation is encountered at shallow depth beneath the site and soils in the thin unsaturated zone (including Made Ground) are typically granular. No cohesive layers which may be punctured by piling have been identified. It is considered that water, and potentially contamination (if present), can freely percolate towards the shallow groundwater table via the unsaturated zone in the absence of piling and installation of piles will not change this.

A FWRA for the Deansgate level is included as Section 8 and for other areas of the site as Section 9.

8. Foundation Works Risk Assessment for the Deansgate Level

8.1. Introduction

Section 8 presents a FWRA specifically for the contiguous pile wall to be constructed along the eastern boundary of the site from the Deansgate level. The FWRA has been informed by specific site investigation targeted at this area which is additional to what has been discussed in the earlier sections of this report.

The approximate location of the proposed contiguous pile wall is shown on Figure 8.1.

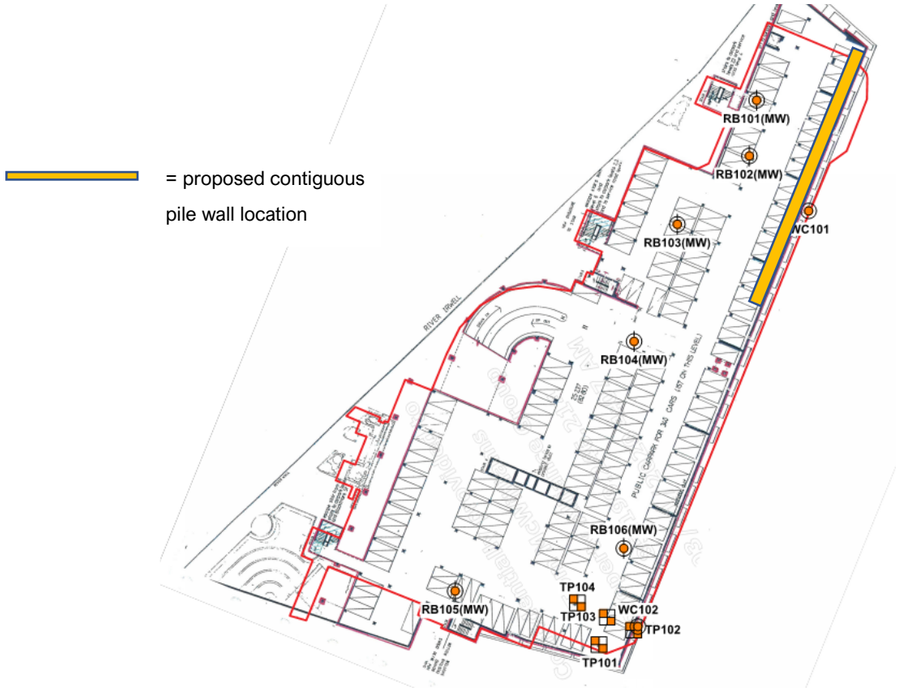


Figure 8.1 Approximate location of the proposed contiguous pile wall

The targeted site investigation to inform the FWRA for contiguous piling was undertaken by A2SI in December 2021. The A2SI Factual Report is included as Appendix C and therein refers to the works as ground investigation phase 1. Ground investigation phase 1 is summarised below and is described in detail in Appendix C. Ground investigation phase 1 is not relevant to other parts of the geo-environmental assessment for the proposed development.

Proposed pile wall drawings are included as Appendix H. In summary, piling for the wall will be undertaken from Deansgate road level along the eastern boundary of the site. Deansgate is at an elevated level compared to the site levels in this area. The piles will extend down from Deansgate level behind the existing gravity retaining wall along the eastern boundary of the site. The piles will extend past the current site ground level and terminate within the sandstone bedrock, likely below shallow groundwater level. On completion of piling, the existing retaining wall will be removed so that the new contiguous pile wall forms the operational boundary of the site. A summary of the proposed finished construction is shown in Figure 8.2.

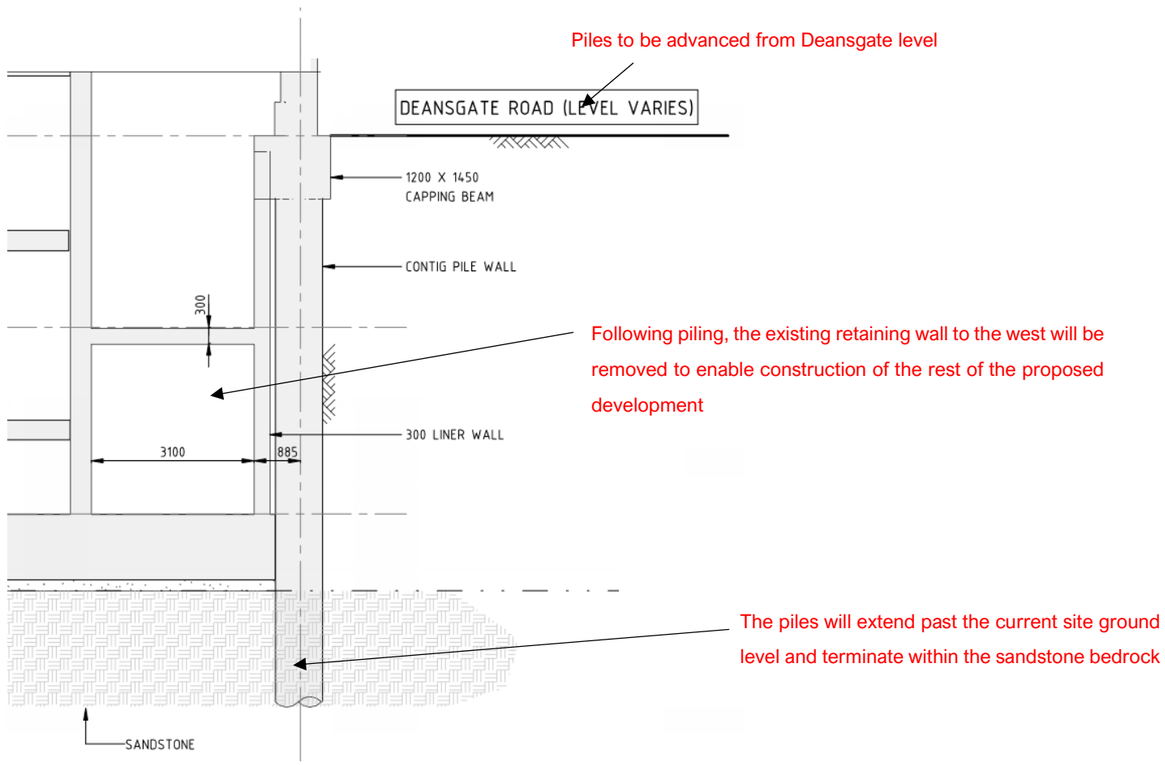


Figure 8.2 Summary contiguous pile wall details

8.2. Site Investigation Summary

In summary, the targeted site investigation to inform the Deansgate level FWRA for contiguous piling comprised the following:

- 5 no. window sampler holes to 6 mbgl (or earlier termination if impenetrable ground conditions encountered) (WS01-05);
- 1 no. deeper borehole location to approximately 10 mbgl (BH01);
- Logging of soils in accordance with *BS5930*;
- In-situ soil sample VOC head-space testing using a PID;
- Soil sampling for chemical laboratory analysis for speciated heavy metals, asbestos (quantified if encountered), speciated PAHs (EPA16), TPHCWG, phenolics and speciated VOCs. 7 no. soil samples were selected for each suite of analysis except the phenolics and VOCs suites for which 3 no. soil samples underwent analysis;
- Chemical laboratory analysis of soil leachate samples in accordance with *BS12457-1* (single stage 2:1 liquids / solids ratio) for speciated heavy metals and speciated PAHs (EPA16). 7 no. soil leachate samples were selected for each suite of analysis.
- Chemical laboratory analysis was undertaken at a laboratory accredited to *ISO17025* by UKAS.

The exploratory holes were advanced from Deansgate level from where the contiguous pile wall will be constructed. An exploratory hole plan is included in Appendix B along with other factual data from the investigation.

Where relevant, data from the E3P Phase 2 Assessment and A2SI ground investigation phase 2 has also been considered in the Deansgate level FWRA as well.

8.3. Ground Conditions

The ground conditions encountered during the recent A2SI ground investigation for the Deansgate level are summarised in Table 8.1.

Table 8.1 Summary ground conditions

Unit	Depth to Top of Stratum (mbgl)	Thickness (m)	Generalised Description
Made Ground	0.0 (Deansgate level)	1.7 – 2.8	Pavement slab over medium dense greyish brown slightly clayey silty gravelly fine to coarse SAND with occasional clay pockets. Gravel is typically angular to subangular, fine to coarse concrete, quartzite, concrete and brick.
Glaciofluvial Sheet Deposits (*only encountered at WS02*)	2.8	0.8	Firm to stiff reddish brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular of flint and quartzite.
Chester Formation	1.7 – 2.8	>8.0	Dense reddish brown poorly cemented fine to medium SAND. From 5.8 mbgl… Weak thinly to medium laminated reddish brown medium to coarse grained cemented SANDSTONE.

No groundwater inflows were encountered within the rotary borehole BH01. Due to the use of flush as part of the rotary drilling process, groundwater strikes/inflows could not be recorded for BH01. Based on the E3P Phase 2 Assessment and other ground investigation data available for the site, shallow groundwater is anticipated approximately 1.4 to 3.7 metres below wider site level (i.e. ground level at the base of the existing retaining wall).

Soil sample VOC head-space readings are all recorded as <0.1 part per million (ppm).

No visual or olfactory evidence of contamination was identified.

8.4. Generic Quantitative Risk Assessment

8.4.1. Human Health (Dermal Contact, Ingestion and Inhalation)

The soil sample laboratory analytical results have been compared to GAC appropriate for assessing risks to the specifically proposed development. The selected human health GAC include the LQM/CIEH S4ULs. The S4ULs are based on Health Criteria Values that represent minimal or tolerable levels of risks to health as described in the Environment Agency's SR2 guidance, ensuring that the resulting assessment criteria are 'suitable for use' under Planning.

For each chemical substance, S4ULs include individual GAC for 6 no. generic land-uses (residential with home grown produce, residential without home grown produce, allotments, commercial and 2no. public open space land uses) and a range of SOM contents. All toxicological and physical-chemical parameters used in the derivation of the S4ULs are presented and discussed in the source publication.

In some instances, selected human health GAC have been applied from the DEFRA C4SLs, CL:AIRE GAC, EA Soil Guideline Values and Atkins AtRisk Soil Screening Values. The source reference used for the human health GAC for each chemical determinant is presented in the screening tables included in Appendix I. DEFRA C4SLs have been used preferentially where available.

The human health GAC have been applied to each chemical determined for the 'residential with home grown produce' land-use scenario. In future, should the site redevelopment plans change from those considered herein then the geo-environmental risk assessments presented herein need to be reconsidered. The GAC for mercury assumes the presence of methyl mercury as a conservative worst-case assumption based on the site history.

There is no published human health GAC with respect to asbestos or ACMs in soil. Industry best practice document '*Asbestos in soil and made ground: a guide to understanding and managing risks', CIRIA C733, 2014*, identifies that soils containing asbestos concentrations of 0.001 % w/w may be able to liberate airborne fibre concentrations that exceed the contemporary occupational exposure limit for nuisance dust. However, as detailed in other research, including publications such as the *CAR-SOIL Industry Guidance (2016)*, in circumstances where very low concentrations of asbestos are identified in soils, the associated risks are considered low. In this study A-squared adopt an asbestos human health GAC of <0.001 % w/w i.e. mitigation or further assessment is required if asbestos in soil is detected at or above <0.001 % w/w.

Screening tables comparing the soil sample laboratory analytical results to the selected human health GAC are provided in Appendix I. All soil samples which underwent laboratory analysis for geo-environmental purposes were collected from Made Ground or the underlying natural soils. A single minor exceedance for beryllium is identified and this is considered further in Section 8.6 and Section 8.7.

8.4.2. Controlled Waters

Soil leachate laboratory analytical results have been compared to GAC appropriate for assessing controlled waters risks. Controlled waters GAC have been selected to assess risks to drinking water quality and the aquatic environment in surface waters.

The selected drinking water quality GAC are based on DWS published by the UK and EU, as well as GVs published by the WHO. The DWS and GVs are used as values indicative of low risk to drinking water quality and have been selected given the aquifer status of the sandstone bedrock beneath the site (Principal Aquifer).

The selected aquatic environment GAC are based on EQS published by the UK and EU, as well as operational targets published by the EA. The EQS and operational targets are used as values indicative of low risk to the aquatic surface water environment and have been selected given the location of the River Irwell immediately west of the site.

The soil leachate laboratory analytical results are presented in a screening table comparing the detected chemical concentrations to the selected controlled waters GAC in Appendix I. The identified exceedances of the selected controlled waters GAC are considered further in Section 8.6 and Section 8.7. For determinants not included in the laboratory leachate analysis, a qualitative assessment based on the detected bulk soil concentrations has been made.

8.5. Conceptual Site Model (CSM) for Piling from the Deansgate Level

A CSM has been developed for the purpose of assessing the potential risks to human health and controlled waters receptors as a direct result of the proposed piling works from the Deansgate level.

A potential pollutant linkage exists where the following three criteria are satisfied:

1.0 A potential source of contamination has been identified;

2.0 A receptor for the contamination is present; and

3.0 A viable pathway can be identified between a potential source and receptor.

Sources

The known sources considered relevant to this assessment are limited to shallow Made Ground where piling is to take place, including heavy metals and metalloids, PAHs and heavy TPHs based on the recent soil sampling undertaken. No source of VOCs has been identified in the area where piling is proposed for the contiguous pile wall.

Migration Pathways

Piling has the potential to create the following contaminant migration pathways:

- Creation of preferential pathways through an aquitard.
- Creation of preferential pathways through a low permeability surface layer.
- Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface.
- Direct contact of the piles or engineered structures with contaminated soil or leachate.
- The driving of solid contaminants down into the Chester Formation (Principal Aquifer) during pile driving.
- Contamination of groundwater and, subsequently, surface waters by wet concrete, cement paste or grout.

It is considered reasonable to assume that, following redevelopment, the area of the pile wall will be almost entirely covered in buildings or hardstanding with associated surface water drainage. This being the case it is considered reasonable to conclude that the potential for infiltration, mobilisation of theoretically leachable contaminants in Made Ground, and subsequent migration to groundwater can be discounted. Human exposure as part of the completed redevelopment via direct contact, ingestion and soil inhalation can also be discounted on this basis.

Key Receptors

The following controlled waters receptors and human health receptors have been identified (note that built structures and ecological receptors have not been considered within the scope of this assessment):

- Groundwater within the Chester Formation (Principal Aquifer). There is a groundwater abstraction point located approximately 65m north-west of the site licenced for "Other industrial/commercial/public services: general cooling (existing licenses only) (High Loss)";
- Surface water within the River Irwell 5 m west of the site. The river is classified by the EA to have a river quality of E (poor); and
- Site workers involved with the formation of the proposed pile walls.

Glaciofluvial Sheet Deposits (Secondary A Aquifer) are not considered a receptor as the ground investigation indicates there is not a coherent groundwater body associated with these deposits beneath the site. These deposits are also widely absent beneath the site and have only been recorded at WS02.

8.6. Foundation Works Risk Assessment and Mitigation Measures

This FWRA is restricted to an assessment of the issues associated with the potential use of piling techniques for the construction of a contiguous pile wall from the Deansgate level in the north-east of the site.

EA documents '*Piling into Contaminated Sites*' and '*Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention*' present guidance on the potential contamination risks that different piling techniques can have on groundwater and, additionally, the potential risks posed to human health.

The guidance presents six potential Source-Pathway-Receptor (S-P-R) linkages to be considered as part of a foundation risk assessment.

S-P-R Scenario 1: Creation of preferential pathways through an aquitard to allow potential contamination of an aquifer.

S-P-R Scenario 2: Creation of preferential pathways through a low permeability surface layer, allowing migration of ground gas, soil gas or contaminant vapours to the surface.

S-P-R Scenario 3: Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface.

S-P-R Scenario 4: Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials.

S-P-R Scenario 5: The driving of solid contaminants down into an aquifer during pile driving.

S-P-R Scenario 6: Contamination of groundwater and, subsequently, surface waters by wet concrete, cement paste or grout.

Consideration of each of these areas within the context of the provisional piling methods identified is discussed in Table 8.2. The provisional piling methods include continuous flight auger (CFA) piling or other rotary bored piling technique.

Table 8.2 Review of Piling Options against S-P-R Scenarios

S-P-R Scenarios	CFA Piling or Other Rotary Bored Piling Technique
Creation of preferential pathways through an aquitard to allow potential contamination of an aquifer.	The method of construction is likely to result in an intimate contact between the concrete of the pile and surrounding soils such that a preferential pathway is unlikely to be present post-construction. Short-term liquid migration risks are discounted given that shallow groundwater in the Made Ground or superficial deposits has not been identified. Groundwater is considered to be primarily present with the bedrock Principal Aquifer and the superficial deposits are not continuous across the site (they are typically not present and do not represent an aquitard).
Creation of preferential pathways through a low permeability surface layer, allowing migration of ground gas, soil gas or contaminant vapours to the surface.	Discounted given that there is no identified low permeability layer through which the proposed piles would penetrate.
Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface.	The soil sample chemical laboratory results from the ground investigation recently undertaken indicate generally low concentrations with respect to construction site health and safety. The risks can be appropriately managed by appropriate construction phase RAMS and CPP using typical methods. No asbestos has been detected in the available samples.
Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials.	Unlikely. Piles should be constructed from concrete with an appropriate Design Sulphate Class and ACEC Class.
The driving of solid contaminants down into an aquifer during pile driving.	Reduced potential due to non-displacement nature of piling (minimal requirement for driving of soils).
Contamination of groundwater and, subsequently, surface waters by wet concrete, cement paste or grout.	Increased potential due to proposed used of cast in-situ concrete for piles, pile caps and foundations.

As replacement (non-displacement) piling methods, CFA piles and rotary bored piles require the removal of soils to create a void which is then filled with concrete to form the piled foundation. Consequently, there is potentially a greater opportunity for the creation of contaminant pathways to be formed during the excavation process. Any pathways arising through this process should, however, be mitigated (at least in part) by the placement of the concrete to form the pile.

The use of wet cast in-situ concrete results in the placing of material with a positive lateral pressure being exerted on the sides of the pile bore. This prevents voids and pathways being created along the soil / concrete interface, and the irregular pile surface (in comparison to a driven pile) would mitigate against downward migration of contaminants.

In addition, the removal of soils during the process results in the potential for exposure of site workers to any contamination in excavated materials. Excavated soils (i.e. piling arisings) may require off-site disposal in accordance with current waste management legislation, although it may be possible to incorporate these materials into the wider landscaping works across the site via a Materials Management Plan operated under the Contaminated Land: Applications in Real Environments (CL:AIRE) initiative '*The Definition of Waste: Development Industry Code of Practice*'.

It is noted that shallow soils are predominantly heterogeneous granular Made Ground comprising demolition materials, over Chester Formation bedrock. These materials likely have relatively high permeability, and the installation of CFA or rotary bored piles is considered unlikely to significantly increase in the number of such pathways through the Made Ground. Theoretically, there may be preferential migration of perched water (delayed infiltration) to deeper groundwater, however such incremental risks are likely to be limited due to (almost entire) extent of hardstanding (and associated surface water drainage) that will be present on completion of the proposed development, and that the process of casting the piles will result in an intimate contact between such that a preferential pathway is not present.

A summary of the site-specific risks from CFA and rotary bored piles advanced from the Deansgate level is provided as Table 8.3.

Table 8.3 Summary of Risks from CFA and Rotary Bored Piles Advanced from Deansgate Level

S-P-R Scenarios	Risk Associated with Pile Design	Magnitude of Risk	Summary of Risk	Does Pile Design Sufficiently Mitigate Risk	Requirement for Alterative Pile Design
Creation of preferential pathways through an aquitard to allow potential contamination of an aquifer.	N	NA	No aquitard identified so creation of a preferential pathway not viable.	Y	N
Creation of preferential pathways through a low permeability surface layer, allowing migration of ground gas, soil gas or contaminant vapours to the surface.	N	NA	No low permeability surface layer identified so creation of a preferential pathway not viable.	Y	N
Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface.	Y	Low to moderate	The soil sample chemical laboratory results indicate typical mitigation measures which can be specified in the RAMS and CPP should be implemented during the construction phase.	Y	N (risk reduced by appropriate mitigation measures)
Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials.	Y	Low to moderate	Piles should be constructed from concrete with an appropriate Design Sulphate Class and ACEC Class to mitigate the risk.	Y	N (risk reduced by appropriate mitigation measures)
The driving of solid contaminants down into an aquifer during pile driving.	N	NA	Not viable given the proposed non-displacement piling technique.	Y	N
Contamination of groundwater and, subsequently, surface waters by wet concrete, cement paste or grout.	Y	Low	The risk is reduced since groundwater transmission through the Chester Formation will be via intergranular flow. The Chester Formation has been logged as a SANDSTONE without significant gravel bands or fractures / joints which would increase migration potential. The existing river wall further restricts the available pathways.	Y	N

In terms of the proposed piling options, CFA or rotary bored piles are unlikely to present a significant risk with the aforementioned mitigation in place.

During construction, any surplus materials excavated should suitably managed (either off-site disposal or incorporation into a suitable remediation strategy) to mitigate risks to future site users.

It is recommended that Quality Assurance (QA) and Quality Control (QC) measures are identified and adopted prior to piling and ground improvement works being undertaken. These are primarily for construction quality and structural performance; however, they are also equally relevant to mitigate environmental risk, for example ensuring that any material imported to site for use as a piling mat is not contaminated and so does not add to the contaminant burden on site. The relevant measures should ensure that the foundation solution techniques are carried out correctly and in an appropriate manner so that the risk assessment and conclusions remains valid.

CL:AIRE Definition of Waste: Development Industry Code of Practice may be used in support of attempts to de-classify excavated materials as 'waste' if they can be sustainably re-used. Should materials require, however, off-site disposal, the developer has a statutory responsibility to ensure that contaminated soil and water is disposed of off-site to a suitably licensed waste management facility in a safe and approved manner. If any soil arisings produced by the piling are to be disposed of to landfill then the available site instigation information from the areas where such arisings are anticipated to be produced should be provided to the landfill in advance of the works to assist in ensuring the appropriate characterisation of waste streams. Waste Acceptance Criteria (WAC) testing would be required to determine the limit values for waste destined to various classes of landfill.

All wastes taken off site, in solid or liquid form, must be handled by a registered waste carrier and be accompanied by an appropriate waste transfer note or consignment note which describes the waste.

9. Foundation Works Risk Assessment – Excluding Deansgate Level

9.1. Introduction

Section 9 presents a FWRA for the proposed development at the application boundary. The FWRA has been informed by the E3P ground investigation and A2SI ground investigation phase 2.

Piles proposed for the site will extend through shallow soils and terminate below shallow groundwater level in the Chester Formation.

Please be aware that this FWRA excludes the contiguous pile wall which may be constructed along the eastern boundary of the site from the Deansgate level. A specific FWRA for the Deansgate level is presented in Section 8.

9.2. Conceptual Site Model (CSM) for Piling

A CSM has been developed for the purpose of assessing the potential risks to human health and controlled waters receptors as a direct result of the proposed piling works.

A potential pollutant linkage exists where the following three criteria are satisfied:

1.0 A potential source of contamination has been identified;

2.0 A receptor for the contamination is present; and

3.0 A viable pathway can be identified between a potential source and receptor.

Sources

The known sources considered relevant to this assessment are limited to shallow Made Ground where piling is to take place, including heavy metals and metalloids, PAHs, heavy TPHs and VOCs based on the recent soil sampling undertaken.

Migration Pathways

Piling has the potential to create the following contaminant migration pathways:

- Creation of preferential pathways through an aquitard.
- Creation of preferential pathways through a low permeability surface layer.
- Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface.
- Direct contact of the piles or engineered structures with contaminated soil or leachate.
- The driving of solid contaminants down into the Chester Formation (Principal Aquifer) during pile driving.
- Contamination of groundwater and, subsequently, surface waters by wet concrete, cement paste or grout.

Following redevelopment, the areas to be piled will be almost entirely covered in buildings or hardstanding with associated surface water drainage. This being the case it is considered reasonable to conclude that the potential for infiltration, mobilisation of theoretically leachable contaminants in Made Ground, and subsequent migration to groundwater can be discounted. Human exposure as part of the completed redevelopment via direct contact, ingestion and soil inhalation can also be discounted on this basis that the limited areas of proposed soft-landscaping will have a clean capping layer constructed at the ground surface.

Key Receptors

The following controlled waters receptors and human health receptors have been identified (note that built structures and ecological receptors have not been considered within the scope of this assessment):

- Groundwater within the Chester Formation (Principal Aquifer). There is a groundwater abstraction point located approximately 65m north-west of the site licenced for “Other industrial/commercial/public services: general cooling (existing licenses only) (High Loss)”;
- Surface water within the River Irwell 5 m west of the site. The river is classified by the EA to have a river quality of E (poor); and
- Site workers involved with the formation of the proposed pile walls.

Glaciofluvial Sheet Deposits (Secondary A Aquifer) are not considered a receptor as the ground investigation indicates there is not a coherent groundwater body associated with these deposits beneath the site. These deposits are also widely absent beneath the site and have only been recorded at WS09A.

9.3. Foundation Works Risk Assessment and Mitigation Measures

EA documents ‘*Piling into Contaminated Sites*’ and ‘*Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention*’ present guidance on the potential contamination risks that different piling techniques can have on groundwater and, additionally, the potential risks posed to human health.

The guidance presents six potential Source-Pathway-Receptor (S-P-R) linkages to be considered as part of a foundation risk assessment.

S-P-R Scenario 1: Creation of preferential pathways through an aquitard to allow potential contamination of an aquifer.

S-P-R Scenario 2: Creation of preferential pathways through a low permeability surface layer, allowing migration of ground gas, soil gas or contaminant vapours to the surface.

S-P-R Scenario 3: Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface.

S-P-R Scenario 4: Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials.

S-P-R Scenario 5: The driving of solid contaminants down into an aquifer during pile driving.

S-P-R Scenario 6: Contamination of groundwater and, subsequently, surface waters by wet concrete, cement paste or grout.

Consideration of each of these areas within the context of the provisional piling methods identified is discussed in Table 9.1. The provisional piling methods include CFA piling or other rotary bored piling technique.

Table 9.1 Review of Piling Options against S-P-R Scenarios

S-P-R Scenarios	CFA Piling or Other Rotary Bored Piling Technique
Creation of preferential pathways through an aquitard to allow potential contamination of an aquifer.	The Chester Formation is encountered at shallow depth beneath the site and soils in the thin unsaturated zone (including Made Ground) are typically granular. No cohesive layers which may be punctured by piling have been identified. It is considered that water, and potentially contamination, can freely percolate towards the shallow groundwater table via the unsaturated zone in the absence of piling. Installation of piles will not change this. The method of construction is likely to result in an intimate contact between the concrete of the pile and surrounding soils such that a preferential pathway is unlikely to be present post-construction.
Creation of preferential pathways through a low permeability surface layer, allowing migration of ground gas, soil gas or contaminant vapours to the surface.	Discounted given that there is no identified low permeability layer through which the proposed piles would penetrate.
Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface.	The soil sample chemical laboratory results from the ground investigation recently undertaken indicate generally low concentrations with respect to construction site health and safety. The risks can be appropriately managed by appropriate construction phase RAMS and construction phase plan CPP using typical methods. The asbestos

S-P-R Scenarios	CFA Piling or Other Rotary Bored Piling Technique
	identified at TP104 should be considered in the preparation of the RAMS and CPP although it is understood that piling is unlikely to be required in this area.
Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials.	Unlikely. Piles should be constructed from concrete with an appropriate Design Sulphate Class and ACEC Class.
The driving of solid contaminants down into an aquifer during pile driving.	Reduced potential due to non-displacement nature of piling (minimal requirement for driving of soils).
Contamination of groundwater and, subsequently, surface waters by wet concrete, cement paste or grout.	Increased potential due to proposed used of cast in-situ concrete for piles, pile caps and foundations.

As replacement (non-displacement) piling methods, CFA piles and rotary bored piles require the removal of soils to create a void which is then filled with concrete to form the piled foundation. Consequently, there is potentially a greater opportunity for the creation of contaminant pathways to be formed during the excavation process. Any pathways arising through this process should, however, be mitigated (at least in part) by the placement of the concrete to form the pile.

The use of wet cast in-situ concrete results in the placing of material with a positive lateral pressure being exerted on the sides of the pile bore. This prevents voids and pathways being created along the soil / concrete interface, and the irregular pile surface (in comparison to a driven pile) would mitigate against downward migration of contaminants.

In addition, the removal of soils during the process results in the potential for exposure of site workers to any contamination in excavated materials. Excavated soils (i.e. piling arisings) may require off-site disposal in accordance with current waste management legislation, although it may be possible to incorporate these materials into the wider landscaping works across the site via a Materials Management Plan operated under the CL:AIRE initiative '*The Definition of Waste: Development Industry Code of Practice*'.

It is noted that shallow soils are predominantly heterogeneous granular Made Ground comprising demolition materials, over Chester Formation bedrock. These materials likely have relatively high permeability, and the installation of CFA or rotary bored piles is considered unlikely to significantly increase in the number of such pathways through the Made Ground. Theoretically, there may be preferential migration of perched water (delayed infiltration) to deeper groundwater, however such incremental risks are likely to be limited due to (almost entire) extent of hardstanding (and associated surface water drainage) that will be present on completion of the proposed development, and that the process of casting the piles will result in an intimate contact between such that a preferential pathway is not present.

A summary of the site-specific risks from CFA and rotary bored piles is provided as Table 9.2.

Table 9.2 Summary of Risks from CFA and Rotary Bored Piles

S-P-R Scenarios	Risk Associated with Pile Design	Magnitude of Risk	Summary of Risk	Does Pile Design Sufficiently Mitigate Risk	Requirement for Alterative Pile Design
Creation of preferential pathways through an aquitard to allow potential contamination of an aquifer.	N	NA	No aquitard identified so creation of a preferential pathway not viable.	Y	N
Creation of preferential pathways through a low permeability surface layer, allowing migration of ground gas, soil gas or contaminant vapours to the surface.	N	NA	No low permeability surface layer identified so creation of a preferential pathway not viable.	Y	N
Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface.	Y	Low to moderate	The soil sample chemical laboratory results indicate typical mitigation measures which can be specified in the RAMS and CPP should be implemented during the construction phase. The asbestos identified at TP104 should be considered in the preparation of the RAMS and CPP although it is understood that piling is unlikely to be required in this area.	Y	N (risk reduced by appropriate mitigation measures)
Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials.	Y	Low to moderate	Piles should be constructed from concrete with an appropriate Design Sulphate Class and ACEC Class to mitigate the risk.	Y	N (risk reduced by appropriate mitigation measures)
The driving of solid contaminants down into an aquifer during pile driving.	N	NA	Not viable given the proposed non-displacement piling technique.	Y	N
Contamination of groundwater and, subsequently, surface waters by wet concrete, cement paste or grout.	Y	Low	The risk is reduced since groundwater transmission through the Chester Formation will be via intergranular flow. The Chester Formation has been logged as a SANDSTONE without significant gravel bands or fractures / joints which would increase migration potential. The existing river wall further restricts the available pathways.	Y	N

In terms of the proposed piling options, CFA or rotary bored piles are unlikely to present a significant risk with the aforementioned mitigation in place.

During construction, any surplus materials excavated should suitably managed (either off-site disposal or incorporation into a suitable remediation strategy) to mitigate risks to future site users.

It is recommended that QA and QC measures are identified and adopted prior to piling and ground improvement works being undertaken. These are primarily for construction quality and structural performance; however, they are also equally relevant to mitigate environmental risk, for example ensuring that any material imported to site for use as a piling mat is not contaminated and so does not add to the contaminant burden on site. The relevant measures should ensure that the foundation solution techniques are carried out correctly and in an appropriate manner so that the risk assessment and conclusions remains valid.

CL:AIRE Definition of Waste: Development Industry Code of Practice may be used in support of attempts to de-classify excavated materials as 'waste' if they can be sustainably re-used. Should materials require, however, off-site disposal, the developer has a statutory responsibility to ensure that contaminated soil and water is disposed of off-site to a suitably licensed waste management facility in a safe and approved manner. If any soil arisings produced by the piling are to be disposed of to landfill then the available site instigation

information from the areas where such arisings are anticipated to be produced should be provided to the landfill in advance of the works to assist in ensuring the appropriate characterisation of waste streams. WAC testing would be required to determine the limit values for waste destined to various classes of landfill.

All wastes taken off site, in solid or liquid form, must be handled by a registered waste carrier and be accompanied by an appropriate waste transfer note or consignment note which describes the waste.

10. Updated Conceptual Site Model and Risk Assessment Summary

Table 10.1 updates the E3P GQRA (see summary in Section 3.5) based on the ground investigation results and supplementary assessments presented herein. No ground conditions were encountered which required an update to the PRA prior to undertaking the quantitative risk assessments. The risk assessment matrix used in preparing Table 10.1 is provided as Appendix E.

Please be aware that Table 10.1 relates to the wider site boundary (see Figure 1.1) including the application boundary. The site boundary extends beyond the application boundary. Therefore, the below recommendations for an oversized clean service corridor in respect to asbestos impacted Made Ground around TP104 is not required for the application boundary area.

Risks to site workers and the environment during the construction phase of the proposed redevelopment can be appropriately managed by successful implementation of construction phase RAMS. The associated construction phase risks from potential contamination are not considered further in this document but should be appropriately considered and mitigated by the Principal Contractor in their preparation and implementation of construction phase RAMS and CPP. The Principal Contractor should be made aware that asbestos has been identified in Made Ground at TP104.

Table 10.1 Updated Risk Assessment Summary

Potential Site Contaminant Sources	Potential Pathways	Potential Receptors	Potential for Complete Pathway	Risk Level Classification
On-site	Direct contact with soil	Proposed site end users	Yes (unacceptable risk is present in areas of proposed soft-landscaping and if new underground services are installed in the vicinity of TP104 where asbestos has been identified in Made Ground) (**Remediation Strategy required**)	Low to moderate †
	Inhalation of windblown soil			Low to moderate †
	Ingestion of soil			Low to moderate †
	Impact to water supply pipes followed by ingestion of contaminated water supply		Yes (there are likely no restrictions on the new water supply pipe construction which can be safely installed, although the final specification of water supply pipe to be installed should be agreed with the utility provider)	Low
	Ground gas generation and inhalation		Yes (no unacceptable risk identified following GQRA)	Low
	Soil vapour generation and inhalation		Yes (unacceptable risk has been identified for the residential development in the north of the site due to dissolved phase VOCs detected in shallow groundwater, although the potential for this to be from an off-site source should be noted) (**Remediation Strategy required**)	Low to moderate †
	Inhalation of windblown soil from the site	Off-site human health receptors	Yes (the limited areas of soft-landscaping proposed will not liberate notable volumes of windblown dust / soil)	Low
	Off-site migration and direct contact with impacted soil		Yes (no open ground is located nearby which is likely to be impacted at shallow depth by contamination sourced from the site)	Low
	Off-site migration and ingestion of impacted soil			Low

Potential Site Contaminant Sources	Potential Pathways	Potential Receptors	Potential for Complete Pathway	Risk Level Classification
	Impact to water supply pipes followed by ingestion of contaminated water supply	On-site buildings and below ground structures (proposed)	Yes (no contamination has been identified in a form which will continue migrating through the unsaturated zone at shallow depth on completion of the proposed development)	Low
	Ground gas generation, off-site migration and inhalation		Yes (no unacceptable risk identified following GQRA)	Low
	Soil vapour generation, off-site migration and inhalation		Yes (the relatively mild vapour impacts to shallow groundwater do not indicate an unacceptable risk to off-site human health)	Low
	Direct contact		Yes (geotechnical assessment falls outside the scope of this report)	Low (*assuming an appropriate sulphate design class is suitably implemented*)
	Migration followed by ignition of ground gas		Yes (no unacceptable risk identified following GQRA)	Low
	Migration followed by ignition of soil vapour		Yes (the soil vapours identified beneath the site have low flashpoint values)	Low
	Off-site migration followed by direct contact		Yes (no gross contamination has been identified with the potential to migrate off-site and damage structures by direct contact)	Very low
	Off-site migration followed by migration followed by ignition of ground gas	Off-site buildings and below ground structures	Yes (no unacceptable risk identified following GQRA)	Low
	Off-site migration followed by migration followed by ignition of soil vapour		Yes (the soil vapours identified beneath the site have low flashpoint values)	Low
	Leaching and migration to groundwater via the unsaturated zone; Perched water percolation or lateral migration; Migration via advection and diffusion in the saturated zone; Vertical and lateral migration of free-phase product in the unsaturated and saturated zones; and Preferential pathways created by piling.	Controlled waters – Underlying bedrock Principal Aquifer (Chester Formation)	Yes (no unacceptable risk identified following GQRA) (FWRA included herein)	Low
		Controlled waters – Surface waters (River Irwell)	Yes (no unacceptable risk identified following GQRA) (FWRA included herein)	Low
Off-site	On-site migration followed by direct contact or ingestion of soil	Proposed site end users	Yes (the identified asbestos contamination is due to an on-site source and no other contamination in the unsaturated zone	Low

Potential Site Contaminant Sources	Potential Pathways	Potential Receptors	Potential for Complete Pathway	Risk Level Classification
			has been identified exceeding the selected human health GACs)	
	Inhalation of windblown soil from off-site		Yes (no notable potential sources of contaminated windblown soil / dust have been identified in the vicinity of the site)	Very low
	On-site migration followed by impact to water supply pipes and ingestion of the water supply		Yes (there are likely no restrictions on the new water supply pipe construction which can be safely installed, although the final specification of water supply pipe to be installed should be agreed with the utility provider)	Low
	Ground gas generation, on-site migration and inhalation		No (the E3P Desk Study identifies no potential off-site sources of ground gas)	Low
	Soil vapour generation, on-site migration and inhalation		Yes (unacceptable risk has been identified for the residential development in the north of the site due to dissolved phase VOCs detected in shallow groundwater) (**Remediation Strategy required**)	Low to moderate †
	On-site migration followed by direct contact	On-site buildings and below ground structures (proposed)	Yes (no gross contamination has been identified with the potential to damage structures by direct contact)	Very low
	On-site migration followed by ignition of ground gas		No (the E3P Desk Study identifies no potential off-site sources of ground gas)	Low
	On-site migration followed by ignition of soil vapour		Yes (the soil vapours identified beneath the site have low flashpoint values)	Low

† - unacceptable risk (ref. *LCRM*)

In summary, the GQRA presented in this report shows that there may be unacceptable risk to proposed on-site human health in soft-landscaping areas and due to the potential for vapour inhalation at the residential scheme. A suitable Remediation Strategy is required to mitigate the risk. The Remediation Strategy should also include appropriate verification protocols. The proposed Remediation Strategy should be formulated specifically for the application boundary.

New water supply pipe construction should be agreed with the utility provider.

Piling can proceed in accordance with the FWRA included herein.

The risks to maintenance workers during the operational phase of the proposed development can be managed by preparing a site operational Health & Safety File. This Supplementary Geo-environmental Assessment Report should be made available to those preparing the Health & Safety File.

11. Closing Remarks

In summary, the GQRA presented in this report shows that there may be unacceptable risk to proposed on-site human health in soft-landscaping areas and due to the potential for vapour inhalation at the residential scheme. A suitable Remediation Strategy is required to mitigate the risk. Outline recommendations for the remediation include installation of a clean cover layer in soft landscaping areas and installation of soil vapour protection for relevant areas of the residential scheme proposed in the north of the site. Other recommendations include:

- Where soft-landscaping is to be constructed at a raised level (e.g. suspended deck), soils imported to these areas should be verified.
- Oversized clean service corridors should be installed if underground services are to be laid through the identified asbestos impacted soils at TP104.
- Unexpected contamination protocols should be implemented.
- New water supply pipe construction should be agreed with the utility provider.
- Piling can proceed in accordance with the FWRA included herein.

The outline recommendations for remediation are in relation to the site boundary but the proposed Remediation Strategy should be formulated specifically for the application boundary.

Risks to site workers and the environment during the construction phase of the proposed redevelopment can be appropriately managed by successful implementation of construction phase RAMS. The associated construction phase risks from potential contamination should be appropriately considered and mitigated by the Principal Contractor in their preparation and implementation of construction phase RAMS and CPP. The Principal Contractor should be made aware that asbestos has been identified in Made Ground at TP104.

The risks to maintenance workers during the operational phase of the proposed development can be managed by preparing a site operational Health & Safety File. This Supplementary Geo-environmental Assessment Report should be made available to those preparing the Health & Safety File.

Should any changes be made to the proposed development compared to the details presented herein, or should any added information become available, then the assessments included in this Supplementary Geo-environmental Assessment Report must be updated.

The recommendations presented herein can be implemented for the proposed development following acceptance of this report by the Local Planning Authority.

Appendix A: E3P (2021) Phase II Geoenvironmental Site Assessment

Phase II Geoenvironmental Site Assessment
Renaissance, Manchester

Reference:14-261-R2-1
Date: 21st May 2021

PHASE II GEOENVIRONMENTAL SITE ASSESSMENT

Renaissance
Deansgate
Manchester
M3 2FE

Prepared for:
Property Alliance Group Ltd

ALLIANCE

Report Ref: 14-261-R2-1
Date Issued: 21st May 2021

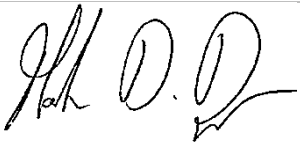
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QUALITY ASSURANCE

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VERSION	Version 1		
REMARKS	Issue 1		
DATE	21st May 2021		
PREPARED BY	N Sellars		
QUALIFICATIONS	MSci (Hons), FGS		
SIGNATURE			
CHECKED BY	S Ellis		
QUALIFICATIONS	BSc (Hons), FGS, CEnv		
SIGNATURE			
AUTHORISED BY	M. Dyer		
QUALIFICATIONS	BSc (Hons), FGS, AIEMA, MIEnvSc, CEnv		
SIGNATURE			

ISO 9001 (2015)
ISO 14001 (2015)
ISO 45001 (2018)
Cert No 18890

EXECUTIVE SUMMARY

Site Address	Land to the west of Deansgate, Manchester, M3 2FE	
Grid Reference	E383745, N398616	
Site Area	0.53 Hectares	
Proposed Development	E3P understands that the proposed development will comprise offices and residential apartments with associated car parking.	
Current Site Use	The subject site currently has several land uses; the Renaissance Hotel, Premier House, Doms Tavola Calda restaurant and an NCP car park. The site comprises a multi-storey building of varying heights with a lower level car park. Externally to the building, there are areas of hardstanding used for walkways and entrance and exit roads for the lower level multi-storey car park. There are retaining walls at the bottom level of the car park.	
Site History	The site has been developed since pre 1848. Historic town plans from 1850-1851 show a Copper Roller Works and a Cotton Finishing Works in the centre of the site and a Wind Turning Mill in the south, with a section of the Water Side Mill in the south west. The historic town plan from 1891 shows an old quarry in the centre of the site. A hotel was recorded in the north of the site pre 1891, with other unspecified buildings recorded across the footprint. From 1908 a building named the Temperance Hotel was in the centre of the site until 1948 until it was named as a ruin which may indicate bomb damage. An access road named Grosvenor Avenue was also present from 1948 along the west of the buildings. From 1973 a larger hotel building and a car park are recorded as present. The site has remained relatively unchanged since 1973.	
Environmental Setting	**Drift Geology**	Glaciofluvial Sheet Deposits (Devensian) – Sand and Gravel.
	Bedrock Geology	Chester Formation – Sandstone.
	Faults	No faults are mapped on site.
	Hydrogeology	Secondary A aquifer strata (drift geology) overlying a principal aquifer (bedrock geology).
	Hydrology	The River Irwell is located 5 m west of the site and forms the western boundary. The river is classified by the EA to have a river quality of E (poor).
	Flood Risk	The site is located within Flood Risk Zone 1 and is considered unaffected by river flooding.
Previous Reports	The following previous reports have been completed for the site: - E3P – Phase I Geoenvironmental Report (Ref: 14261-R1-1, September 2020). The E3P Phase I Report should be read in conjunction with this report.	
Utility Locations	Overflow sewers (culverts) are present in the south-west corner and adjacent to the north. A low-pressure gas main is located through the centre of the site, in the basement. LV and 6 to 6.6 kV electricity cables and BT connections are also present.	
Landfill Sites and Ground Gases	There are no BGS recorded landfill sites located within 500 m of the site boundary. There were also no historical landfill sites located within 500 m of the site.	

Radon	Unaffected – no special precautions required.
Coal Mining/Land Stability	The site is not situated within a development high risk area. There are no mine entries recorded within 500 m of the site boundary. There are also no past shallow coal mine workings or probable shallow coal mine workings or coal outcrops within 500 m of the site boundary.
Brine Workings	The site is not located within an area deemed to be at risk from ground instability arising from historic brine pumping activities and/or salt extraction
Hazardous Installations	No hazardous installations that could potentially prejudice the proposed construction of highly sensitive residential dwellings have been identified within influencing distance of the subject site.

GROUND INVESTIGATION

Ground Investigation Works	E3P has completed an intrusive ground investigation comprising: - 4 x mechanically excavated trial pits - 2 x wall cores, - 6 x rotary boreholes - Construction of environmental monitoring installations.
Ground Conditions	**Made Ground – 0.00 m bgl to 1.50 m bgl** Made Ground deposits were encountered within all exploratory hole locations to a maximum proven depth of 1.50 m bgl. Made Ground deposits generally comprise concrete to circa 0.35 m bgl underlain by grey sandy gravel of limestone (Type 1 MOT). In addition, RBH102 identified a brick wall between 0.70 m and 1.50 m bgl. RBH104 identified a brick wall between 0.35 m and 0.80 m bgl. The full depth is not proven due to the limitations of the scope and access. TP101–TP104 identified concrete with a rubber membrane, over brown gravelly fine to medium sand with concrete and brick to 0.70 m bgl. There is the potential for deep Made Ground to be present in the location of the former quarry.
	DRIFT Drift deposits were not encountered during the ground investigation. There is the potential for drift deposits to be present in areas that have not been investigated to date.
	SOLID – 0.35 m bgl to >10.00 m bgl The solid bedrock geology was encountered between 0.45 m and 10.00 m bgl. The solid geology comprises dense to very dense SANDSTONE. The bedrock will be weathered and the actual depth can only be profiled after the post demolition ground investigation. Weathered sandstone bedrock was encountered as reddish brown medium SAND between 0.35 m and 1.50 m bgl in RBH101 and between 0.70 m and 0.80 m bgl in TP101, TP103 and TP104. A former quarry is present in the centre of the site, therefore there is the potential for notable changes in the depth of bedrock.

Ground Conditions	**GROUNDWATER –** Groundwater strikes were not encountered during the ground investigation. Subsequent monitoring recorded groundwater between 1.40 m and 3.68 m bgl.
Foundation Pits	TP101, TP103 and TP104 identified the foundation slab within the SANDSTONE from 700 mm, the full depth was not determined. TP102 identified the foundation slab from 400 mm to 700 m within the Made Ground.
Rotary Core into Retaining Walls	WC101 went through 300 mm of the brick wall and then a service void to 1.30 m bgl and then 200 mm into the concrete retaining wall. The core could not penetrate the water membrane within the concrete retaining wall. WC102 was cored through a service void and then 200 mm into the concrete retaining wall. The core could not penetrate the water membrane within the concrete retaining wall.

CONTAMINATED LAND ASSESSMENT

Human Health	The Tier I assessment identified a single exceedance for asbestos. Loose chrysotile fibres were identified in the granular Made Ground in TP104 at <0.001 %. No visual signs of ACM were encountered during the ground investigation and it is, therefore, likely that only trace fibres are present. Impacted soils should be managed according to the asbestos risk mitigation conceptual site model. The installation of a suitable cover system in all landscaping and public open space will remove any potential for direct exposure to impacted soils. The specific design and installation process for the appropriate cover systems should be defined within a site remediation and enabling works strategy. Chemical analysis of the natural granular deposits has identified these soils to be acceptable for use as subsoil within the proposed landscaped areas; however, further chemical validation samples will be required to confirm this. There are no suitable sources of topsoil available on the site. Further post-demolition investigations are required to confirm the findings of this initial assessment as and when full and unrestricted access is available.

Controlled Waters	Leachate and groundwater analysis has identified exceedances of the EQS for chromium, copper, mercury, tricholomethane and pH. Historically, the site has been occupied by a Cotton Finishing Works, Copper Roller Works and Mills which are potential sources of mobile contamination. However, the initial soil analysis has not identified a risk to controlled waters. The site is underlain by shallow sandstone bedrock which is classified as a principal aquifer. However, the majority of the identified inorganic compounds are of low solubility. The sensitivity of the principal aquifer in the bedrock is reduced given the closest potable groundwater abstraction is located 507 m north. Tricholormethane has been recorded above the limit of detection in all three groundwater samples from the rotary boreholes which have monitoring wells set within the sandstone bedrock. All other VOCs are less than the limit of detection. It is unlikely that this relates to residual contamination from the former works and mills located on site as these land uses were historical and the compounds would have degraged. It is considered possible that this compound may have migrated from commercial sites further afield. The site is topographically lower than the land to the east, therefore it is likely that groundwater will flow towards the site and towards the River Irwell. The results of the groundwater analysis indicate a higher concentration of trichloromethane at RBH101 in the north east as opposed to RBH105 located in the south west. An additional round of groundwater sampling and surface water analysis is recommended to further assess the risk to controlled waters. The results will be issued in an addendum report.
Ground Gas	Ground gas monitoring thus far has indicated the site would be classed as Characteristic Situation 1, suggesting no gas protection measures will be required. However, the final ground gas regime will be confirmed following the completion of the ground gas monitoring programme.
Potable Water Infrastructure	This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation. Current indications suggest that PE pipe will be suitable.

GEOTECHNICAL ASSESSMENT

Underground Obstructions	Significant concrete and brick obstructions have been encountered within the Made Ground, indicative of relict foundations from the former buildings. A culvert is located in the south-west corner of the site and significant obstructions will be present beneath the existing buildings. An infilled quarry is also located in the centre of the site. During a phase of cut-and-fill enabling works to create the development platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.
Allowable Bearing Pressure	The natural SAND (weathered bedrock) has been assessed as being very dense with a net allowable bearing pressure (ABP) in the order of 504 kN/m^2 at circa 1 m bgl. The underlying SANDSTONE has a net ABP of 403-505 kN/m^2 between 1.00 m and 9.00 m bgl. Due to the highly fractured nature of the bedrock only one Unconfined Compressive Strength (UCS) test could be undertaken from the core recovered.

Allowable Bearing Pressure	The results indicate that at a depth of between 6.63—6.98 m bgl the sandstone recorded a strength of 3.3 (MPa) which equates to 3300 kN/m².
Foundation Options	Given the significant obstructions, prior to the construction of any foundation solution, a programme of remediation and enabling works will be required to remove existing foundation and slab structures and re-engineer the site to provide suitable development platform levels. The Made Ground is not considered a suitable target founding stratum. In respect of the proposed development, E3P consider it feasible to construct the proposed residential apartment blocks utilising piled foundations set within the underlying sandstone bedrock. The final foundation solution will be dependent on the structural loadings, elevation and should be designed by a suitably qualified structural engineer with detailed designs from a specialist piling contractor. Post demolition boreholes are required to further inform the foundation and sub-structure design.
Building Floor Slabs	A ground-bearing slab will be viable; however, it will need to be constructed utilising a sub-base with the thickness designed by a structural engineer to ensure that settlement tolerances are taken into consideration.
Heave Precautions	The site is underlain by granular soils, therefore heave precautions are not required.
Soakaway Drainage	The presence of substantial depths of Made Ground across the site may result in settlement. It is therefore recommended that drain runs are designed using steeper gradients and flexible joints to allow for some differential settlement. The presence of deep Made Ground across the site will preclude the use of soakaway drainage. If soakaway drainage is to be considered, full BRE365 testing must be completed to inform the detailed design.
Sulphate Assessment	Concrete classification will be DS1 AC1s.
CBR Design %	Granular soils can be re-engineered to ensure 5% within the subgrade during favourable climatic conditions.
Cut/Fill	Development levels unknown at this time; however, an element of cut-and-fill works will be required to prepare the development platform.
Civil Engineering Excavations	The E3P Intrusive Ground Investigation has identified the presence of weathered/competent bedrock at a shallow depth, the presence of which will impede the excavation materials to form sewerage and drainage infrastructure and foundations. A former quarry is present in the centre of the site, therefore there is the potential for notable changes in the depth of bedrock. Due to the depth and variability of the Made Ground and the likelihood of trench collapse, it is considered that all excavations are supported or battered back in accordance with the guidance contained in CIRIA R97. Furthermore, the site is topographically lower than the adjacent roadways, consideration must be given to retaining being constructed or current wall adapted to ensure the stability of the soils around the periphery of the site.

Waste Characterisation	Any material that is to be disposed off-site should undergo assessment using Technical Guidance WM3: *Waste Classification – Guidance on the classification and assessment of waste*. Samples of the Made Ground in TP101 at 0.65 m and TP103 at 0.45 m were compared to the Waste Acceptance Criteria. The WAC analysis suggests that the soils would be classified as stable non-reactive.

RECOMMENDATIONS

Based on the findings of the geoenvironmental site assessment, the following additional works are recommended to be completed in due course:

- Further investigation of inaccessible areas and extensive post demolition ground investigation.
- An additional round of groundwater and surface water analysis.
- Further geotechnical testing to determine the settlement characteristics for ground bearing floor slab (upon completion of the reduced level dig) and pavement design.
- Foundations to be designed by suitably qualified Structural Engineer.
- Geotechnical earthworks strategy (infrastructure).
- Remediation and enabling works strategy.
- Construction phase Surface Water Management Plan.

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14-261-005 - Exploratory Hole Location Plan
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14-261-008 - Depth to Founding Strata Plan
14-261-010 - Conceptual Site Model
14-261-012 - Depth to Bedrock Plan
14-261-018 - Contamination Issues Plan-Human Health
14-261-019 - Contamination Issues Plan-Controlled Waters
14-261-023 - Foundation Pit Details
14-261-025 - Wall Core Details

1. INTRODUCTION

1.1. BACKGROUND

E3P has been commissioned by Property Alliance Group to undertake a detailed Phase II Geoenvironmental Site Assessment for a parcel of land at Renaissance, Deansgate, Manchester.

This report is required to determine potential contaminated land liabilities, remediation requirements and geotechnical engineering works that will be required as part of the proposed development for a proposed low-rise residential development.

1.2. PROPOSED DEVELOPMENT

E3P understands that the proposed development will comprise offices and residential apartments with associated car parking.

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 geoenvironmental assessment are as follows:

- Review historical plans, geology, hydrogeology, site sensitivity, floodplain issues, mining records and any local authority information available in order to complete a desk study in line with Environment Agency (EA) document *Land Contamination:Risk Management (LCRM) (2019).*
- Undertake a preliminary stage of sampling and analysis to provide an overview of environmental issues identified.
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors.
- Assess the geotechnical information and provide preliminary recommendations in relation to foundations, pavement construction and floor slabs.
- Provide recommendations regarding future works required.

1.4. SCOPE OF WORKS

The scope of work includes the following elements:

- Design of suitable intrusive ground investigation;
- Rotary boreholes;
- Mechanically excavated trial pits;
- Wall cores;
- In-situ geotechnical testing;
- Chemical and geotechnical laboratory analysis;
- Groundwater monitoring and sampling;
- Ground gas monitoring;
- Contamination risk assessment and conceptual site model;
- Geotechnical assessment and interpretation; and
- Factual and interpretive reporting.

1.5. LIMITATIONS

The limitations of this report are presented in Appendix I.

1.6. 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. GROUND INVESTIGATION

2.1. GENERAL OVERVIEW

A ground investigation has been designed based on the findings of the E3P desk study, with exploratory holes advanced to target specific potential contaminant sources. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed development.

Exploratory fieldwork was completed between 19th February and 26th February 2021. The works are summarised in Table 2.1.

2.2. LIMITATIONS OF THE INVESTIGATION

Access was limited by the existing buildings on site.

2.3. SCOPE OF INVESTIGATION

TABLE 2.1 SUMMARY OF FIELDWORK

POTENTIAL SOURCE/RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (m bgl)	MONITORING WELLS RESPONSE ZONE (m bgl)
General Ground Conditions/ To investigate the existing foundations in the south.	TP101	Mechanically Excavated Trial Pit	0.80	N/A
	TP102		0.70	N/A
	TP103		0.80	N/A
	TP104		0.80	N/A
To investigate the depth and nature of the bedrock and to provide detailed geotechnical information. To permit the installation of deep groundwater monitoring wells.	RBH101	Rotary Borehole	10.00	2.0–10.0
	RBH102		10.00	0.5–1.5
	RBH103		10.00	2.0–10.0
	RBH104		10.00	2.0–10.0
	RBH105		10.00	2.0–10.0
	RBH105		10.00	2.0–10.0
To establish the thickness of the brick wall/concrete retaining wall.	WC101	Wall Core	1.50	N/A
	WC102		0.20	N/A

Mechanically excavated trial pits were advanced to investigate the current footings for the building.

The series of rotary boreholes were advanced to investigate the depth and nature of the underlying bedrock, to complete detailed geotechnical testing and to permit the installation of deep groundwater monitoring wells.

Two concrete cores were completed through the brick wall and concrete retaining wall in the east of the site. The full thickness of the concrete retaining wall could not be determined due to the presence of a rubber membrane. The findings are detailed on Drawing 14-261-025 (Appendix III).

The sampling locations are illustrated in Drawing 14-261-005 (Appendix III). The ground conditions encountered are indicated on the logs, which are provided in Appendix V.

Return visits were made to monitor installations for groundwater level and gas concentrations. In addition, selected wells were purged and samples of groundwater recovered for chemical analysis.

2.4. IN-SITU STANDARD PENETRATION TESTING (SPT)

In-situ geotechnical testing was conducted using the standard penetration test (SPT) and, where the ground is granular, a 60° cone (SPT(C)) was used instead of the sampling tube. The results are shown in the probehole logs in Appendix V and presented in Table 3.2 and discussed in Section 5.

2.5. LABORATORY ANALYSIS

Selected soil samples were submitted for a range of chemical analysis comprising:

- Metals.
- pH, total sulphate, water-soluble sulphate (2:1 extract).
- Sulphide.
- Cyanide.
- Phenols.
- Total and speciated polycyclic aromatic hydrocarbons (PAHs).
- Asbestos identification and quantification.
- Banded total petroleum hydrocarbon (TPH).

I2 Analytical undertook the analytical work and the testing results are included in Appendix VI and discussed in Section 4.

Selected samples were submitted to PSL Laboratory where the following geotechnical tests were undertaken:

- Dry density/moisture content relationship under 4.5 kg compaction;
- Point load tests; and
- Unconfined compressive strength.

Laboratory analysis sheets are included in Appendix VIII and are summarised in Section 9.

3. GROUND AND GROUNDWATER CONDITIONS

3.1. SUMMARY OF GROUND CONDITIONS

The ground investigation generally confirms the published geology and identifies the strata set out in Table 3.1.

TABLE 3.1 SUMMARY OF STRATA

HOLE	DEPTH TO STRATUM (m bgl)			
	MADE GROUND CONCRETE	MADE GROUND	SAND (WEATHERED BEDROCK)	BEDROCK
TP101	0.00–0.35	0.35–0.70	0.70–0.80	–
TP102	0.00–0.35	0.35–0.70	–	–
TP103	0.00–0.35	0.35–0.70	0.70–0.80	–
TP104	0.00–0.35	0.35–0.70	0.70–0.80	–
RBH101	0.00–0.25 0.27–0.35	0.25–0.27	0.35–1.50	1.50–>10.00
RBH102	0.00–0.35	0.35–1.50	–	1.50–>10.00
RBH103	0.00–0.25 0.27–0.33	0.25–0.27 0.33–0.70	–	0.70–>10.00
RBH104	0.00–0.25 0.27–0.35	0.25–0.27 0.35–0.80	–	0.80–>10.00
RBH105	0.00–0.35	0.35–0.45	–	0.45–>10.00
RBH106	0.00–0.26 0.28–1.50	0.26–0.28	–	1.50–>10.00

Note: *The bedrock will be weathered and the actual depth can only be profiled after the post demolition ground investigation.*

3.2. MADE GROUND

Made Ground deposits were encountered within all exploratory hole locations to a maximum proven depth of 1.50 m bgl.

Made Ground deposits generally comprised concrete to circa 0.35 m bgl underlain by grey sandy gravel of limestone (Type 1 MOT). In addition, RBH102 identified a brick wall between 0.70 m and 1.50 m bgl. RBH104 identified a brick wall between 0.35 m and 0.80 m bgl.

TP101-TP104 identified concrete with a rubber membrane over brown gravelly fine to medium sand with concrete and brick to 0.70 m bgl.

There is the potential for deep Made Ground in the location of the former quarry.

A Depth of Made Ground Plan is presented as Drawing 14-261-006 in Appendix III.

3.3. DRIFT DEPOSITS

Drift deposits were not encountered during the ground investigation. There is the potential for drift deposits to be present in areas that have not been investigated to date.

3.4. SOLID GEOLOGY

The solid bedrock geology was encountered between 0.45 m and 10.00 m bgl. The solid geology comprises dense to very dense SANDSTONE. The bedrock will be weathered and the actual depth can only be profiled after the post demolition ground investigation.

Weathered sandstone bedrock was encountered as reddish brown medium SAND between 0.35 m and 1.50 m bgl in RBH101 and between 0.70 m and 0.80 m bgl in TP101, TP103 and TP104.

A former quarry is present in the centre of the site, therefore there is the potential for notable changes in the depth of bedrock.

3.5. GROUNDWATER

Groundwater strikes were not encountered during the ground investigation. Subsequent monitoring recorded groundwater between 1.40 and 3.68 m bgl.

Monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product, if present. These results are summarised in Table 4.7.

3.6. VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

Visual and olfactory evidence of potential contamination has not been identified during the site investigation.

3.7. SOIL CONSISTENCY

Results of the standard penetration tests, including undrained shear strengths derived from SPTs are included in Table 3.2.

3.8. SIDE STABILITY AND EASE OF EXCAVATION

The sides of the exploratory trial pit excavations appeared to be stable during excavation.

The presence of brick and concrete cobbles within the Made Ground deposits meant that in certain places, excavation was slow through the Made Ground. The natural sand (weathered bedrock) was excavated with relative ease.

3.9. ROTARY CORE INTO RETAINING WALL FINDINGS

WC101 went through 300 mm of the brick wall and then a service void to 1.30 m bgl and then 200 mm into the concrete retaining wall. The core could not penetrate the water membrane within the concrete retaining wall.

WC102 was cored through a service void and then 200 mm into the concrete retaining wall. The core could not penetrate the water membrane within the concrete retaining wall.



3.10. TRIAL PIT EXCAVATION FINDINGS

TP101, TP103 and TP104 identified the foundation slab within the SANDSTONE from 700 mm, the full depth was not determined.

TP102 identified the foundation slab from 400 mm to 700 m within the Made Ground

TABLE 3.2 STANDARD/CONE PENETRATION TEST RESULTS

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
RBH101	1.00	SAND	50	50.41	Very Dense	N/A	N/A	N/A	504.07
	2.00	SANDSTONE	46	42.02	Dense	N/A	N/A	N/A	420.23
	3.00	SANDSTONE	50	43.48	Dense	N/A	N/A	N/A	434.83
	4.00	SANDSTONE	50	42.24	Dense	N/A	N/A	N/A	422.43
	5.00	SANDSTONE	50	41.48	Dense	N/A	N/A	N/A	414.81
	6.00	SANDSTONE	50	40.99	Dense	N/A	N/A	N/A	409.94
RBH102	2.00	SANDSTONE	50	45.68	Dense	N/A	N/A	N/A	456.77
	3.00	SANDSTONE	50	43.48	Dense	N/A	N/A	N/A	434.83
	4.00	SANDSTONE	50	42.24	Dense	N/A	N/A	N/A	422.43
	5.00	SANDSTONE	50	41.48	Dense	N/A	N/A	N/A	414.81
	6.00	SANDSTONE	50	40.99	Dense	N/A	N/A	N/A	409.94
	7.00	SANDSTONE	50	40.68	Dense	N/A	N/A	N/A	406.78
	8.00	SANDSTONE	50	40.47	Dense	N/A	N/A	N/A	404.73
RBH103	1.00	SANDSTONE	50	50.41	Very Dense	N/A	N/A	N/A	504.07
	2.00	SANDSTONE	50	45.68	Dense	N/A	N/A	N/A	456.77
	3.00	SANDSTONE	50	43.48	Dense	N/A	N/A	N/A	434.83
	4.00	SANDSTONE	50	42.24	Dense	N/A	N/A	N/A	422.43
RBH104	1.00	SANDSTONE	50	50.41	Very Dense	N/A	N/A	N/A	504.07



BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
RBH104	2.00	SANDSTONE	50	45.68	Dense	N/A	N/A	N/A	456.77
	3.00	SANDSTONE	50	43.48	Dense	N/A	N/A	N/A	434.83
	4.00	SANDSTONE	50	42.24	Dense	N/A	N/A	N/A	422.43
	5.00	SANDSTONE	50	41.48	Dense	N/A	N/A	N/A	414.81
	6.00	SANDSTONE	50	40.99	Dense	N/A	N/A	N/A	409.94
	7.00	SANDSTONE	50	40.68	Dense	N/A	N/A	N/A	406.78
RBH105	3.00	SANDSTONE	50	43.48	Dense	N/A	N/A	N/A	434.83
	4.00	SANDSTONE	50	42.24	Dense	N/A	N/A	N/A	422.43
	6.00	SANDSTONE	50	40.99	Dense	N/A	N/A	N/A	409.94
	7.00	SANDSTONE	50	40.68	Dense	N/A	N/A	N/A	406.78
	8.00	SANDSTONE	50	40.47	Dense	N/A	N/A	N/A	404.73
RBH106	1.00	SANDSTONE	50	50.41	Very Dense	N/A	N/A	N/A	504.07
	2.80	SANDSTONE	50	43.82	Dense	N/A	N/A	N/A	438.21
	3.80	SANDSTONE	50	42.44	Dense	N/A	N/A	N/A	424.43
	4.50	SANDSTONE	50	41.82	Dense	N/A	N/A	N/A	418.18
	5.40	SANDSTONE	50	41.26	Dense	N/A	N/A	N/A	412.61
	6.20	SANDSTONE	50	40.92	Dense	N/A	N/A	N/A	409.20
	7.20	SANDSTONE	50	40.63	Dense	N/A	N/A	N/A	406.30



BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
RBH106	8.20	SANDSTONE	50	40.44	Dense	N/A	N/A	N/A	404.42
	9.00	SANDSTONE	50	40.34	Dense	N/A	N/A	N/A	403.42

NOTES
* The Allowable Bearing Pressure (ABP) should be considered indicative.
The interpretation of in situ mass undrained shear strength (cu) data from SPT Blow Count (N) results and the influence of the Plasticity Index (PI) was reported in Standard Penetration Test in Insensitive Clays and Soft Rocks. Stroud (1974). The standard penetration test and the engineering properties of glacial materials subsequently. Stroud and Butler (1975) and (1989).
Allowable bearing pressure on sands. Soil Mechanics in Engineering Practice Terzaghi, K. & Peck, R.B. 1996.

3.11. SOIL DENSITY/MOISTURE CONTENT RELATIONSHIP

Dry density / moisture content relationship analysis has been conducted on soils using via utilising proctor compaction tests utilising a 4.5 kg rammer. The results of the tests have been summarised in Table 3.3. The full test results can be found in Appendix VIII.

TABLE 3.3 SUMMARY DRY DENSITY AND MOISTURE CONTENT

LOCATION	LABORATORY DESCRIPTION	TOP DEPTH (m)	METHOD OF COMPACTION	INITIAL MOISTURE CONTENT (%)	OPTIMUM MOISTURE CONTENT (%)	MATERIAL RETAINED ON 37.5 mm SIEVE (%)	MAX DRY DENSITY (mg/m³)	MATERIAL RETAINED ON 20.0 mm TEST SIEVE (%)
RBH101	Brown gravelly slightly clayey silty SAND.	0.80	4.5 kg	22	12	0	1.89	0

The proctor compaction tests have indicated that the material in RBH101 is wet of the optimum. It should be noted that if this material is excavated for use in a cut/fill operation careful consideration should be taken in the stabilisation of this material.

Engineering of this type of material will need to be completed during dry weather periods only.

3.12. POINT LOAD TESTS

Point index load tests were performed on samples of sandstone obtained from the rotary boreholes advanced across site to assess the suitability of the sandstone bedrock. The results of which are presented within Appendix VIII and are summarised in Table 3.4.

TABLE 3.4 SUMMARY OF POINT LOAD TEST DATA

LOCATION	DEPTH (m)	TEST TYPE	ORIENTATION	FAILURE LOAD (kN)	UNCORRECTED POINT LOAD STRENGTH INDEX (Is) - MPa	POINT LOAD STRENGTH INDEX (Is50) - MPa
RBH101	2.30	A	Perpendicular	0.21	0.04	0.04
RBH101	6.28	A	Perpendicular	1.01	0.18	0.22
RBH101	7.47	A	Perpendicular	1.43	0.26	0.31
RBH101	8.82	A	Perpendicular	0.99	0.16	0.20
RBH101	6.71	A	Perpendicular	0.81	0.18	0.20
RBH102	7.23	A	Perpendicular	1.59	0.27	0.33
RBH102	1.86	A	Perpendicular	0.97	0.18	0.21
RBH102	8.82	A	Perpendicular	0.77	0.16	0.18
RBH102	9.65	A	Perpendicular	0.69	0.12	0.15

LOCATION	DEPTH (m)	TEST TYPE	ORIENTATION	FAILURE LOAD (kN)	UNCORRECTED POINT LOAD STRENGTH INDEX (Is) - MPa	POINT LOAD STRENGTH INDEX (Is50) - MPa
RBH102	9.30	A	Perpendicular	0.48	0.10	0.11
RBH102	8.64	A	Perpendicular	1.12	0.30	0.33
RBH103	1.50	A	Perpendicular	1.59	0.38	0.43
RBH103	3.40	A	Perpendicular	2.01	0.32	0.40
RBH103	8.60	A	Perpendicular	0.84	0.18	0.21
RBH104	2.43	A	Perpendicular	0.47	0.10	0.11
RBH104	3.36	A	Perpendicular	1.45	0.29	0.34
RBH104	5.60	A	Perpendicular	0.83	0.19	0.21
RBH104	7.26	A	Perpendicular	2.06	0.40	0.47
RBH105	1.10	A	Perpendicular	0.63	0.13	0.15
RBH105	5.00	A	Perpendicular	1.46	0.34	0.38
RBH105	6.80	A	Perpendicular	1.12	0.20	0.24
RBH105	9.73	A	Perpendicular	1.45	0.25	0.31
RBH106	3.10	A	Perpendicular	2.62	0.39	0.48
RBH106	3.37	A	Perpendicular	0.60	0.18	0.19
RBH106	5.40	A	Perpendicular	0.99	0.22	0.25
RBH106	7.20	A	Perpendicular	1.23	0.29	0.33
RBH106	9.80	A	Perpendicular	0.93	0.18	0.21
RBH101	2.30	D	Parallel	0.33	0.043	0.05
RBH101	6.28	D	Parallel	0.72	0.093	0.12
RBH101	7.47	D	Parallel	1.09	0.141	0.18
RBH101	8.82	D	Parallel	0.69	0.089	0.11
RBH101	6.71	D	Parallel	0.68	0.086	0.11
RBH102	7.23	D	Parallel	0.73	0.094	0.12
RBH102	1.86	D	Parallel	0.85	0.118	0.15
RBH102	8.82	D	Parallel	0.54	0.070	0.09



LOCATION	DEPTH (m)	TEST TYPE	ORIENTATION	FAILURE LOAD (kN)	UNCORRECTED POINT LOAD STRENGTH INDEX (Is) - MPa	POINT LOAD STRENGTH INDEX (Is50) - MPa
RBH102	9.65	D	Parallel	0.45	0.057	0.07
RBH102	9.30	D	Parallel	0.48	0.065	0.08
RBH102	8.64	D	Parallel	1.28	0.162	0.21
RBH103	1.50	D	Parallel	1.06	0.134	0.17
RBH103	3.40	D	Parallel	1.11	0.140	0.18
RBH103	8.60	D	Parallel	1.10	0.139	0.18
RBH104	2.43	D	Parallel	0.41	0.057	0.07
RBH104	3.36	D	Parallel	1.01	0.130	0.17
RBH104	5.60	D	Parallel	0.76	0.100	0.13
RBH104	7.26	D	Parallel	1.44	0.190	0.24
RBH105	1.10	D	Parallel	0.43	0.056	0.07
RBH105	5.00	D	Parallel	0.33	0.048	0.06
RBH105	6.80	D	Parallel	0.61	0.077	0.10
RBH105	9.73	D	Parallel	1.51	0.204	0.26

The results of the point load tests indicate that at a depth of between 1.10–9.73 m bgl the sandstone bedrock recorded a strength of between 0.05 and 0.48 (MPa) which equates to 50–480 kN/m².

3.13. UNCONFINED COMPRESSIVE STRENGTH

An unconfined compressive strength test was performed on a sample of sandstone obtained from RBH103. The results of which are presented within Appendix VIII and are summarised in Table 3.5.

TABLE 3.5 SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH

LOCATION	DEPTH (m)	INITIAL MASS (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode
RBH103	6.63-6.98	1840	2.19	15	1.91	20.1	3.3	Brittle

The results indicate that at a depth of between 6.63-6.98 m bgl the sandstone recorded a strength of 3.3 (MPa) which equates to 3300 kN/m².

3.14. pH AND SULPHATE

Chemical analyses for pH and soluble sulphate content contained in Appendix VI (summarised in Table 3.6), shows that the soils at the site meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE *Special Digest 1* (2005).

TABLE 3.6 SUMMARY OF pH AND SULPHATE DATA

LOCATION	DEPTH (m)	SO_4 IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
TP101	0.40	0.031	11.5	DS-1, AC-1s
TP102	0.40	0.0047	12.3	
TP103	0.45	0.077	11.2	
TP104	0.45	0.027	11.3	
RBH101	0.80	0.014	9.2	
RBH102	0.60	0.015	12.4	
RBH103	0.80	0.083	9.2	
RBH103	0.40	0.011	12.3	
RBH104	0.30	0.42	7.8	
RBH104	0.90	0.0095	9.1	
RBH105	0.30	0.02	11.5	
RBH105	0.50	0.014	9.5	
RBH106	0.35	0.017	11.7	

4. TIER I QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

E3P has undertaken a Tier 1 qualitative risk assessment to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

4.1. HUMAN HEALTH RISK ASSESSMENT

At Tier 1 stage, the long term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published in LQM/CIEH S4UL (S4UL3267).

The results of this comparison have been summarised within Table 4.1.

TABLE 4.1 SUMMARY OF INORGANIC AND HYDROCARBON TOXICITY ASSESSMENT FOR A RESIDENTIAL END USE WITHOUT PLANT UPTAKE

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Arsenic	mg/kg	40	13	3.9	-	1	No Further Action
Cadmium	mg/kg	85	13	0.6	-	1	No Further Action
Chromium (VI)	mg/kg	6	13	<4.0	-	1	No Further Action
Lead	mg/kg	200	13	16	-	1	No Further Action
Mercury	mg/kg	1.2	13	<0.3	-	3	No Further Action
Nickel	mg/kg	180	13	11	-	1	No Further Action
Selenium	mg/kg	430	13	<1.0	-	1	No Further Action
Copper	mg/kg	7100	13	30	-	1	No Further Action
Zinc	mg/kg	40000	13	65	-	1	No Further Action
Cyanide – Total	mg/kg	791	13	<1.0	-	1	No Further Action
Phenols – Total	mg/kg	210	13	<1.0	-	1	No Further Action
Asbestos	Fibres	NFD	13	<0.001 %	TP104 0.45 m	3	Further Action
Naphthalene	mg/kg	2.3	13	<0.05	-	4	No Further Action
Acenaphthylene	mg/kg	2900	13	<0.05	-	2	No Further Action
Acenaphthene	mg/kg	3000	13	<0.05	-	1	No Further Action
Fluorene	mg/kg	2800	13	<0.05	-	1	No Further Action
Phenanthrene	mg/kg	1300	13	0.4	-	2	No Further Action
Anthracene	mg/kg	31000	13	<0.05	-	2	No Further Action
Fluoranthene	mg/kg	1500	13	0.44	-	2	No Further Action
Pyrene	mg/kg	3700	13	0.42	-	2	No Further Action
Benzo(a)Anthracene	mg/kg	11	13	0.33	-	2	No Further Action
Chrysene	mg/kg	30	13	0.23	-	2	No Further Action
Benzo(b)Fluoranthene	mg/kg	3.9	13	<0.05	-	2	No Further Action
Benzo(k)Fluoranthene	mg/kg	110	13	<0.05	-	2	No Further Action
Benzo(a)Pyrene	mg/kg	3.2	13	<0.05	-	2	No Further Action
Indeno(123-cd)Pyrene	mg/kg	45	13	<0.05	-	2	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.31	13	<0.05	-	2	No Further Action
Benzo(ghi)Perylene	mg/kg	360	13	<0.05	-	2	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	42	13	<1.0	-	4	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	100	13	<0.1	-	4	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	27	13	<0.1	-	4	No Further Action
TPH C10-C12 (aromatic)*	mg/kg	250	13	<2.0	-	4	No Further Action
TPH C12-C16 (aromatic)*	mg/kg	1800	13	<4.0	-	4	No Further Action
TPH C16-C21 (aromatic)*	mg/kg	1900	13	16	-	1	No Further Action

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
TPH C21-C35 (aromatic)*	mg/kg	1900	13	51	-	1	No Further Action

Notes
PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical / Lateral Migration; PL6 = Corrosion of concrete; PL7=Tainting of water supply; PL8 = Uptake by plants

Abbreviations: GAC = general assessment criteria, n = number of samples, MC = maximum concentration; Loc of Ex = location of exceedance; NFD = no fibres detected.

* The Tier 1 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. E3P has utilised the Tier 1 values for aliphatic compounds for the volatile and semi volatile fractions (C5-C12) and the Tier 1 values for aromatic compound for the non-volatile fractions (C12-C35). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.

Referring to Table 4.1, the results of this direct comparison indicates that the data exceeds the screening criteria for a residential end use for the following contaminant:

- Chrysotile.

Asbestos in the form of loose chrysotile fibres has been identified in the granular Made Ground in TP104 at <0.001 %.

In relation to this exceedance, the following can be determined:

- The main exposure pathway is:
  - Fibre/dust inhalation.
- The exceedance for asbestos is associated with shallow Made Ground deposits in TP104.

Samples of the Made Ground in TP101 at 0.65 m and TP103 at 0.45 m were compared to the Waste Acceptance Criteria. The WAC analysis suggests that the soils would be classified as stable non-reactive. A WM3 waste assessment is still required to confirm the waste classification but based on an initial review of the available data, any soil arisings are likely to be inert.

HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

No visual signs of ACM were encountered during the ground investigation; it is therefore likely that only trace fibres are present. Impacted soils should be managed according to the asbestos risk mitigation conceptual site model shown in Figure 4.1.

The installation of a suitable cover system in all landscaping and public open space will remove any potential for direct exposure to impacted soils.

The specific design and installation process for the appropriate cover systems should be defined within a site remediation and enabling works strategy.

FIGURE 4.1 ASBESTOS RISK MITIGATION CONCEPTUAL SITE MODEL



Notes
ND None Detect
0.001% Soils may contain ≤ 0.001% asbestos using composite testing to ensure there is no potential risk to human health. This value is present within areas where there may be a short term low level exposure of soils containing trace asbestos fibres by construction workers where an appropriate level of asbestos management is employed (dust suppression)
0.1% Soils at a depth of >1.00m bgl may contain <0.1% asbestos using composite testing where they will not be likely to be disturbed in the future and will therefore be in an area of low sensitivity. Risk assessment completed in accordance with Asbestos JIWG risk assessment tools.
Undefined- this will be dependent upon soils encountered during earthworks, which may be placed at these depths to ensure no potential risk to human health.

Chemical analysis of the natural granular deposits has identified these soils to be acceptable for use as subsoil within the proposed landscaped areas; however, further chemical validation samples will be required to confirm this. There are no suitable sources of topsoil available on the site.

Further post demolition ground investigation will be required to confirm the absence of any significant contamination.

4.2. CONTROLLED WATERS RISK ASSESSMENT

E3P has undertaken a controlled waters risk assessment for the site based on the consideration of the conceptual site model and the sensitive receptors which are summarised in Table 4.2.

TABLE 4.2 CONTROLLED WATERS CONCEPTUAL MODEL AND SENSITIVITY PROFILE

DISCUSSION		SENSITIVITY RATING
Contaminant Source		
Made Ground Made Ground infill material from historical construction and demolition activities is present. No significant contamination has been identified, with the exception of asbestos in TP104.		**Low**
Historic Copper Roller Works, Cotton Finishing Works, Mills It is unlikely that the former works and mills are a potential source as the land uses were historical.		**Low**
Pathway		
Vertical Migration Due to the majority of the site being underlain by shallow sandstone bedrock, vertical migration of contaminants is likely to occur as there are no drift deposits overlying the bedrock.		**High**
Lateral migration Lateral migration of contaminants is considered possible due to the presence of shallow bedrock across the site.		**High**
Receptor		
Aquifer Classification in Superficial Drift Deposits	Secondary A aquifer (drift deposits appear to be absent).	**Low**
Aquifer Classification in Bedrock	Principal aquifer.	**High**
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not affected.	**Low**
Distance to the Closest Groundwater Abstraction Point	There is a groundwater abstraction point located 65 m north west of the site licensed to British Telecoms Plc for "Other industrial/commercial/public services: general cooling (existing licenses only) (High Loss)". The closest potable abstraction is 507 m north.	**Medium**
Is the Site Located Within 50 m of a Surface Watercourse?	The River Irwell is located 5 m west of the site and forms the western boundary. A culvert is present in the south west corner of the site.	**High**
The ICSM developed within the context of the site setting has identified viable pollutant pathways, which would be the downward migration of potentially mobile phase-soluble contaminants towards the underlying principal aquifer and the lateral migration towards the River Irwell.		

To ensure a robust appraisal of the identified risk to controlled waters, E3P has identified the sources of potential contamination that represent a risk to controlled waters from the initial CSM, we have then assessed the availability of ground investigation data in the form of analysis of the solid phase (soil) and dissolved phase within the perched groundwater or aquifer. The results of this assessment are presented in Table 4.3.

TABLE 4.3 QUALITATIVE RISK TO CONTROLLED WATERS FROM SOIL ANALYTICAL RESULTS

CONTAMINANT	ASSESSMENT RATING	DISCUSSION
BTEX > 1 mg/kg **Total VOC > 1 mg/kg**	The soil data analysis has not identified any TPH C5 to C6 that might otherwise be indicative of VOC impact.	None
Total SVOC > 1 mg/kg	As above.	None
C5-C10 > 5 mg/kg	All concentrations are below the laboratory LOD.	None
C10-C12 > 10 mg/kg	All concentrations are below the laboratory LOD.	None
C12-C16 > 50 mg/kg	All concentrations are below the laboratory LOD.	None
Phenols > 2 mg/kg	All concentrations are below the laboratory LOD.	None
Naphthalene > 2 mg/kg	All concentrations are below the laboratory LOD.	None
Total PAH > 10 mg/kg	Total concentrations of low-solubility PAH compounds greater than 10 mg/kg have not been detected.	None
PCB > 1 mg/kg	No potential sources of PCB have been identified.	None
Heavy metals > 500 mg/kg	Concentrations of heavy metals above 500 mg/kg have not been recorded.	None

The Tier I assessment has included a comparison of leachate analysis from a sample of the Made Ground and groundwater to drinking water standards and environmental quality standards (EQS).

These are presented in Table 4.4.

TABLE 4.4 COMPARISON OF GROUNDWATER AND LEACHATE ANALYSIS WITH TIER 1 SCREENING LEVELS

DETERMINAND	UNIT	EQS [1, 2, 3] AA	DWS [3,4,5]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
Arsenic	µg/l	50	10	3	2.93	-	1	<1.0		No Further Action
Cadmium	µg/l	0.08-0.25	5	3	0.03	-	1	<0.08		No Further Action
Chromium (VI)	µg/l	3.4	–	3	-	-	1	**11**	**TP101 0.4 m**	Further Action
Chromium (III)	µg/l	4.7	50	3	3.8	-	1	**12**	**TP101 0.4 m**	Further Action
Copper	µg/l	1	2000	3	**8.4 3.1 2.9**	**RBH104 RBH101 RBH105**	1	**14**	**TP101 0.4 m**	Further Action
Total Cyanide	µg/l	1	50	3	<1.0	-	1	<1.0	-	No Further Action
Lead	µg/l	1.2	10	3	0.2	-	1	1.2	-	No Further Action
Mercury	µg/l	–	1.0	3	**1.22**	**RBH104**	1	<0.5	-	Further Action
Nickel	µg/l	4	20	3	2.1	-	1	2.5	-	No Further Action
Selenium	µg/l	–	10	3	2.8	-	1	<4.0	-	No Further Action
Zinc	µg/l	10.9	–	3	7.8	-	1	9.5	-	No Further Action
pH	6–9			3	**10.0 10.2**	**RBH105 RBH104**	1	**12**	**TP101 0.4 m**	Further Action
Naphthalene	µg/l	2	10*	3	<0.01	-	1	<0.01	-	No Further Action
Anthracene	µg/l	0.1	10*	3	<0.01	-	1	<0.01	-	No Further Action
Benzo[b]fluoranthene	µg/l	0.00017*	10*	3	<0.01	-	1	<0.01	-	No Further Action
Benzo[k]fluoranthene	µg/l	0.00017*	10*	3	<0.01	-	1	<0.01	-	No Further Action
Benzo(a)pyrene	µg/l	0.00017*	10*	3	<0.01	-	1	<0.01	-	No Further Action
Indeno(123-cd)pyrene	µg/l	0.00017*	10*	3	<0.01	-	1	<0.01	-	No Further Action

DETERMINAND	UNIT	EQS [1, 2, 3] AA	DWS [3,4,5]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
Fluoranthene	µg/l	0.0063	10*	3	<0.01	-	1	<0.01	-	No Further Action
Benzo(ghi)perylene	µg/l	1.7–4	10*	3	<0.01	-	1	<0.01	-	
TPH C5-C6 (benzene)	µg/l	10	1	3	<1.0	-	1	<1.0	-	
TPH C6-C8 (toluene)	µg/l	74	700	3	<1.0	-	1	<1.0	-	
TPH C8-C10 (ethyl benzene)	µg/l	20	300	3	<1.0	-	1	<1.0	-	
TPH C10-C12 (xylene)	µg/l	30	500	3	<10	-	1	<10	-	
TPH C10-C12 (xylene)	µg/l	30	500	3	<10	-	1	<10	-	
TPH C12-C16	µg/l	2	90[5]	3	<10	-	1	<10	-	
TPH C16-C35	µg/l	50#	90[5]	3	<10	-	1	<10	-	
TPH C5-C6	µg/l	–	15000	3	<1.0	-	1	<1.0	-	
TPH C6-C8	µg/l	–	15000	3	<1.0	-	1	<1.0	-	
TPH C8-C10	µg/l	–	300	3	<1.0	-	1	<1.0	-	
TPH C10-C12	µg/l	–	300	3	<10	-	1	<10	-	
TPH C12-C16	µg/l	–	300	3	<10	-	1	<10	-	
TPH C16-C21	µg/l	–	300**	3	<10	-	1	<10	-	
TPH C21-C35	µg/l	–	300**	3	<10	-	1	<10	-	
Tetrachloroethylene	µg/l	0.4	10	3	<1.0	-	0	-	-	
Trichloroethylene	µg/l	10	10	3	<1.0	-	0	-	-	
Trichlorobenzene	µg/l	0.4	–	3	<1.0	-	0	-	-	

DETERMINAND	UNIT	EQS [1, 2, 3] AA	DWS [3,4,5]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
Trichloromethane	µg/l	2.5	–	3	**18.8 8.6 7.9**	**RBH101 RBH104 RBH105**	0	-	-	No Further Action
Dichloromethane	µg/l	20	200	3	<1.0	-	0	-	-	
Carbon Tetrachloride	µg/l	12	3	3	<1.0	-	0	-	-	
Vinyl Chloride	µg/l	–	0.3	3	<1.0	-	0	-	-	

Notes

Solubility <0.01µg/l
AA – Annual Average
MAC- Maximum Admissible Concentration
* Polyaromatic hydrocarbons (PAH) - Benzo(a)pyrene (BaP), Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water
** There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.
1. The Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations (2015)
2. Directive establishing a framework for Community action in the field of water policy (Water Framework Directive)
3. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances
4. Council Directive on the quality of water intended for human consumption (Drinking Water Directive)
5. WHO Guidelines for Drinking Water Quality. Third edition (2004)

4.2.1. CONTROLLED WATER RISK ASSESSMENT AND MITIGATION

This comparison indicates that the data exceeds the EQS values for the following inorganic compounds:

- Chromium (VI)
- Chromium (III)
- Copper
- Mercury
- pH
- Trichloromethane

Where leachate analysis has been undertaken, this can overstate the risk and is not wholly representative of the site characterisation.

4.2.2. M-BAT ASSESSMENT

Due to exceedances in both soil and leachate samples for copper, an m-BAT assessment has been completed to assess the bioavailability of the metals with respect to surface water receptors (River Irwell, Culvert). The chemical values from the groundwater analysis have been input into the assessment.

Where the Risk Characterisation Ratio (RCR) is greater than 1, this indicates the bioavailable concentration is above the EQS and the receptor is therefore at risk. In this instance, groundwater chemical data for DOC was input into the m-BAT for the onsite locations. The following exceed the RCR:

1. RBH105
    - Copper (1.76)

The m-BAT assessment has confirmed that the RCR is marginally above 1 in the groundwater sample from RBH105. The RCR was below 1 in the other groundwater samples.

In light of the above assessment, E3P do not consider the site to pose an unacceptable level of risk to surface waters for copper.

However, further analysis of the surface water in the River Irwell should be undertaken as groundworks progress, to ensure no future mobilisation of contaminants is caused, which may pose a risk to the watercourse.

4.2.3. DISCUSSION OF CONTROLLED WATERS RISK ASSESSMENT

Historically, the site has been occupied by a Cotton Finishing Works, Copper Roller Works and Mills which are potential sources of mobile contamination. However, the initial soil analysis has not identified a risk to controlled waters.

The site is underlain by shallow sandstone bedrock which is classified as a principal aquifer. However, the majority of the identified inorganic compounds are of low solubility. The sensitivity of the principal aquifer in the bedrock is reduced given the closest potable groundwater abstraction is located 507 m north.

Tricholormethane has been recorded above the limit of detection in all three groundwater samples from the rotary boreholes which have monitoring wells set within the sandstone bedrock. All other VOCs are less than the limit of detection. It is unlikely that this relates to residual contamination from the former works and mills located on site as these land uses were historical and the compounds would have degraged.. It is considered possible that this compound may have migrated from commercial sites further afield. The site is topographically lower than the land to the east, therefore it is likely that groundwater will flow towards the site and towards the River Irwell. The results of the groundwater analysis indicate a higher concentration of trichloromethane at RBH101 in the north east as opposed to RBH105 located in the south west.

The site is encapsulated in hardstanding, therefore infiltration will be limited.

Based on the above, there is considered to be a low risk to controlled waters.

An additional round of groundwater sampling and surface water analysis is recommended to further assess the risk to controlled waters. The results will be issued in an addendum report.

4.3. GROUND GAS

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

4.1. INVESTIGATION RATIONALE

The ICSM has identified that the underlying Made Ground, infilled quarry and former works and mills may represent a potential source of ground gas generation. Based on the identification of these sources, E3P has determined that the site represents a low ground gas source generation potential.

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

The spacing requirements for monitoring wells are detailed within CIRIA 665 Table 4.2, which indicates that for low gas hazard sites (Made Ground with limited degradable material, organic clay of limited thickness) and a high sensitivity development, nominal well spacing should be between 25 m and 50 m.

Table 4.5 Ground Gas Monitoring Location Rationale

LOCATION	GROUND GAS SOURCE	DEPTH OF MONITORING WELL (m)
RBH101	Bedrock	2.0–10.0
RBH102	Made Ground	0.5–1.5
RBH103	Bedrock	2.0–10.0
RBH104	Bedrock	2.0–10.0
RBH105	Bedrock	2.0–10.0
RBH106	Bedrock	2.0–10.0

4.2. MONITORING METHODOLOGY

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

Gas measurements were recorded for a minimum of 60 seconds at each location, at which point the maximum concentration of CH_4 and CO_2, together with the lowest concentration of O_2 were recorded. The results of the ground gas monitoring are presented in Table 4.7.

CIRIA C665 provides assessments for carbon dioxide and methane based upon gas screening values (GSVs) utilising flow rates and concentrations. The site-based GSVs for steady state methane and carbon dioxide are based upon the following equation:

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

The GSVs within CIRIA C665 are based upon all buildings other than standard residential houses. The thresholds for GSVs based upon CIRIA guidance are provided within Table 4.6.

TABLE 4.6 RESIDENTIAL THRESHOLDS FOR GAS SCREENING VALUES (GSV) IN ACCORDANCE WITH CIRIA C665– COMMERCIAL END USE

CIRIA – NO SUBFLOOR VOID	
CLASSIFICATION	**GSV (METHANE AND CARBON DIOXIDE)**
CS1	< 0.07
CS2	< 0.70
CS3	< 3.5
CS4	< 15
CS5	< 70
CS6	> 70

4.2.1. SUMMARY OF MONTIORING RESULTS

Table 4.7 presents of the ground gas and groundwater monitoring results to date.

TABLE 4.7 SUMMARY OF GROUND GAS MONITORING RESULTS

WELL	DATE	CH_4 INITIAL (%V/V)	CH_4 STEADY (%V/V)	CH_4 GSV (l/hr)	CO_2 INITIAL (%V/V)	CO_2 STEADY (%V/V)	CO_2 GSV (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
RBH101	09/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1013	Falling	0.1	2.0–10.0	6.70	2.20
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	20.1	1017	Falling	0.1		6.40	2.85
RBH102	09/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	19.3	1013	Falling	0.1	0.5–1.5	1.40	1.40
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	20.3	1017	Falling	0.1		1.40	1.40
RBH103	09/03/21	-0.1	-0.1	-0.0031	-0.1	-0.1	-0.0031	19.8	1013	Falling	3.1	2.0–10.0	7.45	3.20
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	19.9	1017	Falling	0.1		7.45	3.68
RBH104	09/03/21	-0.2	-0.2	-0.0044	-0.1	-0.1	-0.0022	16.8	1013	Falling	2.2	2.0–10.0	5.62	2.00
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	19.5	1017	Falling	0.1		5.62	2.15
RBH105	09/03/21	-0.1	-0.1	-0.0001	-0.1	-0.1	-0.0001	20.3	1013	Falling	0.1	2.0–10.0	5.40	1.75
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	20.1	1017	Falling	0.1		5.40	1.80
RBH106	09/03/21	-0.1	-0.1	-0.0001	-0.1	-0.1	-0.0001	19.6	1010	Falling	0.1	2.0–10.0	4.90	1.75
	23/03/21	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	1017	Falling	0.1		4.90	1.81

4.2.2. SOURCES OF GROUND GAS

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

- Made Ground deposits.
- Infilled quarry.
- Former works and mills.

4.2.3. GROUNDWATER

Monitoring wells RBH105 and RBH106 were flooded during the first two monitoring visits and cannot therefore be included within the gas assessment. RBH104 was also flooded on the first monitoring visit.

Groundwater levels were observed between 1.40 m and 3.68 m bgl.

4.2.4. GAS FLOW

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

4.2.5. GAS CONCENTRATIONS

No elevated concentrations of methane or carbon dioxide were recorded during the initial monitoring visits.

4.2.6. GAS ASSESSMENT

In accordance with the methodology outlined with the CIRIA publication C665, E3P have utilised the results of the ground gas monitoring surveys to calculate a tentative gas screening value (GSV). The GSVs for the monitoring positions are summarised in Table 4.8.

TABLE 4.8 GAS RISK PROFILE AND LOCATION

LOCATION	MAX CH_4 (% v/v)	GSV (l/hr)	MAX CO_2 (% v/v)	GSV (l/hr)	CLASSIFICATION
RBH101	0.1	0.0001	0.1	0.0001	CS1
RBH102	0.1	0.0001	0.1	0.0001	CS1
RBH103	0.1	-0.0031	0.1	0.0001	CS1
RBH104	0.2	-0.0044	0.1	-0.0022	CS1
RBH105	0.1	0.0001	0.1	0.0001	CS1
RBH106	0.1	0.0001	0.1	0.0001	CS1

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

Preliminary ground gas monitoring suggests that the site can be classified as CS1, and it is considered that gas protection measures will not be required. This will be confirmed on completion of the monitoring.

4.3. POTABLE WATER SUPPLY

This section provides a summary of the site investigation data with reference to the selection of potable water supply pipework. The assessment is made with reference to the UK Water Industry Research (UKWIR) publication "*Guidance on the selection of Water Supply Pipes to be used in Brownfield Sites*"

TABLE 4.9 PIPELINE SELECTION PE THRESHOLD CONCENTRATIONS

Contaminant Group	PE-threshold (mg/kg)	Concentrations at Current pipeline depth (mg/kg)
Total VOC	0.5	<1.0
Total BTEX And MTBE	0.1	N/A
Total SVOCs (Excluding PAH and those substances marked with an *)	2	N/A
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2	<1.0
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	<4.0
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	67
Phenols (From SVOC Analysis)*	2	N/A
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	NA
Ethers*	0.5	NA
Nitrobenzene*	0.5	NA
Ketones*	0.5	NA
Aldehydes*	0.5	NA
Amines	Fail	NA
Other Consideration		
Are there any exceedances of the PE threshold outside of the pipeline depth?	No	
Is free product present in soil and groundwater?	None	
Could hydrocarbon impact at greater depth than current pipeline depth be mobilised by rising groundwater levels?	No hydrocarbon impact has been identified.	
Will soils impacted with above determinands likely be utilised elsewhere on site?	No	
Will soils be imported to site as part of any future earth works	Currently unknown. The importation of materials may affect the WIR Risk Assessment which should be updated after completion.	

Notes - Pipe line depth normally between 0.75m–1.35m

Based on the assessment of current site conditions it is likely that PE pipe will be suitable for the proposed development.

4.4. CONCEPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table 4.10 has been prepared for the site.

TABLE 4.10 CONCEPTUAL MODEL

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL1 PL2	Heavy Metals, non-volatile PAH (Made Ground, Former Works and Mills, Infilled Quarry)	Dermal contact. Dermal contact and ingestion.	Future site users. Off-site receptors.	Low Likelihood	Low	LOW
Assessment: No exceedances have been identified in the chemical testing completed. **Recommendation:** Due to the presence of Made Ground, construction works should be completed with PPE and provision of welfare. A clean cover system should be installed in areas of soft landscaping to prevent direct exposure to the underlying Made Ground.						
PL3	ACM in Made Ground	Inhalation of dust.	Future site users. Buildings. Off-site land users.	Likely	High	LOW
Assessment: Asbestos in the form of loose chrysotile fibres has been identified in the granular Made Ground in TP104 at <0.001 %. **Recommendation:** Asbestos impacted soils should be managed in accordance with the asbestos CSM, A cover system to landscaped areas will prevent exposure to future site users. Construction works completed with PPE and provision of welfare.						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL4	Volatile contaminants such as hydrocarbons, (Made Ground, Former Works and Mills)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off-site receptors.	Low Likelihood	Low	LOW
Assessment: No exceedances have been identified in the chemical testing completed. **Recommendation:** Due to the presence of Made Ground, construction works should be completed with PPE and provision of welfare. If any unidentified contamination is uncovered during remediation and enabling works, the soils may require localised excavation and validation.						
PL4	Methane, carbon dioxide (Made Ground, Infilled Quarry, Former Works and Mills)	Inhalation of gas. Migration through permeable strata and preferential pathways. Explosion in confined spaces.	Future site users. Buildings. Off-site land users.	Low likelihood	Low	LOW
Assessment: Monitoring completed to date suggests CS1. **Recommendation:** Completion of ground gas monitoring.						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL5	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds (Made Ground, Infilled Quarry, Former Works and Mills)	Surface runoff. Migration through permeable strata and preferential pathways. Perched waters migration.	Groundwater (Principal aquifer in bedrock). Surface water (River Irwell).	Low Likelihood	Low	TBC

Assessment:

Leachate and groundwater analysis has identified exceedances of the EQS for chromium, copper, mercury, trichloromethane and pH.

Historically, the site has been occupied by a Cotton Finishing Works, Copper Roller Works and Mills. The initial soil analysis has not identified a risk to controlled waters.

The site is underlain by shallow sandstone bedrock which is classified as a principal aquifer. However, the majority of the identified inorganic compounds are of low solubility. The sensitivity of the principal aquifer in the bedrock is reduced given the closest potable groundwater abstraction is located 507 m north.

Tricholormethane has been recorded above the limit of detection in all three groundwater samples from the rotary boreholes which have monitoring wells set within the sandstone bedrock. All other VOCs are less than the limit of detection. It is unlikely that this relates to residual contamination from the former works and mills located on site as these land uses were historical and the compounds would have degraged. It is considered possible that this compound may have migrated from commercial sites further afield. The site is topographically lower than the land to the east, therefore it is likely that groundwater will flow towards the site and towards the River Irwell. The results of the groundwater analysis indicate a higher concentration of trichloromethane at RBH101 in the north east as opposed to RBH105 located in the south west.

The site is encapsulated in hardstanding, therefore infiltration will be limited.

Recommendation:

An additional round of groundwater sampling and surface water analysis is recommended to further assess the risk to controlled waters. The results will be issued in an addendum report

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL6	Sulphate (potential ash within Made Ground)	Sulphate attack on concrete.	Building structure.	Low likelihood	Low	LOW
Assessment: The soils at the site meet class DS-1, AC-1s. **Recommendation:** Concrete should be designed in accordance with the chemical testing results.						
PL7	Organic contaminants such as hydrocarbons, solvents (Made Ground, Former Works and Mills)	Ingestion of tainted water supply.	Future site users. Water pipes.	Low likelihood	Low	LOW
Assessment: Low likelihood as no significant contamination anticipated at pipeline depth across the site (0.75–1.35 m). Current chemical analysis indicates that PE pipe will be suitable for the site. **Recommendation:** A pipeline risk assessment should be completed following a process of remediation and enabling works. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation.						
PL8	Phytotoxic contaminants (Made Ground, Former Works and Mills)	Direct Contact (plant uptake).	Flora.	Low Likelihood	Low	LOW
Assessment: No exceedances have been identified in the chemical testing completed. **Recommendation** Due to the presence of Made Ground impacted by asbestos, a clean cover system should be installed in areas of proposed planting/soft landscaping.						

Main exposure pathways: PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical / Lateral Migration; PL6 = Corrosion of concrete; PL7=Tainting of water supply; PL8 = Uptake by plants;

5. GEOTECHNICAL ASSESSMENT

5.1. PROPOSED DEVELOPMENT

E3P understands that the proposed development will comprise offices and residential apartments with associated car parking.

5.2. SUMMARY OF GROUND CONDITIONS

- Made Ground
  - Made Ground deposits were encountered within all exploratory hole locations to a maximum proven depth of 1.50 m bgl.
  - Made Ground deposits generally comprised concrete to circa 0.35 m bgl underlain by grey sandy gravel of limestone (Type 1 MOT).
  - In addition, RBH102 identified a brick wall between 0.70 m and 1.50 m bgl. RBH104 identified a brick wall between 0.35 m and 0.80 m bgl.
  - TP101-TP104 identified concrete with a rubber membrane over brown gravelly fine to medium sand with concrete and brick to 0.70 m bgl.
- Drift
  - Drift deposits were not encountered during the ground investigation.
- Solid
  - The solid bedrock geology was encountered between 0.45 m and 10.00 m bgl. The solid geology comprises dense to very dense SANDSTONE.
  - Weathered sandstone bedrock was encountered as reddish brown medium SAND between 0.35 m and 1.50 m bgl in RBH101 and between 0.70 m and 0.80 m bgl in TP101, TP103 and TP104.
  - A former quarry is present in the centre of the site, therefore there is the potential for notable changes in the depth of bedrock.
- Groundwater
  - Groundwater strikes were not encountered during the ground investigation. Subsequent monitoring recorded groundwater between 1.40 and 3.68 m bgl.

5.3. SITE PREPARATION

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the *Manual of Contract Documents for Highway Works (MCHW)*. This should include the following:



- Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill.
- Demolition of all existing buildings and removal of all concrete hardstanding (where applicable).
- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill.
- Buried structures and old foundations have been encountered on site. These should be excavated from below the proposed development footprint with the resulting void backfilled.

5.4. FOUNDATION CONDITIONS AND ASSESSMENT OF POTENTIAL BEARING CAPACITIES

In due consideration of the identified ground conditions, in-situ and laboratory geotechnical testing, E3P has undertaken an assessment of the net safe allowable bearing pressure (ABP) within the underlying natural stratum to assist in the detailed design of foundations and infrastructure and determine the target founding stratum. The results of this assessment are summarised in Table 5.1.

TABLE 5.1 SUMMARY OF ABP

GRANULAR SOILS			
Description	**Depth (Range m bgl)**	**Relative Density**	**Allowable Bearing Pressure (kN/m²)**
SAND (Weathered Bedrock)	1.00	Very Dense	504
SANDSTONE	1.00-9.00	Dense – Very Dense	403 - 505
SANDSTONE	6.63-6.98	Dense – Very Dense	3.3 MPa (3300 kN/m²)

Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying sandstone bedrock.

Due to the highly fractured nature of the bedrock, only one Unconfined Compressive Strength (UCS) test could be undertaken from the core recovered. The results indicate that at a depth of between 6.63—6.98 m bgl the sandstone recorded a strength of 3.3 (MPa) which equates to 3300 kN/m².

A culvert is located in the south-west corner of the site and significant obstructions will be present beneath the existing buildings. All obstructions would need to be removed as part of the enabling works prior to any piling.

While a detailed assessment of pile depths and bearing capacity is beyond the scope of this report, it is likely that piles would achieve a 'set' within the sandstone. Consideration of the effects of negative skin friction due to variability on the Made Ground and natural drift strata will be required.

A specialist piling contractor should be contacted to obtain detailed designs and costs for a specialist piling technique and to allow them to reduce the factor of safety based on their extensive pile testing data.

Post demolition boreholes are required to further inform the foundation and sub-structure design.

Table 5.2 outlines the anticipated depth to suitable founding strata from existing levels at each E3P location.

TABLE 5.2 ANTICIPATED FOUNDATIONS

LOCATION	ANTICIPATED FOUNDING STRATA DEPTH (m bgl)	GROUND WATER (m bgl)	TARGET STRATUM	TREES	FOUNDATION TYPE	TYPE OF CONCRETE
TP101	1.05	N/A	Dense SAND	N	Pile	DS-1 AC-1s
TP102	>1.00	N/A	Dense SAND	N	Pile	DS-1 AC-1s
TP103	1.05	N/A	Dense SAND	N	Pile	DS-1 AC-1s
TP104	1.05	N/A	Dense SAND	N	Pile	DS-1 AC-1s
RBH101	0.90	N/A	Dense SAND	N	Pile	DS-1 AC-1s
RBH102	1.85	N/A	SANDSTONE	N	Pile	DS-1 AC-1s
RBH103	1.05	N/A	SANDSTONE	N	Pile	DS-1 AC-1s
RBH104	1.15	N/A	SANDSTONE	N	Pile	DS-1 AC-1s
RBH105	0.90	N/A	SANDSTONE	N	Pile	DS-1 AC-1s
RBH106	1.85	N/A	SANDSTONE	N	Pile	DS-1 AC-1s

5.5. GROUND FLOOR SLABS

Given the nature of the proposed high-rise residential development is it recommended that a ground bearing floor slab be utilised.

In order to accommodate for differential settlement and slab failure, it is recommended further Plate Load Testing is undertaken on the sub-grade following the breaking out of hardstand and reduced level dig to understand settlement characteristics and inform a geotechnical design specification in order to engineer to the required level to support a proposed ground bearing slab.

5.6. HEAVE PRECAUTIONS

The site has been proven to be underlain by shallow bedrock and no clay soils have been identified, therefore heave precautions are not required.

5.7. HIGHWAYS CONSTRUCTION

A programme of remediation and enabling works will be required to remediate the proposed road subgrade in accordance with the requirements of the Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works (Series 600-Earthworks) for a method compaction.

It is considered that the material can be re-engineered using method compaction to achieve a CBR in excess of 5% if works are completed in favourable climatic conditions.



5.8. DRAINAGE

The presence of substantial depths of Made Ground across some areas of the site may result in settlement. It is therefore recommended that drain runs are designed using steeper gradients and flexible joints to allow for some differential settlement.

The presence of deep Made Ground across the site will preclude the use of soakaway drainage. If soakaway drainage is to be considered, full BRE365 testing must be completed to inform the detailed design.

5.9. CONCRETE DURABILITY

Based upon the results of the chemical analyses it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE *Special Digest 1* (2005).

5.10. EXCAVATIONS

Trial pits were generally stable; as such, it is considered that near-surface excavations will be feasible.

Site observations indicated that excavations should be feasible in the near-surface with normal plant; however, obstructions were identified, including former foundations and former floor slabs. It is anticipated that any obstructions will be grubbed out during the reduced-level dig for the substructure works. Shallow bedrock has been identified, therefore larger plant may be required.

However, due to the depth and variability of the Made Ground and the likelihood of trench collapse, it is considered that all excavations are supported or battered back in accordance with the guidance contained in CIRIA R97. Furthermore, the site is topographically lower than the adjacent roadways, consideration must be given to retaining being constructed or current wall adapted to ensure the stability of the soils around the periphery of the site.

If local pumping of groundwater is required during the advancement of excavations for the proposed foundations then consideration should be given to the potential for dewatering gravels in the surrounding areas that may cause structural damage to building substructures in close proximity to the site.

TABLE 5.3 CIVIL ENGINEERING EXCAVATION RISK MATRIX

RISK ITEM	PRESENT	COMMENT
Running Sands	No	No running sand has been identified.
Minor Water Ingress	Yes	Minor water ingress will require localised dewatering/sump pumping during the construction of site drainage infrastructure. Ingress of water into foundation excavation will potentially flood foundation excavations, limiting the viability of spread foundations to be constructed.
Shallow Bedrock	Yes	Shallow bedrock has been identified. The presence of bedrock will impede excavation for drainage infrastructure using traditional excavation plant and equipment.

5.11. CONSTRUCTION ACTIVITY AND INSPECTION

The following activities and inspections should be incorporated into the site works:

- Due to the variability of the soils at the site, it is recommended that sufficient allowance is made for the inspection of formations and sub-formations to foundations and pavement construction.
- Excavations where access is required should be subject to a risk assessment from a competent person and, where appropriate, mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 should be utilised.
- It is considered that dewatering may be required, especially following periods of heavy rainfall. Removal of surface water and water within trenches should be possible with conventional sump pumping. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to the provision of space for settling tanks or an attenuation pond.
- Where access to confined spaces is required, appropriate mitigation measures should be addressed within the construction stage health and safety plan. Particular account should be taken of the gas results.
- The presence of potential contamination and mitigation measures should be addressed as part of the construction stage health and safety plan and should include measures to design out the risks, reduce their impact and, finally, include the use of personnel protective equipment (PPE).

5.12. GEOTECHNICAL RISK REGISTER

POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON-SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Remediation of contaminated soils	On-site	TBC	Asbestos should be managed according to the asbestos CSM. Should significant backfill be needed deeper or specialist foundations may be required in those areas.
Bedrock	On-site	100	Shallow bedrock is identified, this represents a significant risk in terms of the viability for excavations to install infrastructure using standard construction equipment. The actual depth is currently unprofiled across the site.
Obstructions	All	100	Significant obstructions are present under the existing buildings.
Artificially levelled and filled platforms	On-site	100	The site appears to have been levelled and artificially backfilled. An infilled quarry is present in the centre of the site.
Retaining walls	On-site	100	There are retaining walls on all boundaries of the site. These will need to be considered during the phased demolition of the site.
Trench collapse	All	100	Made Ground present beneath the site is likely to be loosely compacted and possibly prone to collapse.
Volume change potential clay	N/A	N/A	No clay soils have been identified, therefore heave precautions are not required.
Running sands	N/A	N/A	Data searches indicate low risk.
Ground dissolution	N/A	N/A	Data searches indicate no hazard.
Concrete design	On-site	100	The soils meet class DS-1, AC-1s.
Low-permeability ground	On-site	N/A	The presence of deep Made Ground across the site will preclude the use of soakaway drainage. If soakaway drainage is to be considered, full BRE365 testing must be completed to inform the detailed design.

POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON-SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Services/sensitive structures	-	-	A review of online services has identified a number of services within the site boundary including a culvert in the south-west. Piling may not be possible within close proximity to any sensitive infrastructure.
Abnormal foundation solutions	On-site	100	A piled foundation will be required due to the imposed loads, presence of deep Made Ground and obstructions.
Areas not investigated	On-site	60	Further investigation will be required once the existing buildings have been demolished.

5.13. FURTHER WORKS

Based on the findings of the intrusive site investigation, the following additional works are recommended to be completed in due course:

- Further investigation of inaccessible areas and extensive post demolition ground investigation.
- Additional round of groundwater and surface water sampling.
- Further geotechnical testing to determine the settlement characteristics for ground bearing floor slab (upon completion of the reduced level dig) and pavement design.
- Foundations to be designed by suitably qualified Structural Engineer.
- Geotechnical earthworks strategy (infrastructure).
- Remediation and enabling works strategy.
- Construction phase Surface Water Management Plan.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. CONTAMINATED LAND ASSESSMENT

Human Health	The Tier I assessment identified a single exceedance for asbestos. Loose chrysotile fibres were identified in the granular Made Ground in TP104 at <0.001 %. No visual signs of ACM were encountered during the ground investigation; it is therefore likely that only trace fibres are present. Impacted soils should be managed according to the asbestos risk mitigation conceptual site model. The installation of a suitable cover system in all landscaping and public open space will remove any potential for direct exposure to impacted soils. The specific design and installation process for the appropriate cover systems should be defined within a site remediation and enabling works strategy. Chemical analysis of the natural granular deposits has identified these soils to be acceptable for use as subsoil within the proposed landscaped areas; however, further chemical validation samples will be required to confirm this. There are no suitable sources of topsoil available on the site. Further post-demolition investigations are required to confirm the findings of this initial assessment as and when full and unrestricted access is available.
Controlled Waters	Leachate and groundwater analysis has identified exceedances of the EQS for chromium, copper, mercury, tricholomethane and pH. Historically, the site has been occupied by a Cotton Finishing Works, Copper Roller Works and Mills which are potential sources of mobile contamination. However, the initial soil analysis has not identified a risk to controlled waters. The site is underlain by shallow sandstone bedrock which is classified as a principal aquifer. However, the majority of the identified inorganic compounds are of low solubility. The sensitivity of the principal aquifer in the bedrock is reduced given the closest potable groundwater abstraction is located 507 m north. Tricholormethane has been recorded above the limit of detection in all three groundwater samples from the rotary boreholes which have monitoring wells set within the sandstone bedrock. All other VOCs are less than the limit of detection. It is unlikely that this relates to residual contamination from the former works and mills located on site as these land uses were historical and the compounds would have degraged. It is considered possible that this compound may have migrated from commercial sites further afield. The site is topographically lower than the land to the east, therefore it is likely that groundwater will flow towards the site and towards the River Irwell. The results of the groundwater analysis indicate a higher concentration of trichloromethane at RBH101 in the north east as opposed to RBH105 located in the south west.

Controlled Waters	The site is encapsulated in hardstanding, therefore infiltration will be limited. An additional round of groundwater sampling and surface water analysis is recommended to further assess the risk to controlled waters. The results will be issued in an addendum report.
Ground Gas	Characteristic Situation 1 (pending completion of gas monitoring).
Potable Water	This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation. Current indications suggest that PE pipe may be suitable.

6.2. GEOTECHNICAL ASSESSMENT

The natural SAND (weathered bedrock) has been assessed as being very dense with a net allowable bearing pressure (ABP) in the order of 504 kN/m² at circa 1 m bgl.

The underlying SANDSTONE has a net ABP of 403-505 kN/m² between 1.00 m and 9.00 m bgl.

Given the significant obstructions, prior to the construction of any foundation solution, a programme of remediation and enabling works will be required to remove existing foundation and slab structures and re-engineer the site to provide suitable development platform levels.

The Made Ground is not considered a suitable target founding stratum.

In respect of the proposed development, E3P consider it feasible to construct the proposed residential apartment blocks utilising piled foundations set within the underlying sandstone bedrock. The final foundation solution will be dependent on the structural loadings, elevation and should be designed by a suitably qualified structural engineer with detailed designs from a specialist piling contractor.

Post demolition boreholes are required to further inform the foundation and sub-structure design.

END OF REPORT

APPENDIX I
LIMITATIONS

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

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

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

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

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

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

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

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

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

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

APPENDIX II
GLOSSARY

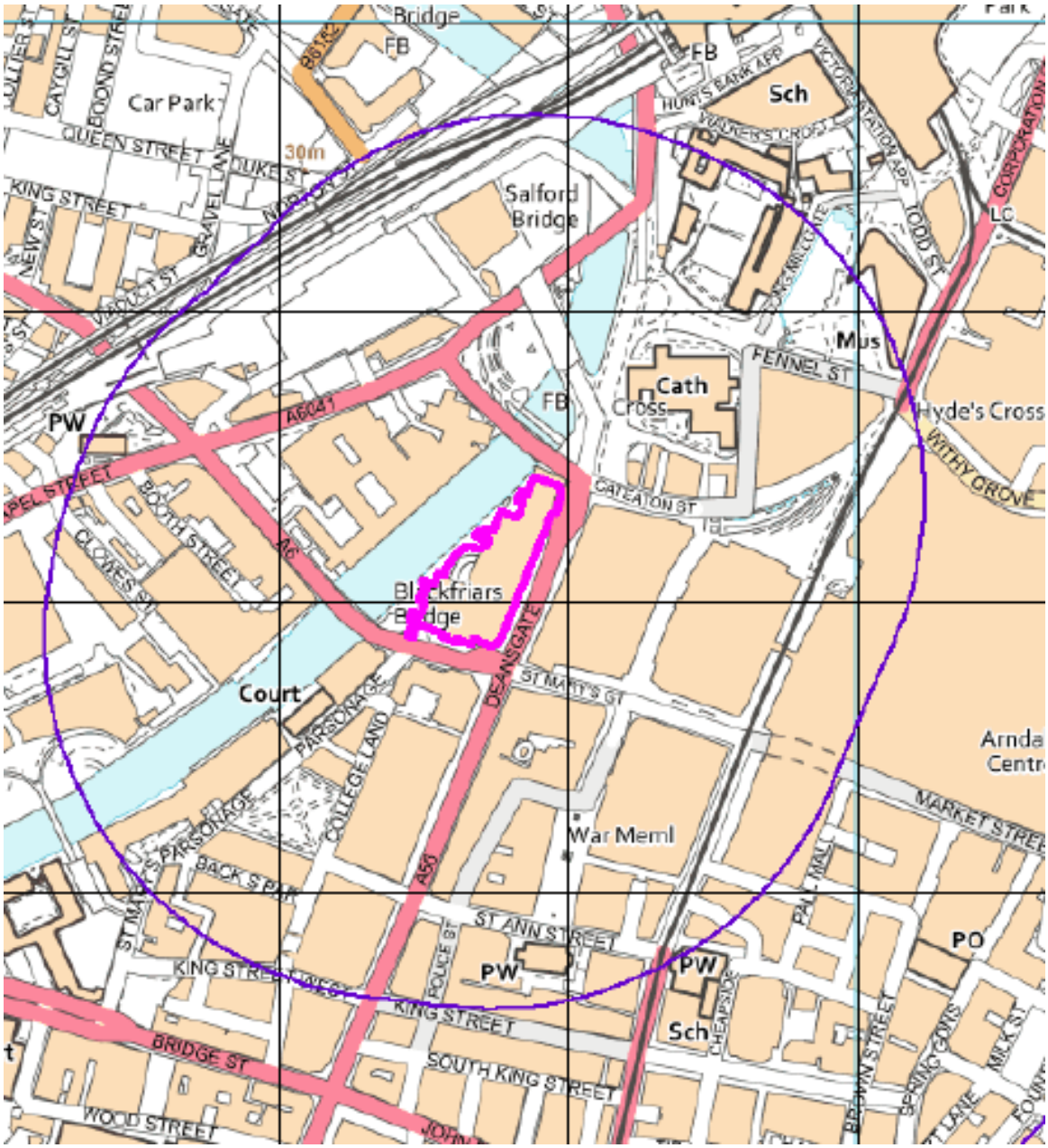
TERMS

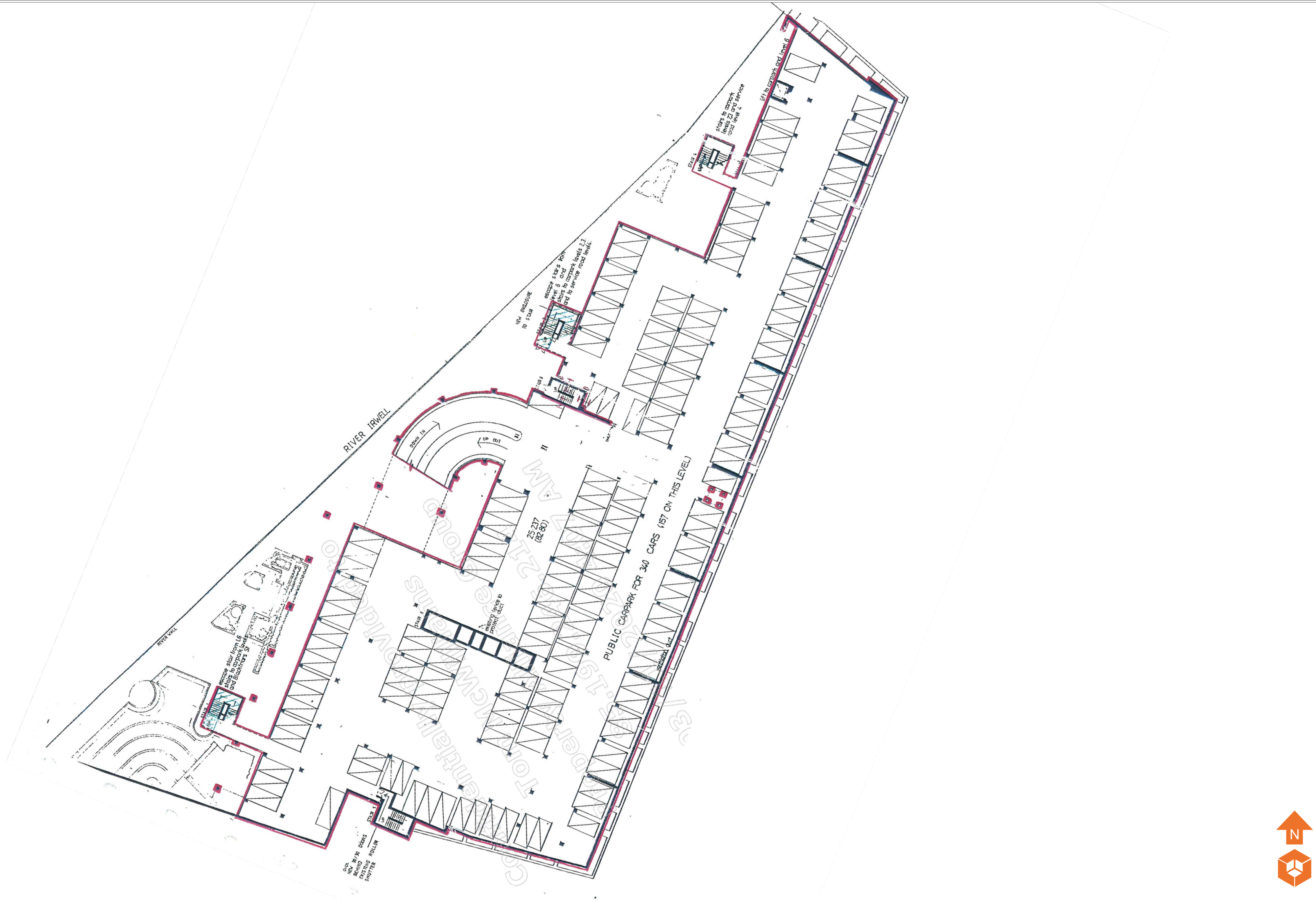
ACM	Asbestos-containing material	**MMP**	Materials management plan
ADS	Acoustic design statement	**ND**	Not detected
AST	Above-ground storage tank	**NDP**	Nuclear density probe
BGS	British Geological Survey	**NMP**	Noise management plan
BSI	British Standards Institute	**NPSE**	Noise policy statement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

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

APPENDIX III
DRAWINGS

DRAWING 14-261-001 – SITE LOCATION PLAN





Notes:	Client:	Job No:	Date:
	Property Alliance Group Ltd	14-261	21.04.2021
		Drawing No: 002	Scale: NTS

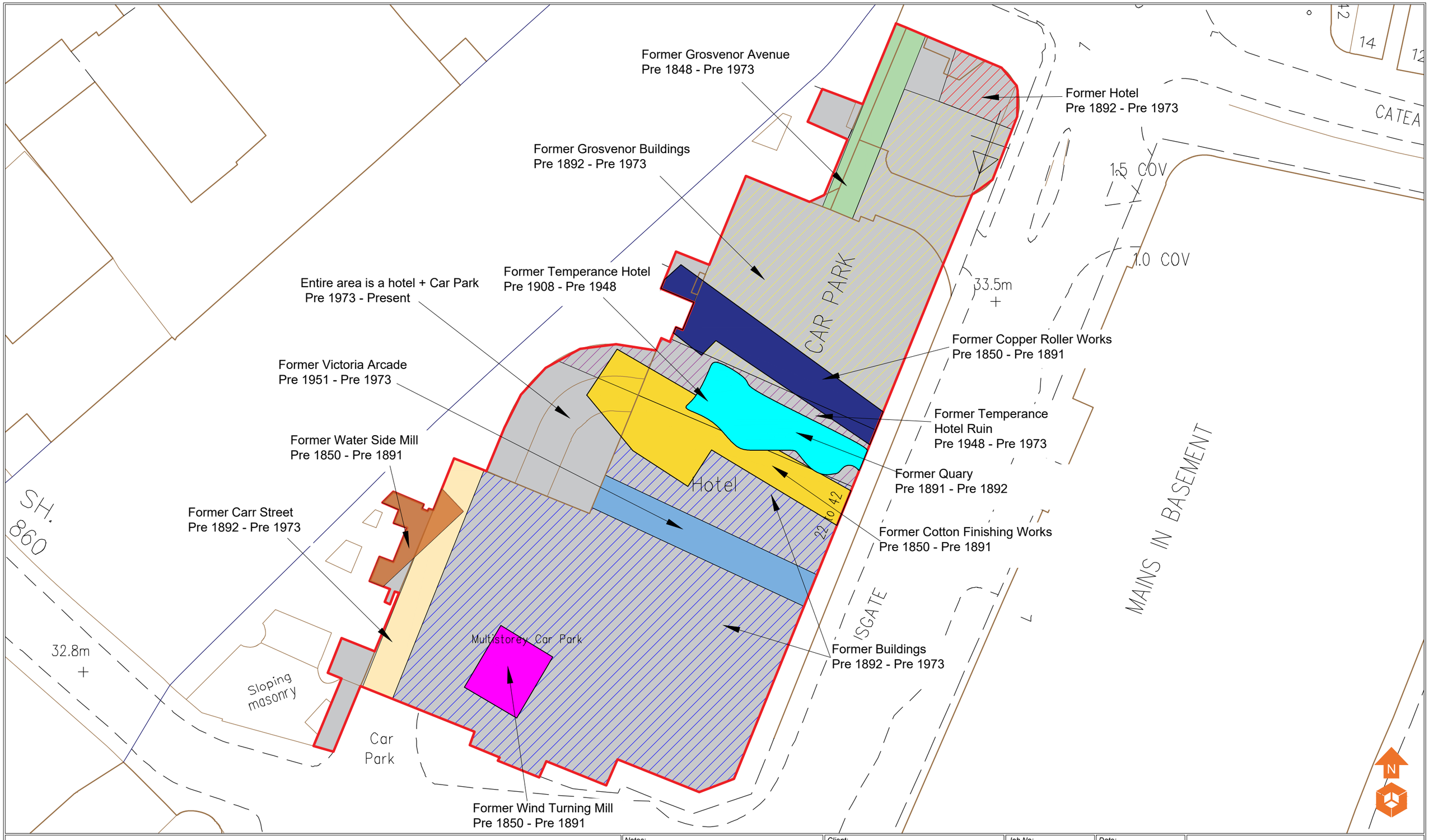
P1	REVA	21.04.2021	LM	NS
Phase	Issue	Date	Drawn	Checked

Job Title: Renaissance Deansgate

Drawing Title: Proposed Development Plan

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Historical Features

- Former Buildings
- Former Carr Street
- Former Victoria Arcade
- Former Temperance Hotel
- Former Grosvenor Building
- Former Grosvenor Avenue
- Former Hotel
- Current Hotel and Car Park
- Former Quarry
- Former Wind Turning Mill
- Former Cotton Finishing Works
- Former Copper Roller Works
- Former Water Side Mill

Notes:

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 13.05.2021

Drawing No: 003

Scale: NTS

Phase	Issue	Date	Drawn	Checked
P1	REVB	13.05.2021	EB	NS
P1	REVA	28.07.2020	LM	EF

Job Title: Renaissance Deansgate

Drawing Title: Historical Features Plan

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Site Features

- Multi-Storey Car Park
- Hotel
- Restaurant
- Staircases
- Car Park Ramp

Notes:

P1	REVA	28.07.2020	LM	EF
Phase	Issue	Date	Drawn	Checked

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 28.07.2020

Drawing No: 004

Scale: NTS

Job Title: Renaissance Deansgate

Drawing Title: Site Features Plan

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Location Symbols

- Approximate Core Through Wall Location
- Approximate Trial Pit Location
- Approximate Rotary Borehole Location with Install

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVC	15.04.2021	HM	JC
P1	REVB	06.04.2021	CB	NS
P1	REVA	01.04.2021	CB	NS

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 15.04.2021

Drawing No: 005

Scale: NTS

Job Title: Renaissance Deansgate

Drawing Title: Exploratory Hole Location Plan

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Depth of area is assumed to be greater than 2.50m bgl.

RB101(MW)
RB102(MW)
RB103(MW)
WC101
RB104(MW)
RB106(MW)
TP104
TP102
TP103
RB105(MW)
TP101
WC102

CATEA
1.5 COV
1.0 COV
33.5m
MAINS IN BASEMENT
DEANSGATE
Multi-storey Car Park
Car Park
Sloping masonry
32.8m
SH. 860
Hotel
14

N

Location Symbols

- Approximate Core Through Wall Location
- Approximate Trial Pit Location
- Approximate Rotary Borehole Location with Install

Made Ground Depth (m)

- Depth of Made Ground 0.00 - 0.24m
- Depth of Made Ground 0.25 - 0.49m
- Depth of Made Ground 0.50 - 0.74m
- Depth of Made Ground 0.75 - 0.99m
- Depth of Made Ground 1.00 - 1.24m
- Depth of Made Ground 1.25 - 1.49m
- Depth of Made Ground 1.50 - 1.74m
- Depth of Made Ground 1.75 - 1.99m
- Depth of Made Ground >2.00m

Notes:

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 07.04.2021

Drawing No: 006

Scale: NTS

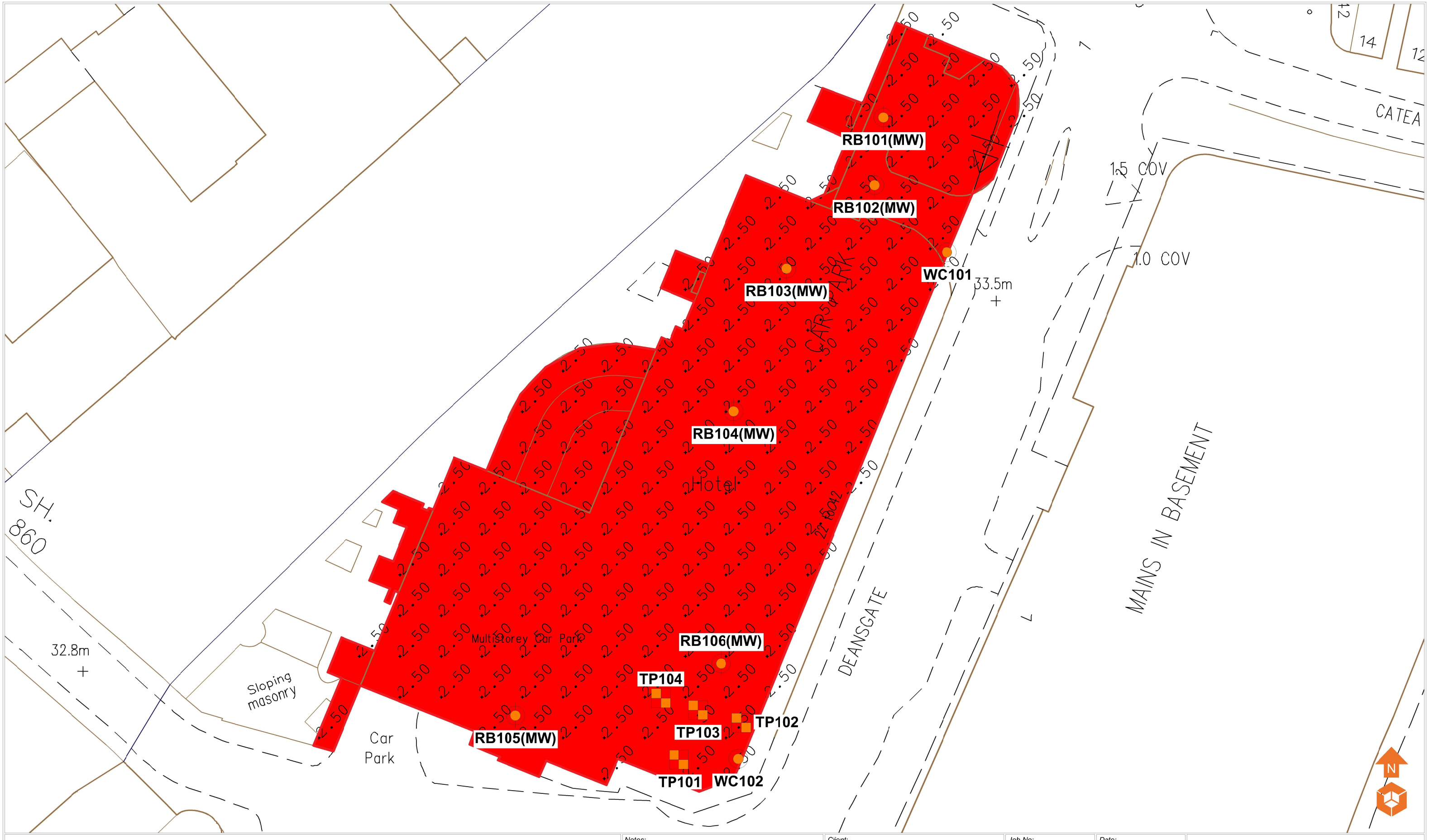
Phase	Issue	Date	Drawn	Checked
P1	REVA	07.04.2021	EB	NS

Job Title: Renaissance Deansgate

Drawing Title: Depth Of Made Ground Plan

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Location Symbols

- Approximate Core Through Wall Location
- Approximate Trial Pit Location
- Approximate Rotary Borehole Location with Install

Shallow Spread Footings

- Depth to Founding Strata 0.00 - 1.24m
- Depth to Founding Strata 1.25 - 1.49m

Mass Trench Fill Footings

- Depth to Founding Strata 1.50 - 1.74m
- Depth to Founding Strata 1.75 - 1.99m
- Depth to Founding Strata 2.00 - 2.24m

Engineered Footings

- Depth to Founding Strata 2.25 - 2.49m
- Depth to Founding Strata >2.50m

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVA	07.04.2021	EB	NS

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 07.04.2021

Drawing No: 008

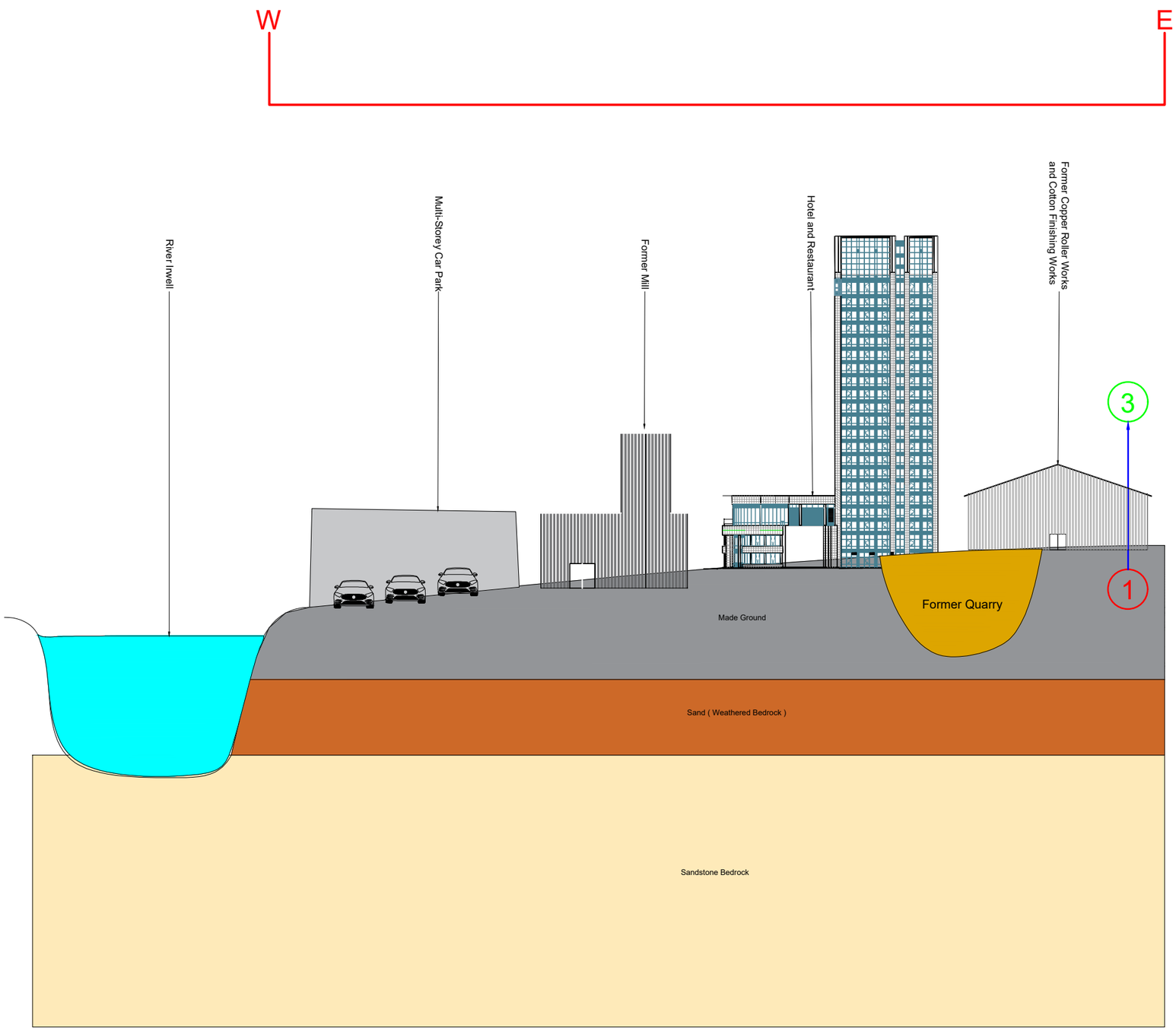
Scale: NTS

Job Title: Renaissance Deansgate

Drawing Title: Depth Of Founding Strata Plan

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Geology Key

- Made Ground
- Sand (Weathered Bedrock)
- Sandstone Bedrock
- Former Quarry

Sources

1 Asbestos

Receptors

1 Future Site Users / Construction Workers

Pathways

Dust Inhalation

Notes:

P1	REVB	13.05.2021	EB	NS
P1	REVA	07.04.2021	EB	NS
Phase	Issue	Date	Drawn	Checked

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 13.05.2021

Drawing No: 010

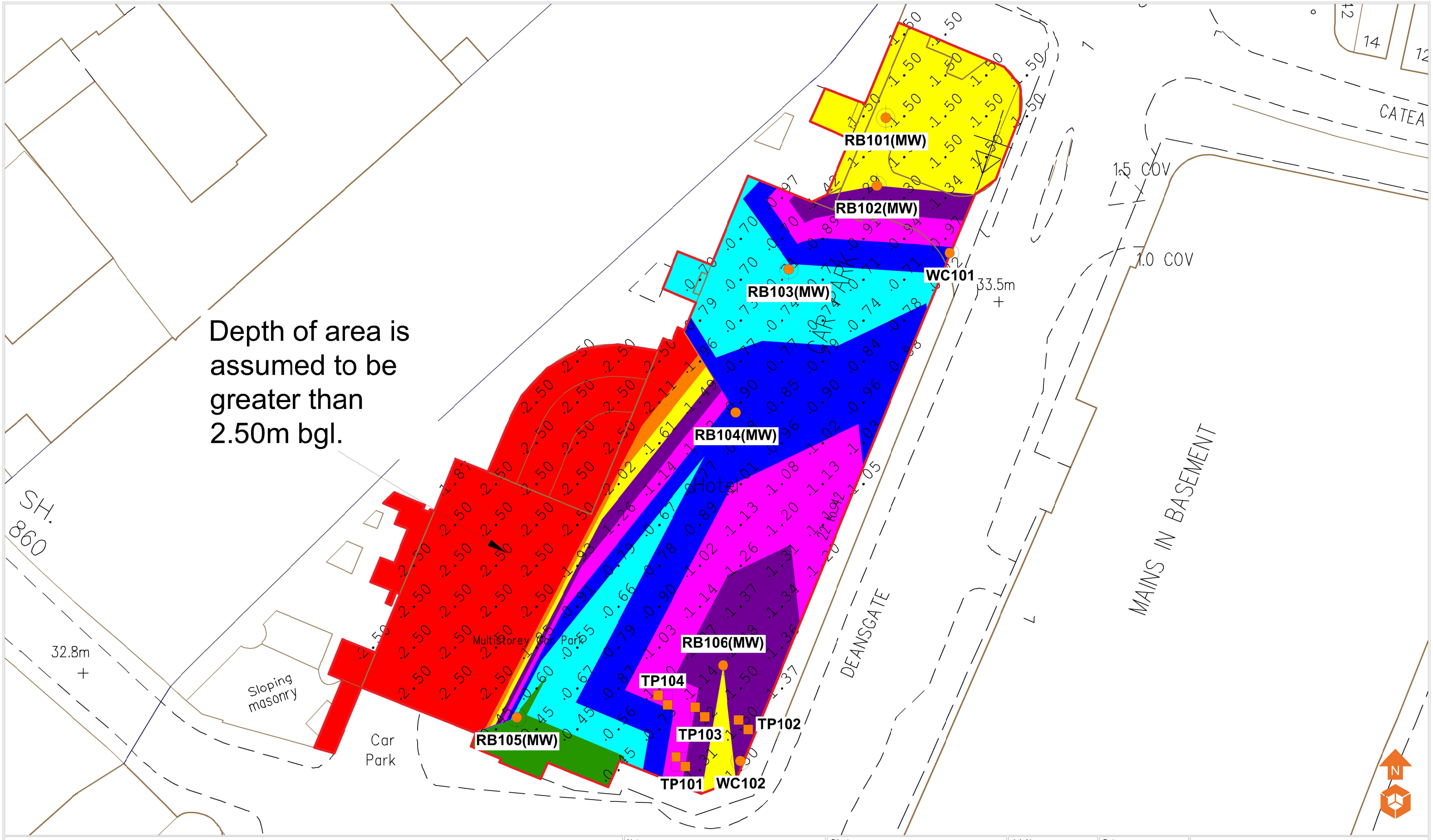
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Job Title: Renaissance Deangate

Drawing Title: Conceptual Site Model

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Location Symbols

- Approximate Core Through Wall Location
- Approximate Trial Pit Location
- Approximate Rotary Borehole Location with Install

Bedrock Depth (m)

- Depth of Bedrock 0.00 - 0.24m
- Depth of Bedrock 0.25 - 0.49m
- Depth of Bedrock 0.50 - 0.74m
- Depth of Bedrock 0.75 - 0.99m
- Depth of Bedrock 1.00 - 1.24m
- Depth of Bedrock 1.25 - 1.49m
- Depth of Bedrock 1.50 - 1.74m
- Depth of Bedrock 1.75 - 1.99m
- Depth of Bedrock >2.00m

Notes:

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 07.04.2021

Drawing No: 012

Scale: NTS

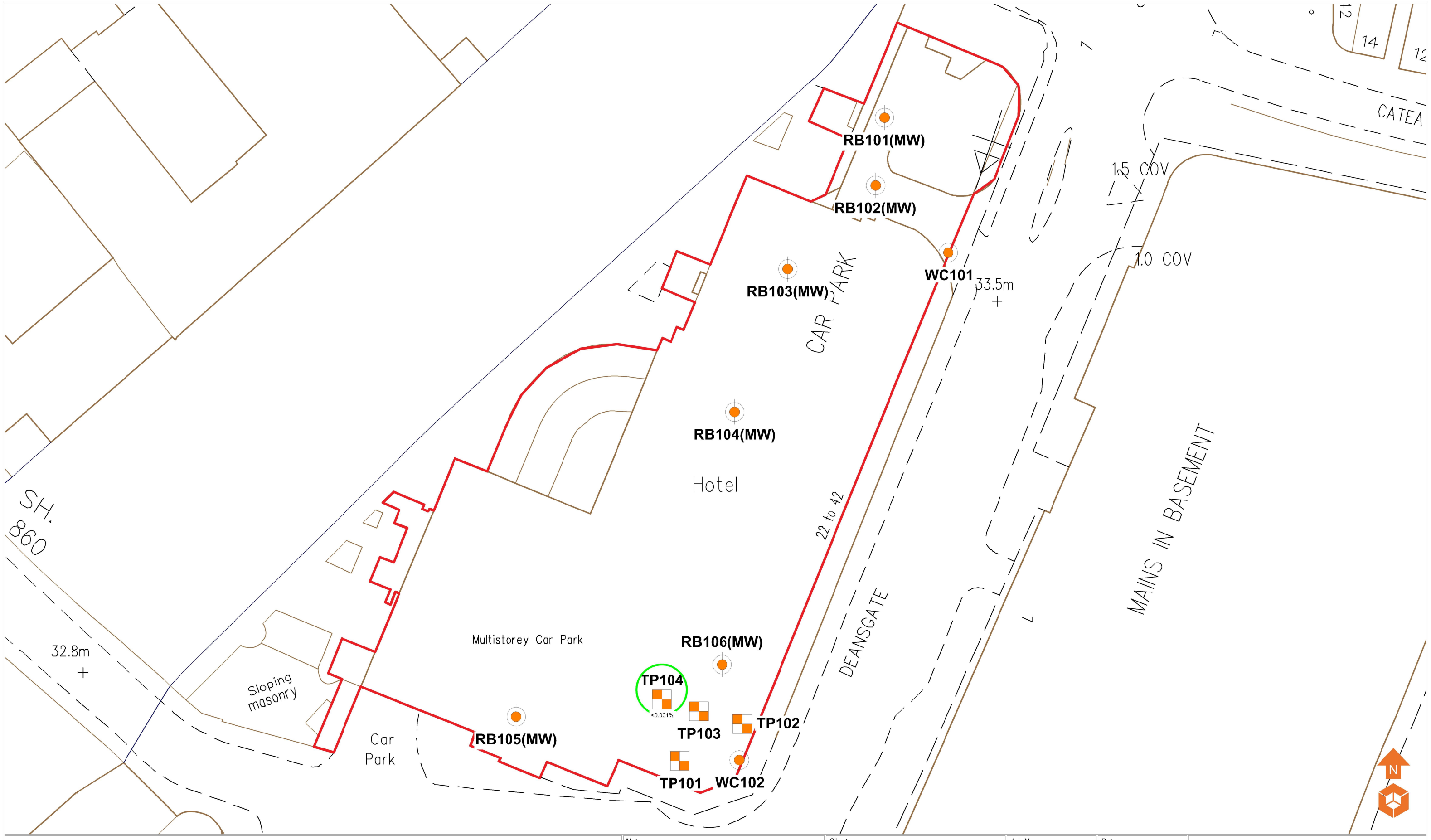
P1	REVA	07.04.2021	EB	NS
Phase	Issue	Date	Drawn	Checked

Job Title: Renaissance Deansgate

Drawing Title: Depth Of Bedrock Plan

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Location Symbols

- Approximate Core Through Wall Location
- Approximate Trial Pit Location
- Approximate Rotary Borehole Location with Install

Contaminants

- Asbestos

Notes:

P1	REVA	07.04.2021	EB	NS
Phase	Issue	Date	Drawn	Checked

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 07.04.2021

Drawing No: 018

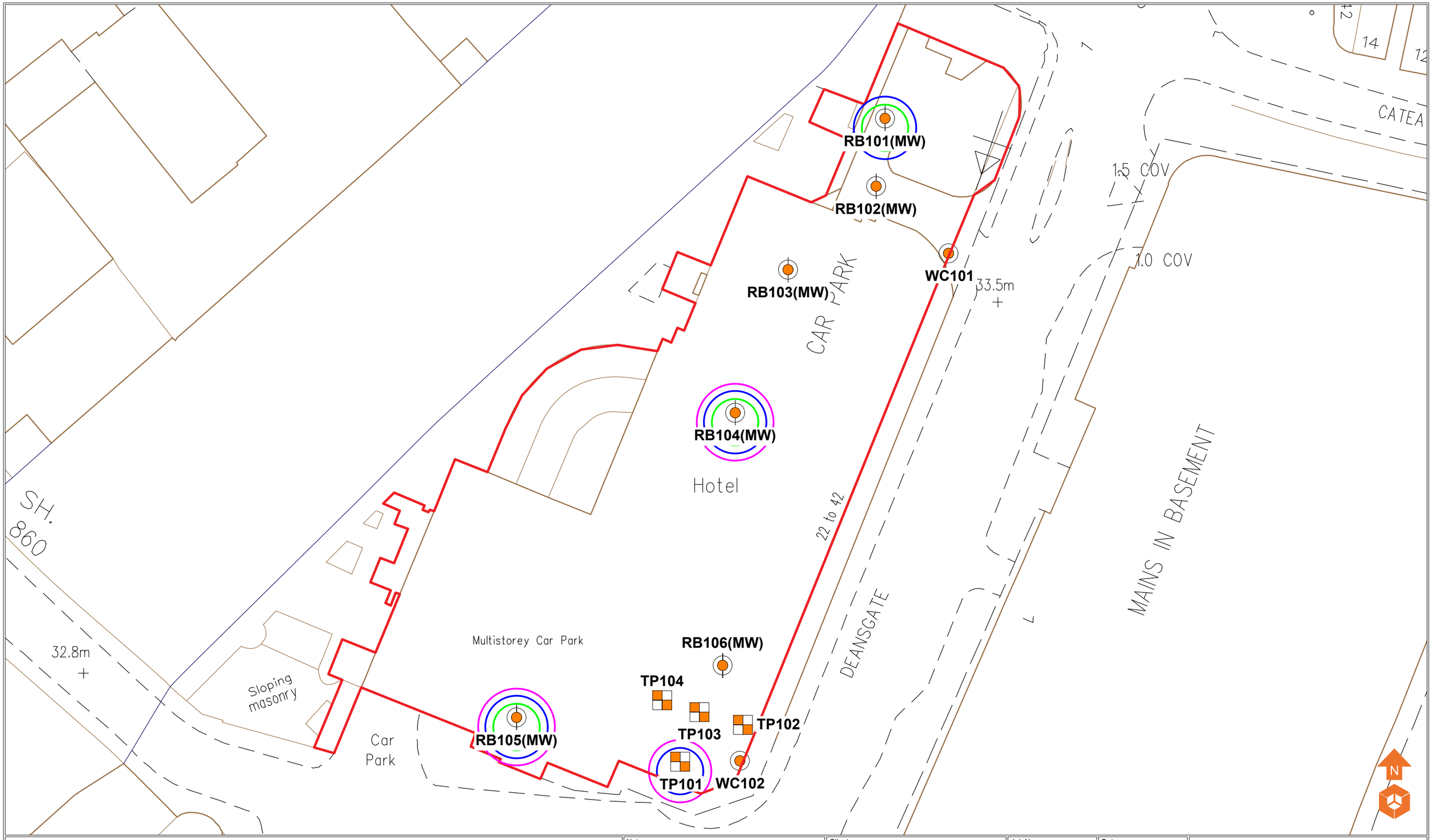
Scale: NTS

Job Title: Renaissance Deansgate

Drawing Title: Contamination Issues Plan - Human Health

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Location Symbols

- Approximate Core Through Wall Location
- Approximate Trial Pit Location
- Approximate Rotary Borehole Location with Install

Contaminants

- Heavy Metals
- PH
- Trichloromethane

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVB	13.05.2021	EB	NS
P1	REVA	07.04.2021	EB	NS

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 13.05.2021

Drawing No: 019

Scale: NTS

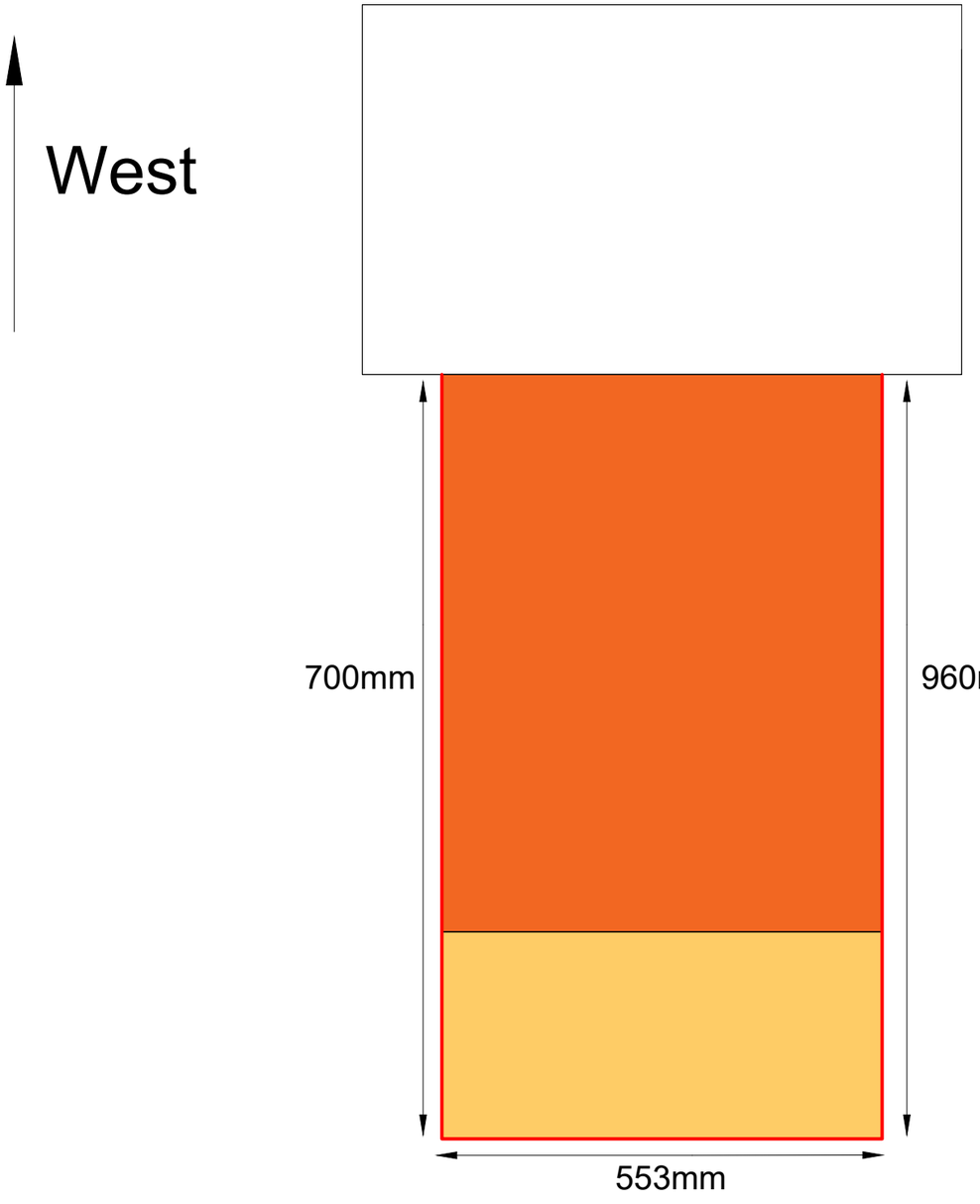
Job Title: Renaissance Deansgate

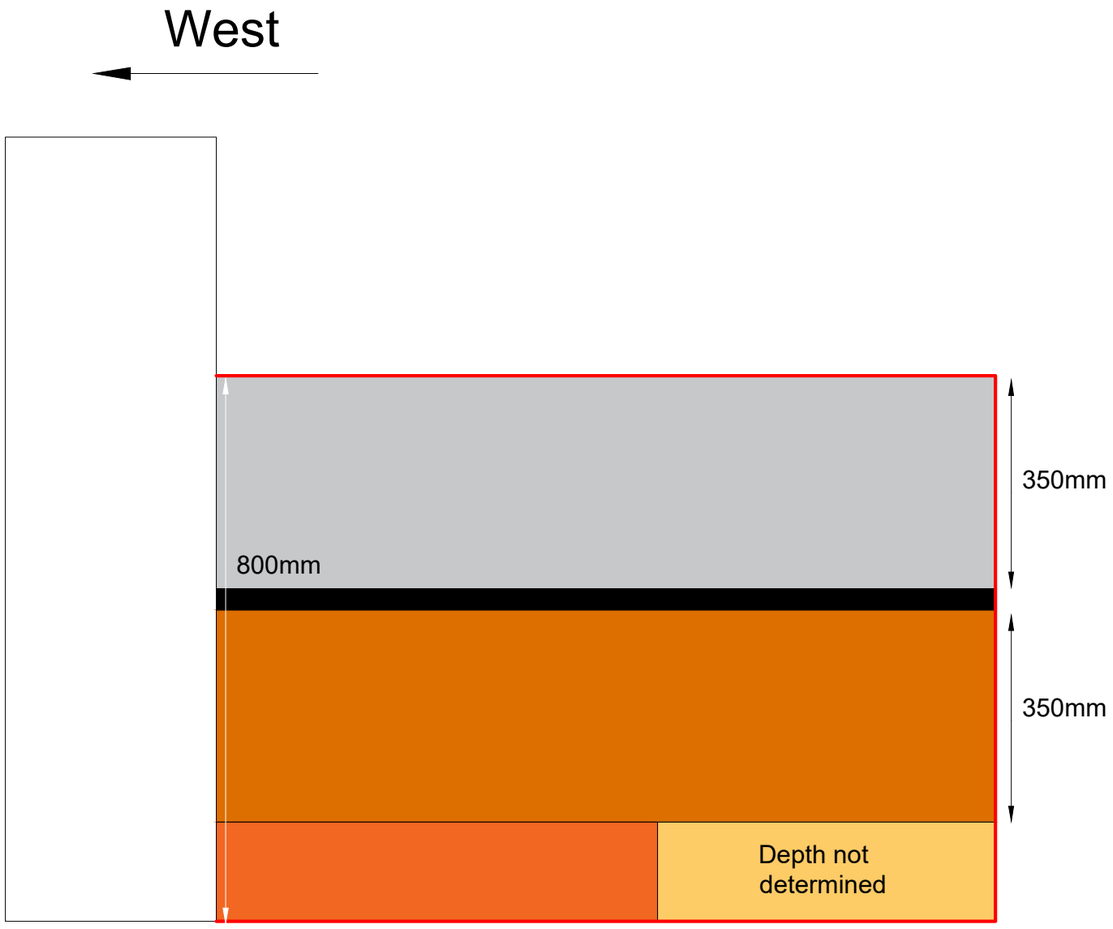
Drawing Title: Contamination Issues Plan - Controlled Waters

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TP101





Foundation Pit Details

- Concrete Pillar
- Foundation Slab
- Concrete
- Sandstone
- Made Ground - Brown Gravelly Sand. Site won natural backfill
- Rubber Membrane
- Trial Pit

Notes:

P1	REVA	12.03.2021	LM	JC
Phase	Issue	Date	Drawn	Checked

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 12.03.2021

Drawing No: 023

Scale: NTS

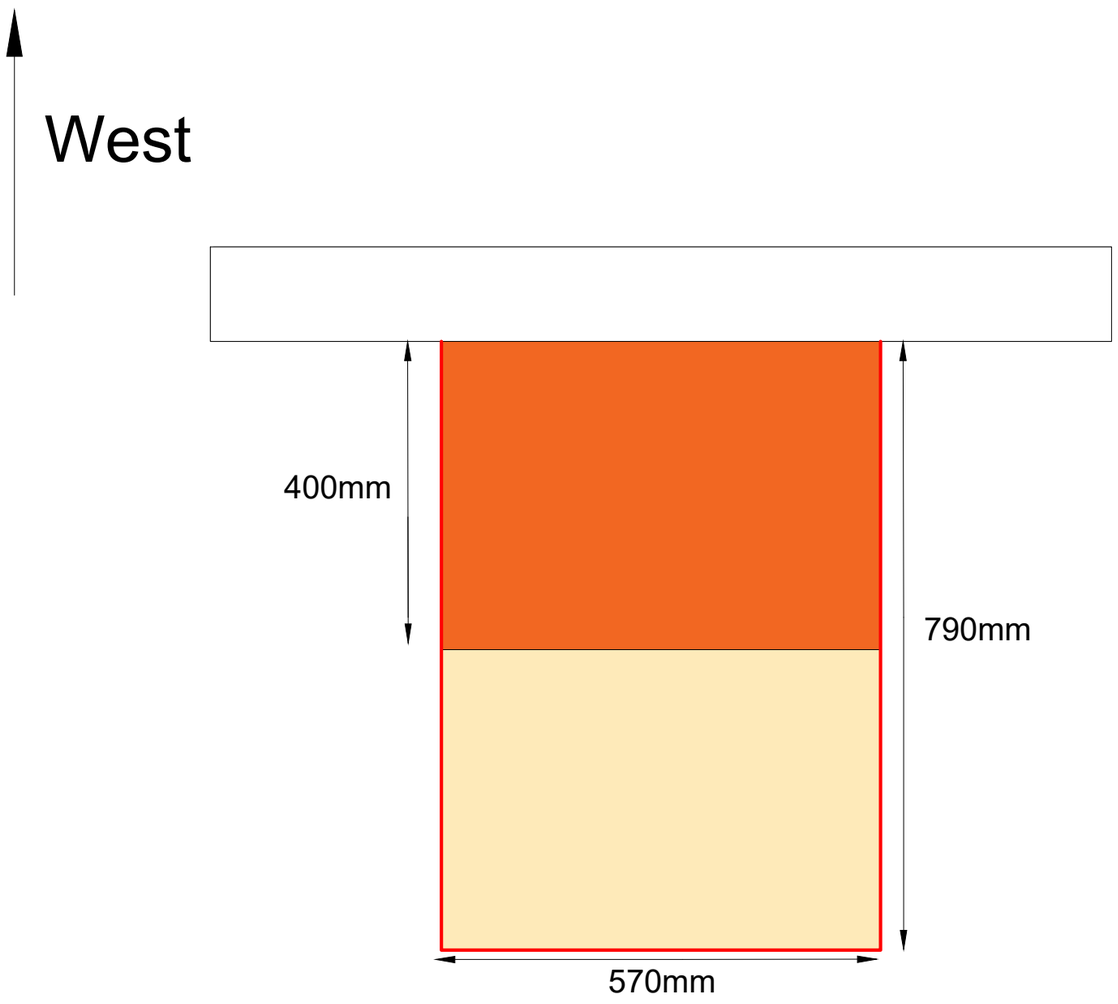
Job Title: Renaissance Deansgate

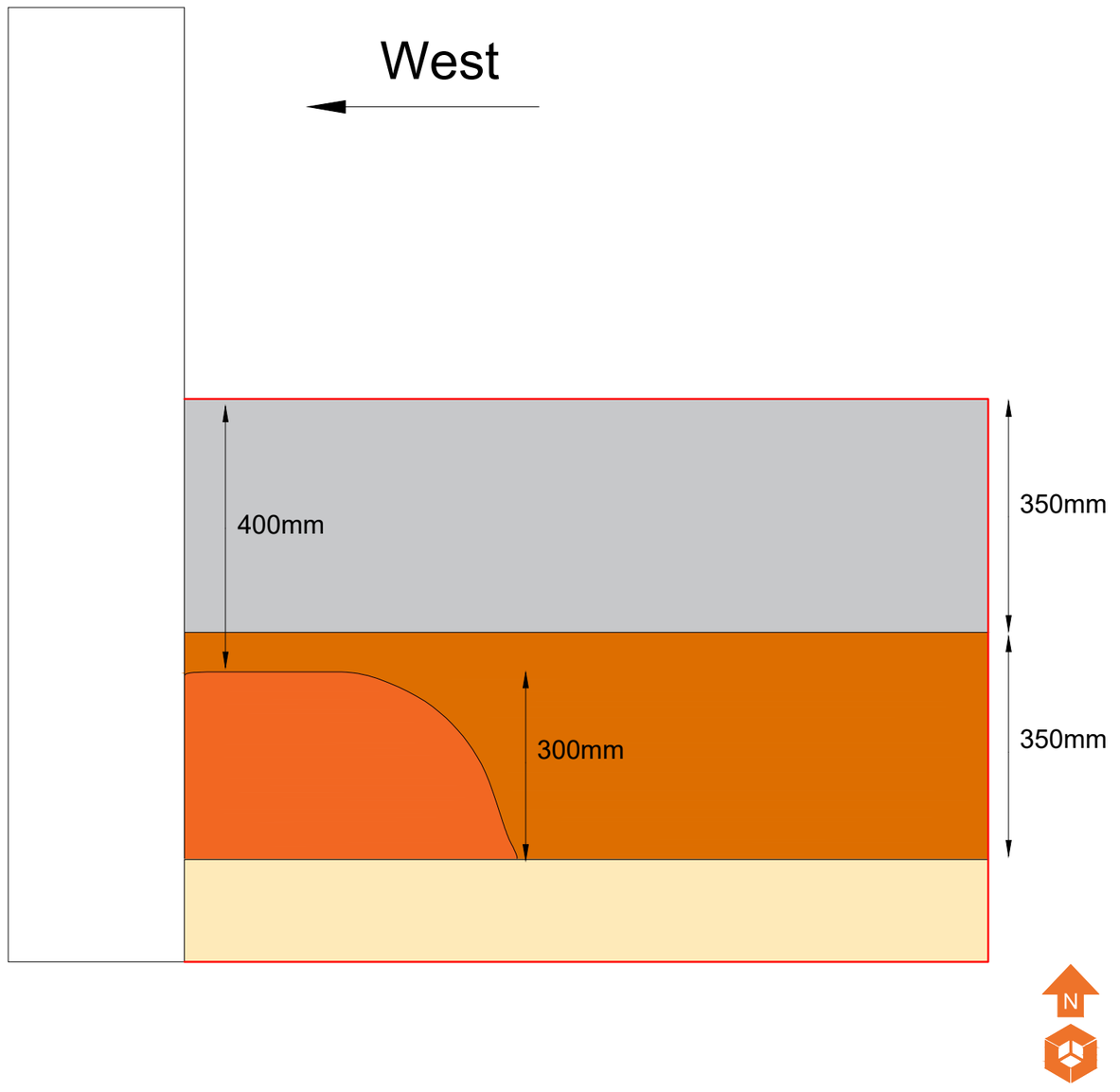
Drawing Title: Foundation Pit Details - TP101

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TP102





Foundation Pit Details

- Concrete Pillar
- Foundation Slab
- Concrete
- Sandstone
- Made Ground - Brown Gravelly Sand. Site won natural backfill
- Rubber Membrane
- Trial Pit

Notes:

P1	REVA	12.03.2021	LM	JC
Phase	Issue	Date	Drawn	Checked

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 12.03.2021

Drawing No: 023

Scale: NTS

Job Title: Renaissance Deansgate

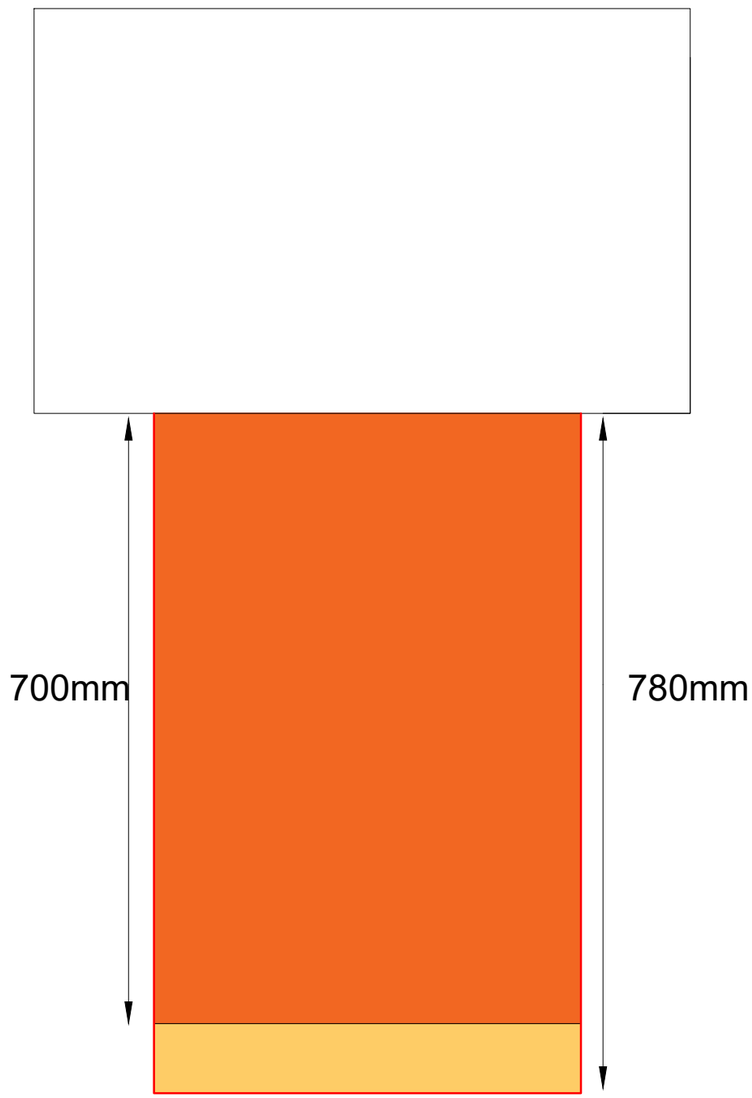
Drawing Title: Foundation Pit Details - TP102

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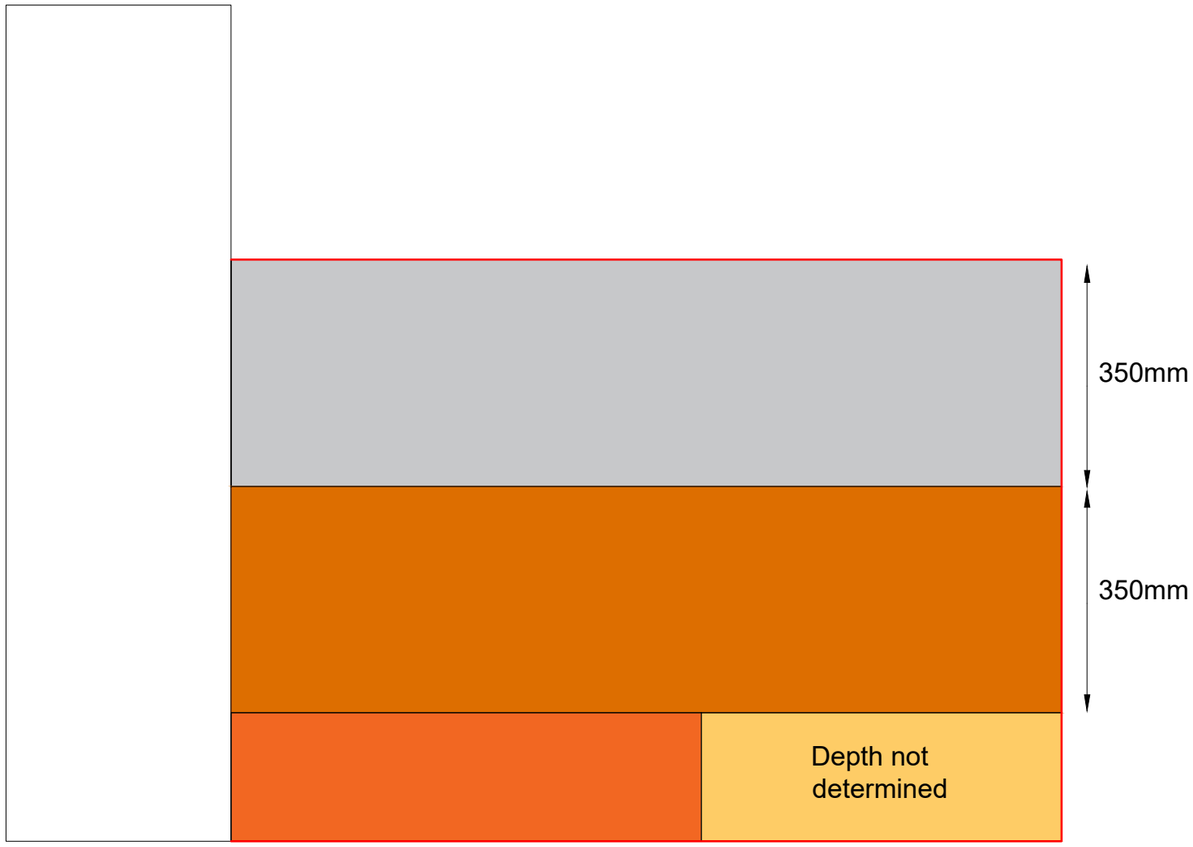
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TP103

South



South



Foundation Pit Details

- Concrete Pillar
- Foundation Slab
- Concrete
- Sandstone
- Made Ground - Brown Gravelly Sand. Site won natural backfill
- Rubber Membrane
- Trial Pit

Notes:

P1	REVA	12.03.2021	LM	JC
Phase	Issue	Date	Drawn	Checked

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 12.03.2021

Drawing No: 023

Scale: NTS

Job Title: Renaissance Deansgate

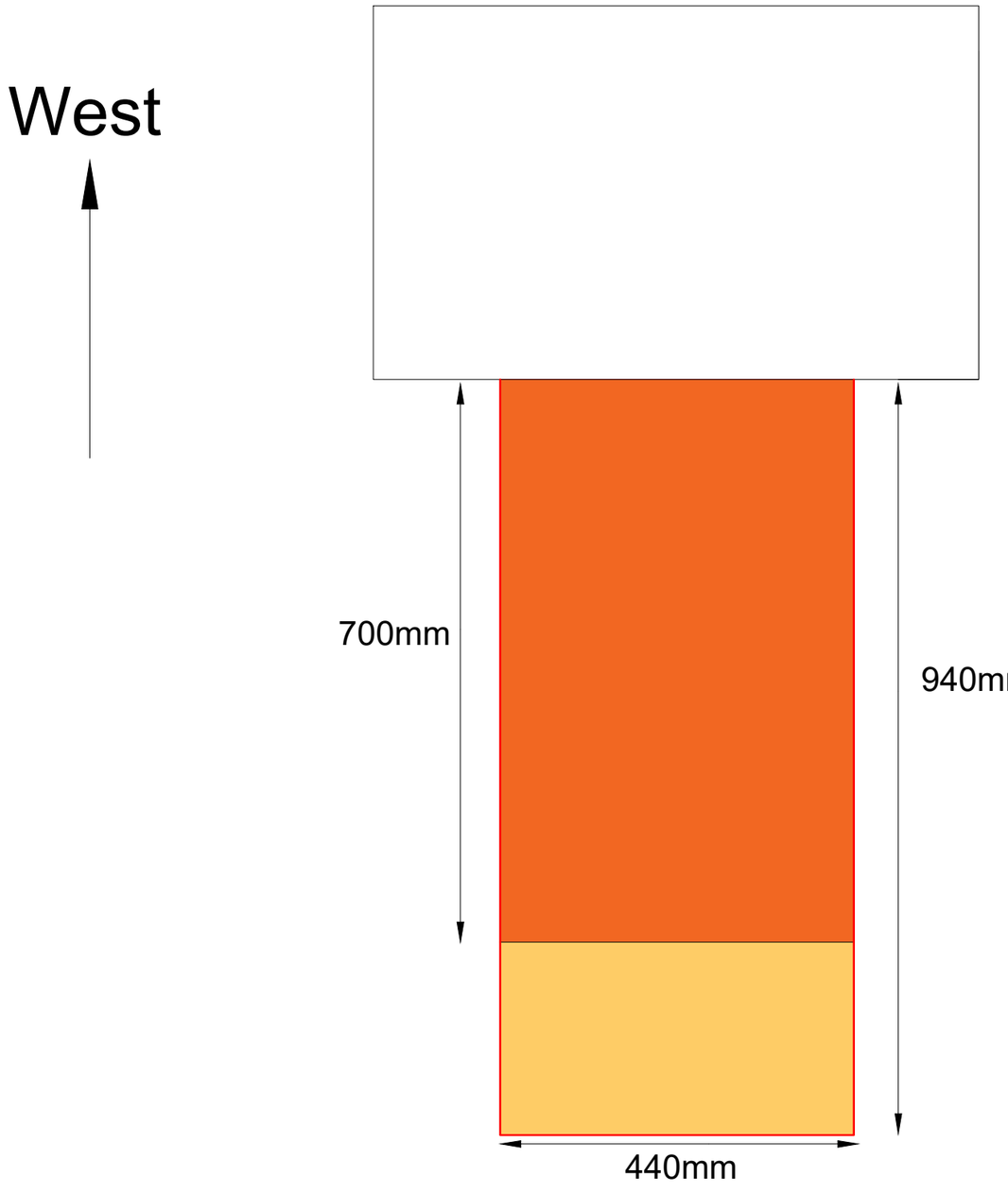
Drawing Title: Foundation Pit Details - TP103

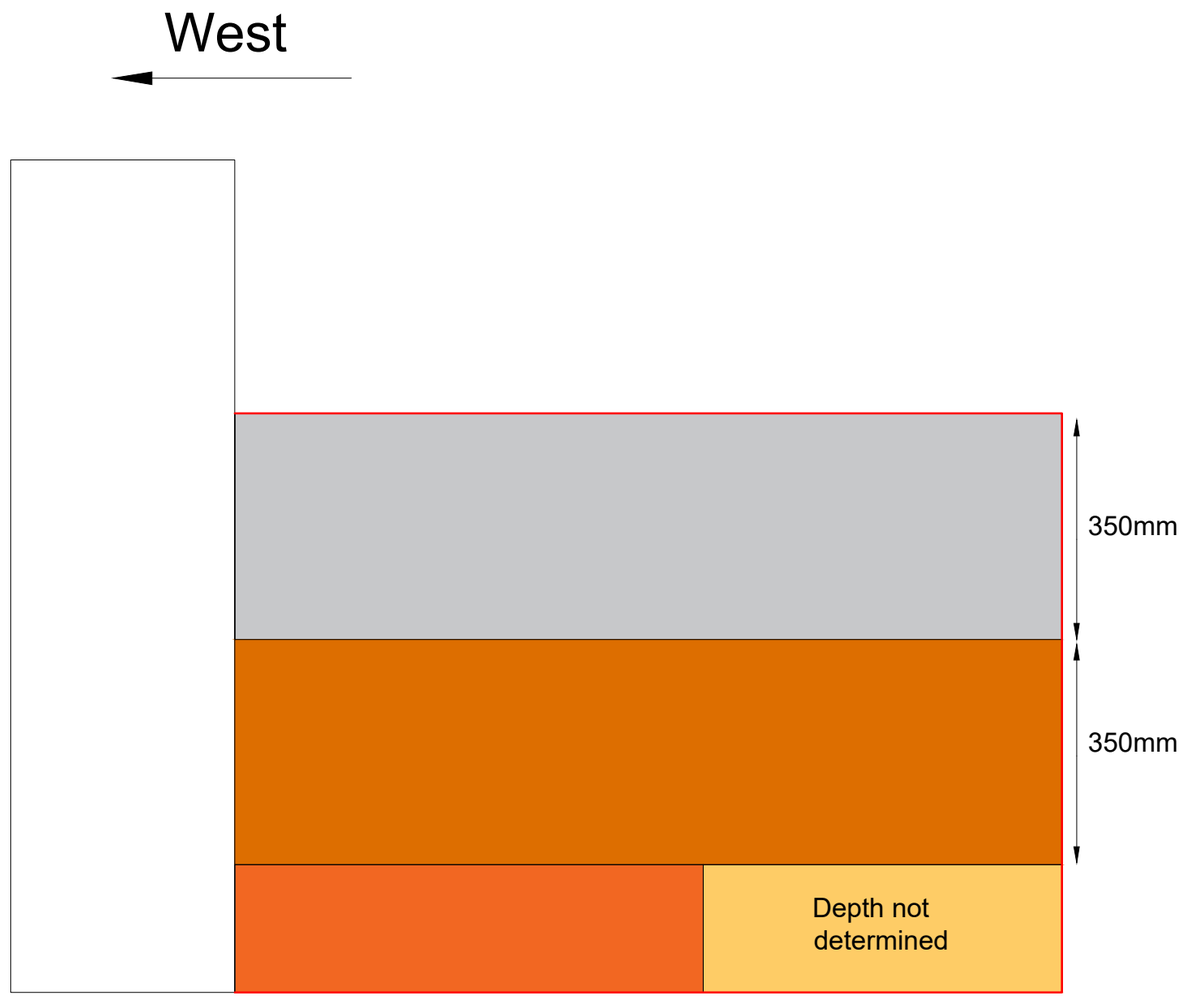
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TP104





Foundation Pit Details

- Concrete Pillar
- Foundation Slab
- Concrete
- Sandstone
- Made Ground - Brown Gravelly Sand. Site won natural backfill
- Rubber Membrane
- Trial Pit

Notes:

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 12.03.2021

Drawing No: 023

Scale: NTS

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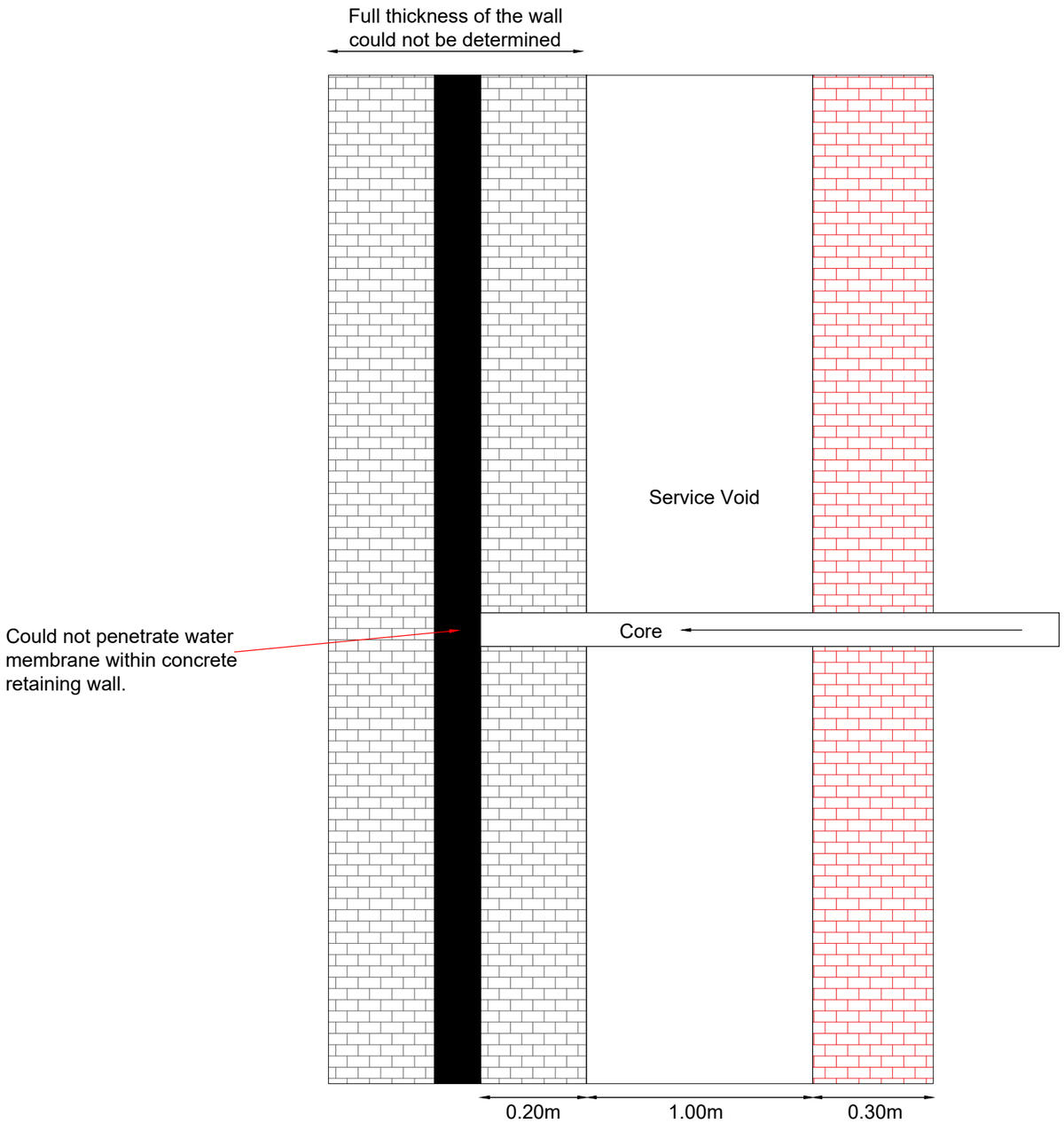
Phase	Issue	Date	Drawn	Checked
P1	REVA	12.03.2021	LM	JC

Job Title: Renaissance Deansgate

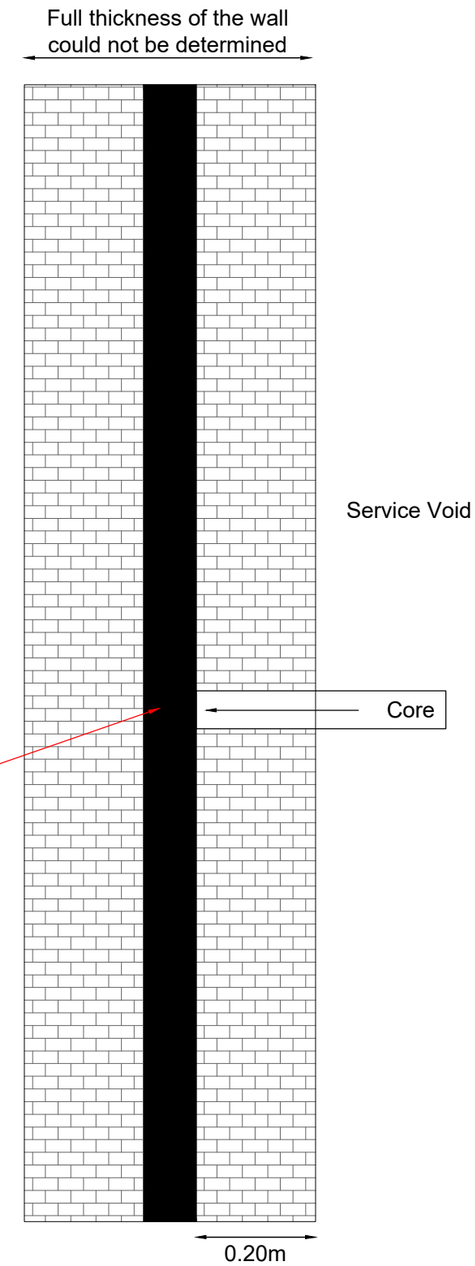
Drawing Title: Foundation Pit Details - TP104

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WC101



WC102



Key

- Rubber Membrane
- Concrete Retaining Wall
- Brick Outer Wall

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVB	21.04.2021	LM	NS
P1	REVA	07.04.2021	EB	NS

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 21.04.2021

Drawing No: 025

Scale: NTS

Job Title: Renaissance Deansgate

Drawing Title: Wall Core Details

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APPENDIX IV
PHOTOGRAPHS

PLATE 1 TP103 EXCAVATION



PLATE 2 TP104 EXCAVATION



PLATE 3 RBH101 ROCK CORE (1.00 – 6.00 M BGL)



PLATE 4 RBH103 ROCK CORE (8.00 – 10.00 m bgl)



PLATE 5 RBH104 ROCK CORE (3.00 – 7.00 m bgl)



PLATE 6 RBH106 ROCK CORE (4.40 – 8.00 m bgl)



APPENDIX V
E3P EXPLORATORY HOLE LOGS

Trial Pit Log

TrialPit No: TP101
Sheet 1 of 1

Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383715.00 - 398580.00 Level:	Date 26/02/2021
Location: Deansgate, Manchester		Dimensions (m): 0.96 × 0.55 Depth 0.80	Scale 1:30
Client: Property Alliance Group Ltd			Logged J Craig

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Concrete.
	0.40	ES		0.35 0.36			MADE GROUND: Rubber membrane.
	0.65	BULK		0.70			MADE GROUND: Brown gravelly medium sand. Gravel is fine to coarse angular to subangular of concrete and brick. (Site won natural material used for foundation backfill)
				0.80			Reddish brown medium SAND. (Weathered bedrock) End of Pit at 0.80m

1
2
3
4

Remarks: 1. Foundation pad observed at 0.70m bgl 2. Foundation pad 0.70m in length from supporting pillar 3. Depth of pad could not be determined

Stability: Stable

Trial Pit Log

			TrialPit No TP102 Sheet 1 of 1
Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383724.00 - 398586.00 Level:	Date 26/02/2021
Location: Deansgate, Manchester		Dimensions (m): 0.79 x 0.57 Depth 0.70	Scale 1:30
Client: Property Alliance Group Ltd			Logged J Craig

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Concrete.
	0.40	ES		0.35 0.36			MADE GROUND: Rubber membrane.
				0.70			MADE GROUND: Brown gravelly medium sand. Gravel is fine to coarse angular to subangular of concrete and brick. (Site won natural material used for foundation backfill)
							End of Pit at 0.70m

1
2
3
4

Trial Pit Photographs



TP102 spoil

Remarks: 1. Foundation for wall observed at 0.40m bgl, placed upon possible beam structure observed at 0.70m bgl. 2. Depth of foundation could not be determined

Stability: Stable

Trial Pit Log

TrialPit No: TP103
Sheet 1 of 1

Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383718.00 - 398591.00 Level:	Date 26/02/2021
Location: Deansgate, Manchester		Dimensions (m): 0.78 x 0.49 Depth 0.80	Scale 1:30
Client: Property Alliance Group Ltd			Logged J Craig

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.35			MADE GROUND: Concrete.
	0.45 0.50	ES BULK		0.36			MADE GROUND: Rubber membrane.
				0.70			MADE GROUND: Brown gravelly medium sand. Gravel is fine to coarse angular to subangular of concrete and brick. (Site won natural material used for foundation backfill)
				0.80			Reddish brown medium SAND. (Weathered bedrock) End of Pit at 0.80m

1
2
3
4

Trial Pit Photographs



TP103

Remarks: 1. Foundation pad observed at 0.70m bgl 2. Foundation pad 0.70m in length from supporting pillar 3. Depth of pad could not be determined

Stability: Stable

Trial Pit Log

TrialPit No: TP104
Sheet 1 of 1

Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383713.00 - 398591.00 Level:	Date 26/02/2021
Location: Deansgate, Manchester		Dimensions (m): 0.94 × 0.44 Depth 0.80	Scale 1:30
Client: Property Alliance Group Ltd			Logged J Craig

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Concrete.
	0.45	ES		0.35 0.36			MADE GROUND: Rubber membrane.
				0.70			MADE GROUND: Brown gravelly medium sand. Gravel is fine to coarse angular to subangular of concrete and brick. (Site won natural material used for foundation backfill)
				0.80			Reddish brown medium SAND. (Weathered bedrock) End of Pit at 0.80m

Trial Pit Photographs



TP104

Remarks: 1. Foundation pad observed at 0.70m bgl 2. Foundation pad 0.70m in length from supporting pillar 3. Depth of pad could not be determined

Stability: Stable

Borehole Log

Borehole No. **RBH101**

Sheet 1 of 1

Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383744E - 398650N	Hole Type BH
Location: Deansgate, Manchester		Level:	Scale 1:50
Client: Property Alliance Group Ltd		Dates: 19/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25			MADE GROUND: Concrete.
					0.27			MADE GROUND: Rubber membrane.
					0.35			MADE GROUND: Concrete.
		0.80	BULK					Reddish brown medium SAND. (Weathered bedrock)
		1.00	SPT	50 (14,11/50 for 245mm)				
					1.50			Very weak medium bedded reddish brown fine SANDSTONE with occasional lenses of extremely weak sandstone (3.00-3.18m bgl) (3.78-3.86m bgl). Bedding 0-10 degrees, widely to medium spaced, planar rough.
		2.00	SPT	46 (21,4/46 for 84mm)				
		2.30	U					
		3.00	SPT	50 (25 for 50mm/50 for 70mm)				
		4.00	SPT	50 (25 for 45mm/50 for 55mm)				
		5.00	SPT	50 (25 for 40mm/50 for 50mm)				
		5.50	U		5.10			Medium strong (becoming very strong at 6.28m bgl) medium bedded reddish brown coarse SANDSTONE with occasional interbeds of weak sandstone (6.50-6.53m bgl) (7.24-7.35m bgl) (7.82-7.89m bgl). Bedding 0-10 degrees, medium spaced planar rough (becoming closely spaced undulating rough at 8.43m bgl).
		6.00	SPT	50 (25 for 25mm/50 for 70mm)				
		6.28	U					
		6.71	U					
		7.47	U					
		8.82	U					
		9.47	U					
		9.81	U					
					10.00			End of Borehole at 10.00m

Remarks

1. Install of 2m plain, 8m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

Borehole Log

Borehole No. **RBH102**

Sheet 1 of 1

Project Name:	Renaissance Hotel	Project No. 14261	Co-ords:	383741E - 398643N	Hole Type BH
Location:	Deansgate, Manchester		Level:		Scale 1:50
Client:	Property Alliance Group Ltd		Dates:	20/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.35			MADE GROUND: Concrete.
					0.46			MADE GROUND: Grey slightly sandy gravel. Gravel is fine to coarse angular to subangular of limestone. (MOT)
								MADE GROUND: Brick wall. (unknown underlying structure)
					1.50			Strong medium bedded reddish brown medium SANDSTONE. Bedding 0-10 degrees medium spaced planar rough.
		1.86	U					
		2.00	SPT	50 (25 for 45mm/50 for 50mm)	2.00			NO RECOVERY (Assumed SANDSTONE).
		3.00	SPT	50 (25 for 60mm/50 for 40mm)				
		4.00	SPT	50 (25 for 30mm/50 for 30mm)				
		5.00	SPT	50 (25 for 55mm/50 for 45mm)				
		6.00	SPT	50 (25 for 30mm/50 for 70mm)				
		7.00	SPT	50 (25 for 15mm/50 for 25mm)	7.00			Strong medium bedded reddish brown coarse SANDSTONE with occasional interbedded mudstone (8.44-8.47m bgl) (8.58-8.63m bgl). Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough. Jointing 40-45 degrees undulating rough.
		7.23	U					
		8.00	SPT	50 (25 for 20mm/50 for 20mm)				
		8.39	U					
		8.64	U					
		8.82	U					
		9.30	U					
		9.45	U					
		9.65	U					
					10.00			End of Borehole at 10.00m

Remarks

1. Install of 0.5m plain, 1.1m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

Borehole Log

Borehole No. **RBH103**

Sheet 1 of 1

Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383734E - 398636N	Hole Type BH
Location: Deansgate, Manchester		Level:	Scale 1:50
Client: Property Alliance Group Ltd		Dates: 20/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25			MADE GROUND: Concrete.
					0.27			MADE GROUND: Rubber membrane.
					0.33			MADE GROUND: Concrete.
		0.70	U		0.70			MADE GROUND: Grey slightly sandy gravel. Gravel is fine to coarse angular to subangular of limestone. (MOT)
		1.00	SPT	50 (6,7/50 for 105mm)				Strong medium bedded reddish brown coarse SANDSTONE. Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough. Jointing 40-45 degrees undulating rough.
		1.50	U					
		2.00	SPT	50 (25 for 85mm/50 for 60mm)				
		2.70	U					
		3.00	SPT	50 (25 for 60mm/50 for 55mm)				
		3.40	U					
		4.00	SPT	50 (25 for 50mm/50 for 45mm)				
		5.43	U					
		6.63	U					
		7.52	U					
		8.60	U					
					10.00			End of Borehole at 10.00m

1 2 3 4 5 6 7 8 9 10

Remarks

1. Install of 2m plain, 8m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

Borehole Log

Borehole No. **RBH104**

Sheet 1 of 1

Project Name:	Renaissance Hotel	Project No. 14261	Co-ords:	383729E - 398624N	Hole Type BH
Location:	Deansgate, Manchester		Level:		Scale 1:50
Client:	Property Alliance Group Ltd		Dates:	22/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.25			MADE GROUND: Concrete.
					0.27			MADE GROUND: Rubber membrane.
					0.35			MADE GROUND: Concrete.
					0.80			MADE GROUND: Brick wall. (unknown underlying structure)
		0.90	ES					
		1.00	SPT	50 (25 for 60mm/50 for 45mm)				Very weak medium bedded reddish brown fine SANDSTONE. Bedding 0-10 degrees, widely to medium spaced, planar rough.
		1.45	U					
		2.00	SPT	50 (25 for 45mm/50 for 40mm)				
		2.43	U					
		3.00	SPT	50 (25 for 30mm/50 for 20mm)	3.00			Strong medium bedded reddish brown coarse SANDSTONE. Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough. Jointing 40-45 degrees undulating rough.
		3.36	U					
		4.00	SPT	50 (25 for 25mm/50 for 30mm)				
		4.20	U					
		5.00	SPT	50 (25 for 2mm/50 for 10mm)				
		5.60	U					
		6.00	SPT	50 (25 for 70mm/50 for 75mm)				
		6.43	U					
		7.00	SPT	50 (25 for 60mm/50 for 55mm)				
		7.26	U					
		9.60	U					
					10.00			End of Borehole at 10.00m

Remarks

1. Install of 2m plain, 8m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

Borehole Log

Borehole No. **RBH105**

Sheet 1 of 1

Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383704E - 398599N	Hole Type BH
Location: Deansgate, Manchester		Level:	Scale 1:50
Client: Property Alliance Group Ltd		Dates: 26/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.35			MADE GROUND: Concrete.
		0.50	ES		0.45			MADE GROUND: Grey slightly sandy gravel. Gravel is fine to coarse angular to subangular of limestone. (MOT)
		0.78	U					Very weak medium bedded reddish brown fine SANDSTONE. Bedding 0-10 degrees, widely to medium spaced, planar rough.
		1.10	U					
		3.00	SPT	50 (25 for 70mm/50 for 45mm)				
		3.40	U					
		4.00	SPT	50 (25 for 45mm/50 for 55mm)				
					4.48			Strong medium bedded reddish brown coarse SANDSTONE. Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough.
		5.00	U					
		6.00	SPT	50 (25 for 60mm/50 for 40mm)				
		6.13	U					
		6.80	U					
		7.00	SPT	50 (25 for 30mm/50 for 35mm)				
		8.00	SPT	50 (25 for 50mm/50 for 40mm)				
		8.37	U					
		9.73	U					
					10.00			End of Borehole at 10.00m

Remarks

1. Install of 2m plain, 8m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

Borehole Log

Borehole No. **RBH106**

Sheet 1 of 1

Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383722E - 398602N	Hole Type BH
Location: Deansgate, Manchester		Level:	Scale 1:50
Client: Property Alliance Group Ltd		Dates: 24/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.35	ES		0.26			MADE GROUND: Concrete.
					0.28			MADE GROUND: Rubber membrane.
					0.40			MADE GROUND: Concrete.
								MADE GROUND: Concrete wall and sandstone.
		1.54	U		1.50			Strong medium bedded reddish brown coarse SANDSTONE. Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough.
		1.80	SPT	50 (25 for 70mm/50 for 45mm)				
		2.80	SPT	50 (21,4/50 for 70mm)				
		3.10	U					
		3.37	U					
		3.80	SPT	50 (25 for 45mm/50 for 75mm)				
		4.50	SPT	50 (25 for 60mm/50 for 55mm)				
		4.70	U					
		5.40	U					
		5.40	SPT	50 (25 for 50mm/50 for 45mm)				
		6.20	SPT	50 (25 for 6mm/50 for 70mm)				
		7.20	U					
		7.20	SPT	50 (25 for 60mm/50 for 45mm)				
		8.20	U		8.20			NO RECOVERY (Assumed SANDSTONE).
		8.20	SPT	50 (25 for 50mm/50 for 35mm)				
		9.00	SPT	50 (25 for 60mm/50 for 40mm)	9.20			Strong medium bedded reddish brown coarse SANDSTONE. Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough.
		9.80	U					
					10.00			End of Borehole at 10.00m

Remarks

1. Install of 2m plain, 8m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

APPENDIX VI
CHEMICAL TESTING RESULTS

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e3p
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Manchester
M41 7JQ

e: sellis@e3p.co.uk

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

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

Analytical Report Number : 21-59458

Project / Site name:	Renaissance Hotel	**Samples received on:**	26/02/2021
Your job number:	14-261	**Samples instructed on/ Analysis started on:**	26/02/2021
Your order number:	14-261-SE-K	**Analysis completed by:**	08/03/2021
Report Issue Number:	1	**Report issued on:**	08/03/2021
Samples Analysed:	4 soil samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-59458
Project / Site name: Renaissance Hotel
Your Order No: 14-261-SE-K

Lab Sample Number				1786020	1786021	1786022	1786023
Sample Reference				RH101	RH102	RH103	RH103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	0.60	0.80	0.40
Date Sampled				23/02/2021	23/02/2021	23/02/2021	23/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	19	13	18	14
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5	0.5
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	9.2	12.4	9.2	12.3
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	94	5500	270	5100
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.014	0.015	0.083	0.011
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	28	31	170	21
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	13.8	15.4	83.3	10.5
Sulphide	mg/kg	1	MCERTS	< 1.0	4.6	< 1.0	5.8
Total Sulphur	mg/kg	50	MCERTS	< 50	2000	390	1900
Total Phenols							
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.4	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.44	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.42	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.33	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.23	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	1.82	< 0.80
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	1.7	3.2	2.2	3.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	< 0.2	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	4.2	14	5.7	14
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	29	14	30
Lead (aqua regia extractable)	mg/kg	1	MCERTS	3.6	9.8	14	11
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	5.9	9.5	7.4	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	21	64	38	65
Petroleum Hydrocarbons							

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Analytical Report Number: 21-59458
Project / Site name: Renaissance Hotel
Your Order No: 14-261-SE-K

Lab Sample Number				1786020	1786021	1786022	1786023
Sample Reference				RH101	RH102	RH103	RH103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	0.60	0.80	0.40
Date Sampled				23/02/2021	23/02/2021	23/02/2021	23/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	7.1	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	51	< 1.0	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10	60	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number : 21-59458
Project / Site name: Renaissance Hotel

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1786020	RH101	None Supplied	0.8	Brown sand.
1786021	RH102	None Supplied	0.6	Light grey sandy clay with gravel.
1786022	RH103	None Supplied	0.8	Brown sand with gravel.
1786023	RH103	None Supplied	0.4	Light grey sandy clay with gravel.

Analytical Report Number : 21-59458
Project / Site name: Renaissance Hotel

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

Analytical Report Number : 21-59458
Project / Site name: Renaissance Hotel

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

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Analytical Report Number : 21-59809

Project / Site name:	Renaissance Hotel	**Samples received on:**	01/03/2021
Your job number:	14-261	**Samples instructed on/ Analysis started on:**	02/03/2021
Your order number:	14261-SE-K	**Analysis completed by:**	09/03/2021
Report Issue Number:	1	**Report issued on:**	09/03/2021
Samples Analysed:	1 leachate sample - 4 soil samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-59809
Project / Site name: Renaissance Hotel
Your Order No: 14261-SE-K

Lab Sample Number				1787943	1787944	1787945	1787946
Sample Reference				TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.40	0.45	0.45
Date Sampled				26/02/2021	26/02/2021	26/02/2021	26/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	4.6	14	5.9	4.8
Total mass of sample received	kg	0.001	NONE	1	0.5	0.5	0.5
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Chrysotile
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	< 0.001
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	< 0.001
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	11.5	12.3	11.2	11.3
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	1200	1800	640	390
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.031	0.0047	0.077	0.027
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	62	9.3	150	53
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	31.2	4.7	76.7	26.6
Sulphide	mg/kg	1	MCERTS	2.7	5.6	13	8
Total Sulphur	mg/kg	50	MCERTS	460	630	620	250
Total Phenols							
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80

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Analytical Report Number: 21-59809
Project / Site name: Renaissance Hotel
Your Order No: 14261-SE-K

Lab Sample Number				1787943	1787944	1787945	1787946
Sample Reference				TP01	TP02	TP03	TP04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.40	0.45	0.45
Date Sampled				26/02/2021	26/02/2021	26/02/2021	26/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	3.5	1.6	1.9	1.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2	0.4	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8.5	8.2	6.1	5.6
Copper (aqua regia extractable)	mg/kg	1	MCERTS	27	18	13	12
Lead (aqua regia extractable)	mg/kg	1	MCERTS	16	4.1	7.1	6.4
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.2	6.6	6	5.5
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	54	24	23	21
Petroleum Hydrocarbons							
TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	< 1.0	16	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	< 1.0	42	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	14	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10	< 10	74	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number: 21-59809
Project / Site name: Renaissance Hotel
Your Order No: 14261-SE-K

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1787946	TP04	0.45	136	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

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Analytical Report Number: 21-59809
Project / Site name: Renaissance Hotel

Your Order No: 14261-SE-K

Lab Sample Number				1787947
Sample Reference				TP01
Sample Number				None Supplied
Depth (m)				0.40
Date Sampled				26/02/2021
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH	pH Units	N/A	ISO 17025	12
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0
Total Phenols				
Total Phenols (monohydric)	µg/l	1	ISO 17025	6.7
Speciated PAHs				
Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01
Total PAH				
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2
Heavy Metals / Metalloids				
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	11
Chromium (dissolved)	µg/l	0.4	ISO 17025	12
Copper (dissolved)	µg/l	0.7	ISO 17025	14
Lead (dissolved)	µg/l	1	ISO 17025	1.2
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	2.5
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	9.5
Monoaromatics & Oxygenates				
Benzene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10

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Analytical Report Number: 21-59809
Project / Site name: Renaissance Hotel

Your Order No: 14261-SE-K

Lab Sample Number				1787947
Sample Reference				TP01
Sample Number				None Supplied
Depth (m)				0.40
Date Sampled				26/02/2021
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Petroleum Hydrocarbons				
TPH1 (C10 - C40)	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 21-59809
Project / Site name: Renaissance Hotel

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1787943	TP01	None Supplied	0.4	Brown loam and sand with gravel and vegetation.
1787944	TP02	None Supplied	0.4	Brown clay and sand with gravel and vegetation.
1787945	TP03	None Supplied	0.45	Brown clay and sand with gravel.
1787946	TP04	None Supplied	0.45	Brown clay and sand with gravel.

Analytical Report Number : 21-59809
Project / Site name: Renaissance Hotel

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in leachate - LOW LEVEL 1 ug/l	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In house method.	L005-PL	W	ISO 17025
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

Analytical Report Number : 21-59809
Project / Site name: Renaissance Hotel

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

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Analytical Report Number : 21-60252

Project / Site name:	Renaissance Hotel	**Samples received on:**	03/03/2021
Your job number:	14-261	**Samples instructed on/ Analysis started on:**	03/03/2021
Your order number:	14261-JC-H	**Analysis completed by:**	10/03/2021
Report Issue Number:	1	**Report issued on:**	10/03/2021
Samples Analysed:	5 soil samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-60252
Project / Site name: Renaissance Hotel
Your Order No: 14261-JC-H

Lab Sample Number				1790718	1790719	1790720	1790721	1790722
Sample Reference				RBH104	RBH104	RBH105	RBH105	RBH106
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.90	0.30	0.50	0.35
Date Sampled				02/03/2021	02/03/2021	02/03/2021	02/03/2021	02/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	51	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	11	11	2.2	12	3.4
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4	0.4
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.8	9.1	11.5	9.5	11.7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	1300	100	980	140	2800
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.42	0.0095	0.02	0.014	0.017
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	830	19	40	29	34
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	416	9.5	19.8	14.3	16.9
Sulphide	mg/kg	1	MCERTS	2.8	1	8.5	< 1.0	4.2
Total Sulphur	mg/kg	50	MCERTS	370	< 50	450	< 50	1100
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80

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Analytical Report Number: 21-60252
Project / Site name: Renaissance Hotel
Your Order No: 14261-JC-H

Lab Sample Number				1790718	1790719	1790720	1790721	1790722
Sample Reference				RBH104	RBH104	RBH105	RBH105	RBH106
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.90	0.30	0.50	0.35
Date Sampled				02/03/2021	02/03/2021	02/03/2021	02/03/2021	02/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	3.6	3.2	2.6	3.2	3.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	0.6	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	7.5	5.6	9.2	6.5	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	20	11	12	13	22
Lead (aqua regia extractable)	mg/kg	1	MCERTS	16	2.9	13	2.8	16
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	7.7	7.8	9.5	8.6	9
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	31	18	45	18	54
Petroleum Hydrocarbons								
TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number : 21-60252
Project / Site name: Renaissance Hotel

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1790718	RBH104	None Supplied	0.3	Brown loam and sand with gravel and vegetation.
1790719	RBH104	None Supplied	0.9	Brown loam and sand with gravel and vegetation.
1790720	RBH105	None Supplied	0.3	Brown loam and sand with gravel and stones.
1790721	RBH105	None Supplied	0.5	Brown loam and sand with gravel.
1790722	RBH106	None Supplied	0.35	Brown loam and sand with gravel.

Analytical Report Number : 21-60252
Project / Site name: Renaissance Hotel

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

Analytical Report Number : 21-60252
Project / Site name: Renaissance Hotel

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

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Analytical Report Number : 21-60269

Project / Site name:	Renaissance Hotel	**Samples received on:**	03/03/2021
Your job number:	14-261	**Samples instructed on/ Analysis started on:**	03/03/2021
Your order number:	14-261-JC-I	**Analysis completed by:**	10/03/2021
Report Issue Number:	1	**Report issued on:**	10/03/2021
Samples Analysed:	2 wac multi samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

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Waste Acceptance Criteria Analytical Results

Report No:	**21-60269**						
					Client:	**E3P**	
Location	**Renaissance Hotel**						
Lab Reference (Sample Number)	1790751				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	03/03/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP101						
Depth (m)	0.65						
Solid Waste Analysis							
TOC (%)**	0.1				3%	5%	6%
Loss on Ignition (%) **	0.5				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.30				1	--	--
Mineral Oil (mg/kg) #	90				500	--	--
Total PAH (WAC-17) (mg/kg)	3.10				100	--	--
pH (units)**	11.1				--	>6	--
Acid Neutralisation Capacity (mol / kg)	45				--	To be evaluated	To be evaluated
Eluate Analysis	2:1	8:1		Cumulative 10:1	Limit values for compliance leaching test		
(BS EN 12457 - 3 preparation utilising end over end leaching procedure)	mg/l	mg/l		mg/kg	using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.010	< 0.010		< 0.050	0.5	2	25
Barium *	0.24	0.090		1.0	20	100	300
Cadmium *	< 0.0005	< 0.0005		< 0.0020	0.04	1	5
Chromium *	0.015	0.0062		0.069	0.5	10	70
Copper *	0.010	0.012		0.12	2	50	100
Mercury *	< 0.0015	< 0.0015		< 0.010	0.01	0.2	2
Molybdenum *	0.0069	0.0032		0.035	0.5	10	30
Nickel *	0.0026	0.0023		0.023	0.4	10	40
Lead *	< 0.0050	< 0.0050		0.026	0.5	10	50
Antimony *	< 0.0050	< 0.0050		0.026	0.06	0.7	5
Selenium *	< 0.010	< 0.010		< 0.040	0.1	0.5	7
Zinc *	0.0018	0.0036		0.035	4	50	200
Chloride *	13	< 4.0		30	800	15000	25000
Fluoride	0.34	0.32		3.2	10	150	500
Sulphate *	8.9	14		130	1000	20000	50000
TDS*	830	400		4200	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.13	< 0.13		< 0.50	1	-	-
DOC	6.9	5.3		54	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.2						
Dry Matter (%)	94						
Moisture (%)	5.8						
Stage 1							
Volume Eluate L2 (litres)	0.34						
Filtered Eluate VE1 (litres)	0.12						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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The results included within the report are representative of the samples submitted for analysis.

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Waste Acceptance Criteria Analytical Results

Report No:	**21-60269**						
					Client:	**E3P**	
Location	**Renaissance Hotel**						
Lab Reference (Sample Number)	1790752				**Landfill Waste Acceptance Criteria Limits**		
Sampling Date	03/03/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	TP103						
Depth (m)	0.45						
Solid Waste Analysis							
TOC (%)**	0.1				3%	5%	6%
Loss on Ignition (%) **	0.4				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.30				1	--	--
Mineral Oil (mg/kg) #	57				500	--	--
Total PAH (WAC-17) (mg/kg)	2.04				100	--	--
pH (units)**	11.2				--	>6	--
Acid Neutralisation Capacity (mol / kg)	69				--	To be evaluated	To be evaluated
Eluate Analysis	2:1	8:1		Cumulative 10:1	Limit values for compliance leaching test		
(BS EN 12457 - 3 preparation utilising end over end leaching procedure)	mg/l	mg/l		mg/kg	using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.010	< 0.010		< 0.050	0.5	2	25
Barium *	0.23	0.099		1.1	20	100	300
Cadmium *	< 0.0005	< 0.0005		< 0.0020	0.04	1	5
Chromium *	0.015	0.0057		0.063	0.5	10	70
Copper *	0.016	0.0058		0.065	2	50	100
Mercury *	< 0.0015	< 0.0015		< 0.010	0.01	0.2	2
Molybdenum *	0.0047	< 0.0030		0.023	0.5	10	30
Nickel *	0.0028	0.0023		0.024	0.4	10	40
Lead *	< 0.0050	< 0.0050		0.023	0.5	10	50
Antimony *	< 0.0050	< 0.0050		< 0.020	0.06	0.7	5
Selenium *	< 0.010	< 0.010		< 0.040	0.1	0.5	7
Zinc *	0.0082	0.0073		0.074	4	50	200
Chloride *	13	< 4.0		31	800	15000	25000
Fluoride	0.38	0.31		3.2	10	150	500
Sulphate *	11	13		130	1000	20000	50000
TDS*	940	460		4900	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.13	< 0.13		< 0.50	1	-	-
DOC	6.9	5.5		56	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.2						
Dry Matter (%)	96						
Moisture (%)	4.1						
Stage 1							
Volume Eluate L2 (litres)	0.33						
Filtered Eluate VE1 (litres)	0.12						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

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This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Analytical Report Number : 21-60269
Project / Site name: Renaissance Hotel

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1790751	TP101	None Supplied	0.65	Brown clay and sand with gravel.
1790752	TP103	None Supplied	0.45	Brown clay and sand with gravel.

Analytical Report Number : 21-60269
Project / Site name: Renaissance Hotel

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Preparation WAC leachate		In-house method	L043-PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	MCERTS
Chloride in WAC leachate (BS EN 12457-3 Prep)	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride in WAC leachate (BS EN 12457-3 Prep)	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L033-PL	W	ISO 17025
Phenol Index in WAC leachate (BS EN 12457-3 Prep)	Determination of monohydric phenols in leachate by continuous flow analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Sulphate in WAC leachate (BS EN 12457-3 Prep)	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L039-PL	W	ISO 17025
TDS in WAC leachate (BS EN 12457-3 Prep)	Determination of total dissolved solids in leachate by electrometric measurement.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L031-PL	W	NONE
DOC in WAC leachate (BS EN 12457-3 Prep)	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR analyser.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L037-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil in Soil C10 - C40	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method based on USEPA 8270	L076-PL	D	NONE
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS
Metals in WAC leachate (BS EN 12457-3 Prep)	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L039-PL	W	ISO 17025
PCB's by GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS

Analytical Report Number : 21-60269
Project / Site name: Renaissance Hotel

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BTEX (Sum of BTEX compounds) in soil	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

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Analytical Report Number : 21-68515

Project / Site name:	Deansgate CLR Park	**Samples received on:**	14/04/2021
Your job number:	14 261	**Samples instructed on/ Analysis started on:**	14/04/2021
Your order number:	14 261 SE S	**Analysis completed by:**	21/04/2021
Report Issue Number:	1	**Report issued on:**	21/04/2021
Samples Analysed:	3 water samples		

Signed: Karolina Marek

Karolina Marek
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-68515
Project / Site name: Deansgate CLR Park

Your Order No: 14 261 SE S

Lab Sample Number				1835880	1835881	1835882
Sample Reference				RB 101	RB 104	RB 105
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				13/04/2021	13/04/2021	13/04/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
General Inorganics						
pH	pH Units	N/A	ISO 17025	7.3	10.2	10.0
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	0.80	6.01	0.97
Total Phenols						
Total Phenols (monohydric)	µg/l	1	ISO 17025	4.8	4.8	3.4
Heavy Metals / Metalloids						
Calcium (dissolved)	mg/l	0.012	ISO 17025	18	22	20
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.39	2.93	1.18
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	0.03	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	1.2	3.8	1.6
Copper (dissolved)	µg/l	0.5	ISO 17025	3.1	8.4	2.9
Lead (dissolved)	µg/l	0.2	ISO 17025	0.2	< 0.2	< 0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	120	0.60	0.46
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	1.22	0.07
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.2	2.1	0.5
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	2.8	2.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	7.8	2.7	2.2
Monoaromatics & Oxygenates						
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons						
TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10

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Analytical Report Number: 21-68515
Project / Site name: Deansgate CLR Park

Your Order No: 14 261 SE S

Lab Sample Number				1835880	1835881	1835882
Sample Reference				RB 101	RB 104	RB 105
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				13/04/2021	13/04/2021	13/04/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
VOCs						
Chloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/l	1	ISO 17025	18.8	8.6	7.9
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0

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Analytical Report Number: 21-68515
Project / Site name: Deansgate CLR Park

Your Order No: 14 261 SE S

Lab Sample Number				1835880	1835881	1835882
Sample Reference				RB 101	RB 104	RB 105
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				13/04/2021	13/04/2021	13/04/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
SVOCs						
Aniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	3.1	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Carbazole	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 21-68515
Project / Site name: Deansgate CLR Park

Your Order No: 14 261 SE S

Lab Sample Number				1835880	1835881	1835882
Sample Reference				RB 101	RB 104	RB 105
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				13/04/2021	13/04/2021	13/04/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
3&4-Methylphenol	µg/l	0.1	NONE	< 0.10	< 0.10	< 0.10

U/S = Unsuitable Sample I/S = Insufficient Sample

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 21-68515
Project / Site name: Deansgate CLR Park

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

APPENDIX VII
ORIGIN OF TIER I GENERIC ASSESSMENT CRITERIA

CONSTITUENT	ORIGIN OF RISK ASSESSMENT VALUE
Arsenic	2014 LQM/CIEH S4ULs
Cadmium	2014 LQM/CIEH S4ULs
Chromium	2014 LQM/CIEH S4ULs
Lead	2014 LQM/CIEH S4ULs
Mercury	2014 LQM/CIEH S4ULs – methylmercury
Nickel	2014 LQM/CIEH S4ULs
Selenium	2014 LQM/CIEH S4ULs
Copper	2014 LQM/CIEH S4ULs
Zinc	2014 LQM/CIEH S4ULs
Cyanide – Total	2014 LQM/CIEH S4ULs
Phenols – Total	2014 LQM/CIEH S4ULs
Naphthalene	General assessment criteria (GAC) developed by CIEH/LQM Suitable 4 Use Levels with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM.
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene	
Chrysene	
Benzo(b/k)Fluoranthene [iii]	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C_5-C_6 (aliphatic)	
TPH C_6-C_8 (aliphatic)	
TPH C_8-C_{10} (aliphatic)	
TPH C_{10}-C_{12} (aliphatic)	
TPH C_{12}-C_{16} (aromatic)	
TPH C_{16}-C_{21} (aromatic)	
TPH C_{21}-C_{35} (aromatic)	

APPENDIX VIII
GEOTECHNCAL TESTING CERTIFICATES

LABORATORY REPORT

4043

Contract Number: PSL21/1855

Report Date: 30 March 2021

Client's Reference: 14-261

Client Name: E3P
Taylor Road
Urmston
Manchester
M41 7JQ

For the attention of: Jamie Craig

Contract Title: Renaissance Deansgate

Date Received: 4/3/2021
Date Commenced: 4/3/2021
Date Completed: 30/3/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins (Director)
R Berriman (Quality Manager)
S Royle (Laboratory Manager)

L Knight (Senior Technician)
S Eyre (Senior Technician)
H Daniels (Senior Technician)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
RBH101		B	0.80		Brown gravelly slightly clayey silty SAND

UKAS TESTING
4043

PSL
Professional Soils Laboratory

Renaisssance Deansgate

Contract No:
PSL21/1855
Client Ref:
14-261

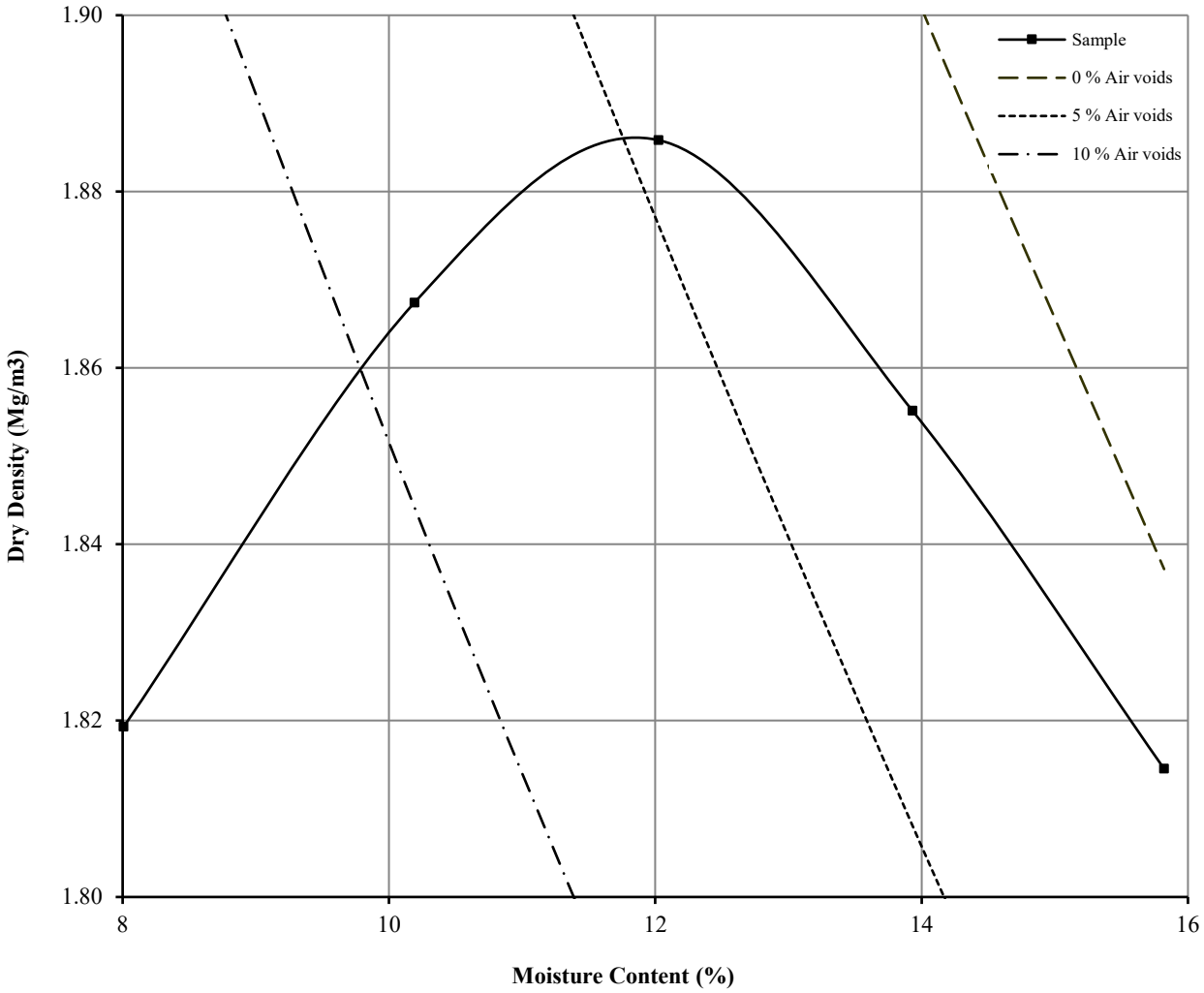
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.5 : 1990

Hole Number: RBH101 **Top Depth (m) :** 0.80

Sample Number: **Base Depth (m) :**

Sample Type: B



Initial Moisture Content:		22	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m3):	2.59	Measured	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.89	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		12			
Remarks See summary of soil descriptions					

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

Hole Number	Sample Number	Sample Type	Top Depth (m)	Base Depth (m)	Sample Diameter (mm)	Sample Length (mm)	Height Ratio	Initial Mass (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode	Date Tested	Remarks
RBH103		C	6.63	6.98	88	138	1.6	1840	2.19	15	1.91	20.1	3.3	Brittle	26/03/21	

Professional Soils Laboratory

Renaissance Deansgate

Contract No:
PSL21/1855
Client Ref:
14-261

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
RBH101	2.30		A	Perp	88	53	4664	5938.39	77.06	-	0.21	0.04	1.215	0.04	Valid	
RBH101	6.28		A	Perp	88	50	4400	5602.25	74.85	-	1.01	0.18	1.199	0.22	Valid	
RBH101	7.47		A	Perp	88	50	4400	5602.25	74.85	-	1.43	0.26	1.199	0.31	Valid	
RBH101	8.82		A	Perp	88	54	4752	6050.43	77.78	-	0.99	0.16	1.220	0.20	Valid	
RBH101	6.71		A	Perp	89	40	3560	4532.73	67.33	-	0.81	0.18	1.143	0.20	Valid	
RBH102	7.23		A	Perp	88	53	4664	5938.39	77.06	-	1.59	0.27	1.215	0.33	Valid	
RBH102	1.86		A	Perp	85	50	4250	5411.27	73.56	-	0.97	0.18	1.190	0.21	Valid	
RBH102	8.82		A	Perp	88	44	3872	4929.98	70.21	-	0.77	0.16	1.165	0.18	Valid	
RBH102	9.65		A	Perp	89	50	4450	5665.92	75.27	-	0.69	0.12	1.202	0.15	Valid	
RBH102	9.30		A	Perp	86	45	3870	4927.44	70.20	-	0.48	0.10	1.165	0.11	Valid	
RBH102	8.64		A	Perp	89	33	2937	3739.50	61.15	-	1.12	0.30	1.095	0.33	Valid	
RBH103	1.50		A	Perp	89	37	3293	4192.78	64.75	-	1.59	0.38	1.123	0.43	Valid	
RBH103	3.40		A	Perp	89	55	4895	6232.51	78.95	-	2.01	0.32	1.228	0.40	Valid	
RBH103	8.60		A	Perp	89	41	3649	4646.05	68.16	-	0.84	0.18	1.150	0.21	Valid	
RBH104	2.43		A	Perp	85	45	3825	4870.14	69.79	-	0.47	0.10	1.162	0.11	Valid	
RBH104	3.36		A	Perp	88	44	3872	4929.98	70.21	-	1.45	0.29	1.165	0.34	Valid	
RBH104	5.60		A	Perp	87	40	3480	4430.87	66.56	-	0.83	0.19	1.137	0.21	Valid	
RBH104	7.26		A	Perp	87	46	4002	5095.50	71.38	-	2.06	0.40	1.174	0.47	Valid	
RBH105	1.10		A	Perp	88	43	3784	4817.94	69.41	-	0.63	0.13	1.159	0.15	Valid	
RBH105	5.00		A	Perp	83	41	3403	4332.83	65.82	-	1.46	0.34	1.132	0.38	Valid	
RBH105	6.80		A	Perp	89	50	4450	5665.92	75.27	-	1.12	0.20	1.202	0.24	Valid	
RBH105	9.73		A	Perp	86	52	4472	5693.93	75.46	-	1.45	0.25	1.203	0.31	Valid	

Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL Professional Soils Laboratory

Renaissance Deansgate

Contract No:

PSL21/1855

Client Ref:

14-261

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D_e^2	D_e	Failure Load		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	L	D		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
RBH101	2.30		D	Par	-	88	7744	88.00	-	0.33	0.043	1.290	0.05	Valid	
RBH101	6.28		D	Par	-	88	7744	88.00	-	0.72	0.093	1.290	0.12	Valid	
RBH101	7.47		D	Par	-	88	7744	88.00	-	1.09	0.141	1.290	0.18	Valid	
RBH101	8.82		D	Par	-	88	7744	88.00	-	0.69	0.089	1.290	0.11	Valid	
RBH101	6.71		D	Par	-	89	7921	89.00	-	0.68	0.086	1.296	0.11	Valid	
RBH102	7.23		D	Par	-	88	7744	88.00	-	0.73	0.094	1.290	0.12	Valid	
RBH102	1.86		D	Par	-	85	7225	85.00	-	0.85	0.118	1.270	0.15	Valid	
RBH102	8.82		D	Par	-	88	7744	88.00	-	0.54	0.070	1.290	0.09	Valid	
RBH102	9.65		D	Par	-	89	7921	89.00	-	0.45	0.057	1.296	0.07	Valid	
RBH102	9.30		D	Par	-	86	7396	86.00	-	0.48	0.065	1.276	0.08	Valid	
RBH102	8.64		D	Par	-	89	7921	89.00	-	1.28	0.162	1.296	0.21	Valid	
RBH103	1.50		D	Par	-	89	7921	89.00	-	1.06	0.134	1.296	0.17	Valid	
RBH103	3.40		D	Par	-	89	7921	89.00	-	1.11	0.140	1.296	0.18	Valid	
RBH103	8.60		D	Par	-	89	7921	89.00	-	1.10	0.139	1.296	0.18	Valid	
RBH104	2.43		D	Par	-	85	7225	85.00	-	0.41	0.057	1.270	0.07	Valid	
RBH104	3.36		D	Par	-	88	7744	88.00	-	1.01	0.130	1.290	0.17	Valid	
RBH104	5.60		D	Par	-	87	7569	87.00	-	0.76	0.100	1.283	0.13	Valid	
RBH104	7.26		D	Par	-	87	7569	87.00	-	1.44	0.190	1.283	0.24	Valid	
RBH105	1.10		D	Par	-	88	7744	88.00	-	0.43	0.056	1.290	0.07	Valid	
RBH105	5.00		D	Par	-	83	6889	83.00	-	0.33	0.048	1.256	0.06	Valid	
RBH105	6.80		D	Par	-	89	7921	89.00	-	0.61	0.077	1.296	0.10	Valid	
RBH105	9.73		D	Par	-	86	7396	86.00	-	1.51	0.204	1.276	0.26	Valid	

Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

UKAS TESTING 4043

PSL Professional Soils Laboratory

Renaissance Deansgate

Contract No:

PSL21/1855

Client Ref:

14-261

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
RBH106	3.10		A	Perp	89	60	5340	6799.10	82.46	-	2.62	0.39	1.252	0.48	Valid	
RBH106	3.37		A	Perp	86	30	2580	3284.96	57.31	-	0.60	0.18	1.063	0.19	Valid	
RBH106	5.40		A	Perp	87	41	3567	4541.65	67.39	-	0.99	0.22	1.144	0.25	Valid	
RBH106	7.20		A	Perp	89	37	3293	4192.78	64.75	-	1.23	0.29	1.123	0.33	Valid	
RBH106	9.80		A	Perp	89	45	4005	5099.32	71.41	-	0.93	0.18	1.174	0.21	Valid	

Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL Professional Soils Laboratory

Renaissance Deansgate

Contract No:

PSL21/1855

Client Ref:

14-261

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D_e^2	D_e	Failure Load		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	L	D		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
RBH106	3.10		D	Par	-	89	7921	89.00	-	1.76	0.222	1.296	0.29	Valid	
RBH106	3.37		D	Par	-	86	7396	86.00	-	0.15	0.020	1.276	0.03	Valid	
RBH106	5.40		D	Par	-	87	7569	87.00	-	0.46	0.061	1.283	0.08	Valid	
RBH106	7.20		D	Par	-	89	7921	89.00	-	0.89	0.112	1.296	0.15	Valid	
RBH106	9.80		D	Par	-	89	7921	89.00	-	0.61	0.077	1.296	0.10	Valid	

Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

UKAS TESTING 4043

PSL Professional Soils Laboratory

Renaissance Deansgate

Contract No:

PSL21/1855

Client Ref:

14-261

Appendix B: A2SI (2022) Factual Report

A2 Site Investigation

Renaissance, Manchester

Factual Report

April 2022

17321-A2SI-XX-XX-RP-X-0001-01

Project Name	Renaissance, Manchester
Project Number	17321
Client	BG&E
Document Name	Factual Report

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Engineer	Senior Engineer	Director

Document Reference	Status	Notes	Revision	Issued by	Date
17321-A2SI-XX-XX-RP-X-0001-00	First Issue		00	RB	04/02/2022
17321-A2SI-XX-XX-RP-X-0001-01	Second Issue	Including additional works	01	FA	08/04/2022

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Appendices

Appendix A: Exploratory Hole Location Plan

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1. Introduction

A2 Site Investigation Limited were appointed by BG&E to undertake a geotechnical ground investigation 6 Deansgate, Manchester M3 1RH. This report describes the work undertaken and presents the findings to date.

2. Site Location

The site is located within the Central Retail District of Manchester City Centre, Manchester, M3 1RH. The site is roughly triangular with Deansgate to the east, River Irwell to the west, Victoria Bridge Street to the north and Blackfriars Street to the south. The site forms part of a wider development associated with the existing hotel. The River Irwell is situated within a man-made channel understood to be supported by concrete and masonry walls.

The site is currently occupied by a 13-storey hotel, four-storey office building and multi-storey car park. There is an approximately 9.5 m difference in level across the site between Deansgate and the River Irwell, with an existing retaining wall along the Deansgate side.

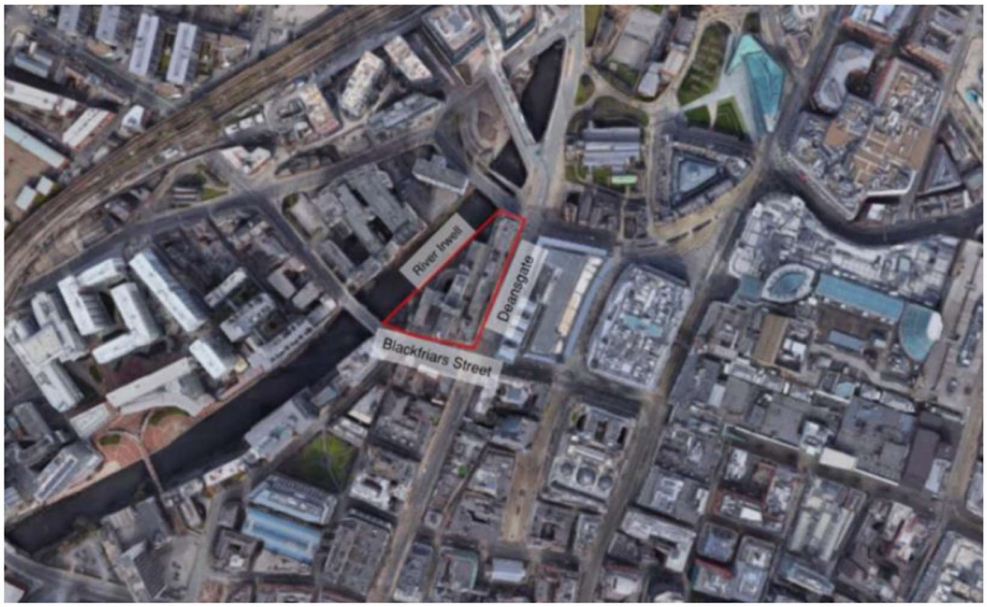


Figure 2.1 Site location and extent shown in red

3. Anticipated Ground Conditions

From a review of available geological maps and memoirs, including the online British Geological Survey “Geology of Britain Viewer”, and previous site investigations, the following geological sequence was anticipated:

Table 3.1 Anticipated geological sequence

Unit	Depth (mbgl) [1]	Thickness (m)	Description
Made Ground	0.0	10.0	Asphalt, roadstone, brick and concrete fill with gravels.
Chester Formation	10.0	>100	Weak, very thinly bedded, reddish brown, medium to coarse grained sandstone.

1. Depth refers to top of stratum.

4. Purpose and Scope of the Investigation

The purpose of the investigation was to recover data on the ground and groundwater conditions at the site relating to geotechnical risks that may affect the proposed development.

This investigation comprised of the excavation of inspection pits using vacuum excavation, drilling of rotary cored borehole and dynamic sampling boreholes. In addition, in-situ testing, geo-environmental and geotechnical sampling was undertaken along with installation of combined gas and groundwater monitoring wells.

A2 Site Investigation Limited have been commissioned to undertake a ground investigation at the site comprising three phases of work;

The Phase 1 fieldwork k was undertaken between 20th – 22nd December 2021. The Phase 2 fieldwork was undertaken between 22nd – 23rd February 2022. The Phase 3 fieldwork was undertaken between 28th – 30th March 2022. Monitoring visit was undertaken on 15th March 2022.

This detailed scope of works was as follows:

Phase 1:

- 6 no. Vacuum excavated inspection pits.
- 1 no. Rotary drilled borehole to a depth of 10.5m (BH01).
- 5 no. Dynamic Sampler boreholes to a maximum depth of 6m (WS01-05).
- Walkover of the site to identify and take water levels in historical monitoring wells.

Phase 2:

- 8no. window sample boreholes to a maximum depth of 3mbgl (WS06-WS13).
- 1no. return monitoring visit was undertaken to determine ground gas and groundwater levels and groundwater sampling the historical and newly installed monitoring wells.

Phase 3:

- 2no. Rotary drilled boreholes to a depth of 12m (BH02-03).

5. Limitations of Report

This report has been prepared in accordance with the specification provided by the client. The data reported relates to the specific locations where each exploratory hole was formed and may not represent the ground and groundwater conditions of the site as a whole. Furthermore, it should be considered that groundwater levels may vary throughout the year due to seasonal conditions and other influences such as flooding and leaking mains, storm drainage and foul water systems.

6. Standards

The site investigation, soil descriptions and laboratory testing were undertaken in accordance with following standards

- UK Specification for Ground Investigation 2nd Edition, published by ICE Publishing (2012)
- BGS Geology of Britain Viewer: 2018. www.bgs.ac.uk. British Geological Survey
- British Standards Institution BS 5930:2015+A1:2020, Code of practice for site investigations.
- British Standards Institution BS 10175:2011+A2:2017, Investigation of potentially contaminated sites – code of practice.
- British Standards Institution BS EN ISO 14688-1:2018, Geotechnical investigation and testing, classification of soil. Identification and description.

- British Standards Instit133ution BS EN ISO 14688-2:2018, Geotechnical investigation and testing. Identification and classification of soil. Principle for a classification.
- British Standards Institution BS EN ISO 22475-1: 2006 : Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 Technical principles for execution.

7. Ground Investigation Summary

7.1. Fieldwork Overview

A walkover was conducted on the first day of the ground investigation and confirmed the anticipated layout of the site.

Following a review of all available service information and site reconnaissance, all locations were scanned using Electromagnetic (CAT & Genny) techniques to check for services within proximity to exploratory hole locations. All positions were surveyed to determine the National Grid coordinates. Due to the density of underground services around the site, all locations have been Vacuum Excavated to 1.50mbegl for a safer excavation of starter pits.

A preliminary UXO desk study was undertaken by Zetica (2014). The preliminary UXO risk assessment recommended that further action was warranted to address the level of UXO risk at this site. Based on the results; it was necessary to have UXO supervision onsite to conduct a watching brief and undertake downhole magnetometer testing during the drilling.

All works were supervised by a senior ground engineer.

An exploratory hole location plan is shown in Appendix A.

7.2. Rotary Rig Borehole

The rotary borehole (BH01) was progressed using a Comacchio GEO 305 rotary rig with sampling to a maximum depth of 10.50 mbegl. Standard Penetration Tests (SPTs) were carried out in the borehole.

BH02 and BH03 was not undertaken due to heavy density of underground services on proposed location. A series of vacuum excavated trial pits were undertaken at alternative locations but it was not possible to locate a safe area to drill the boreholes and work was abandoned after three days.

All soils encountered were logged on site and sub-sampled accordingly for geotechnical laboratory analysis. Core runs were photographed, and are presented in Appendix B.

7.3. Window Sample Boreholes

The window sampler boreholes (WS01-WS05) were progressed with a track mounted rig using dynamic sampling techniques to a maximum depth of 6.0 mbegl. SPT’s were undertaken in all exploratory holes at 1m spacing.

During site works, WS01 was cancelled due to a sperate excavation within proximity to the starter pit. It was not possible to ascertain an alternative drilling location due to the density of underground services within the immediate area.

WS02 was drilled to a depth of 4mbgl and backfilled with bentonite to surface.

WS03, WS04 and WS05 had refusals between 1.5-1.6 mbegl, all encountering concrete slab at termination depth. It was not possible to ascertain an alternative drilling location due to the density of underground services within the immediate area of the exploratory hole locations.

WS06 was not drilled due to no access to the location. WS07 was not drilled for health and safety reasons due to demolition works happening above hole location.

WS08 had refusal at 0.95m, encountering brickwork at termination depth. Two other locations were attempted (WS08A and WS08B), but hole was terminated for the same reason. WS09 also had refusal, being terminated at 0.8m due to thick layer of concrete extending from 0.4m to termination depth. A location nearby was attempted with success (WS09A) to 4m.

All soils encountered were logged on site and samples recovered for geotechnical and geo-environmental laboratory analysis.

A standpipe piezometer was installed in two of the window sample boreholes (WS09A and WS13) for subsequent sampling and monitoring of groundwater levels.

7.4. Gas and Groundwater Monitoring Installations

7.4.1. Previous Groundwater Monitoring Installations

Groundwater monitoring pipes were installed during Phase II Geoenvironmental Site Assessment conducted by E3P (E3P, Phase II Geoenvironmental Site Assessment, Renaissance, Manchester, Reference:14-261-R2-1, dated 21) 1st May 2021. The monitoring wells are each comprised of one 50mm internal diameter PVC casing and well screen. Details of all installations are show in Table 7.4.1 below.

Table 7.4.1 Identified Monitoring Installation details

Location Ref	Base of Borehole (mbegl)	Installation Diameter (mbegl)	Type of Installation	Bottom of Response Zone (mbegl)	Top of Response Zone (mbegl)	Strata
RBH101	10.0	50mm	SP/G	10.0	2.0	Chester Formation
RBH102*	**10.0**	**50mm**	**SP/G**	**1.5**	**0.5**	**Made Ground**
RBH103	10.0	50mm	SP/G	10.0	2.0	Chester Formation
RBH104	10.0	50mm	SP/G	10.0	2.0	Chester Formation
RBH105	10.0	50mm	SP/G	10.0	2.0	Chester Formation
RBH106	10.0	50mm	SP/G	10.0	2.0	Chester Formation

Key

SP/G – Standpipe with Gas Monitoring Valve

*** - Monitoring well not found**

During the site walkover, all previous installed wells at the basement car park level were identified with the exception of RBH102, which at the time of the walkover had heavy pallets, possibly obstructing the headworks as shown in the photo 7.4.1.



Figure 7.4.1 Possible RBH102 location with obstruction.

7.4.2. Gas and Groundwater Monitoring Installations

Combined gas and groundwater monitoring pipes were installed in WS09A and WS13. The monitoring installation comprises of a 50mm internal diameter PVC casing and wellscreen. Details are shown in Table 7.4.2 below:

Table 7.4.2 Gas and Groundwater Monitoring Installations

Location Ref	Base of Borehole (mbegl)	Installation Diameter (mbegl)	Type of Installation	Bottom of Response Zone (mbegl)	Top of Response Zone (mbegl)	Strata
WS09A	4.0	50mm	SP/G	3.5	2.0	Made Ground/Possible Glaciofluvial Deposits
WS13	6.0	50mm	SP/G	4.0	2.0	Made Ground

Key

SP/G – Standpipe with Gas Monitoring Valve

8. Ground Conditions

8.1. Encountered Geology

The following ground conditions were encountered at the site. The measurements were taken from the top of the existing exploratory holes (mbegl). Details are shown in Table 8.1 below:

Table 8.1 Ground Conditions Encountered

Unit	Depth (mbegl)	Thickness (m)	Description
Made Ground	0.00	1.70	Medium dense greyish brown slightly clayey silty SAND and GRAVEL. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of concrete and brick.
Weathered Chester Formation	1.70	4.1	Dense reddish brown poorly cemented fine to medium SAND.
Chester Formation	5.8	Not Proven	Weak thinly to medium laminated reddish brown medium to coarse grained cemented SANDSTONE.

Detailed exploratory hole logs can be found in Appendix B.

8.2. Groundwater

Groundwater inflows were encountered in at all borehole locations as detailed in Table 8.2 below.

Location Ref	Depth of inflow (mbgl)	Rising to (Mins)				Strata / Remarks
		5	10	15	20	
WS09A	2.90	-	-	-	-	Made Ground
WS13	3.50	-	-	-	-	Made Ground

9. Laboratory Testing

9.1. Geotechnical Testing

Geotechnical laboratory testing was undertaken by GSTL Limited and Geolabs, both United Kingdom Accreditation Service (UKAS) accredited laboratory, in accordance with relevant standards.

The following type and number of tests scheduled is shown in Table 9.1 below and the results are presented in Appendix D.

Table 9.1 Geotechnical Testing

Test Description	Number of Tests
Natural moisture content	1
4 Point Liquid and Plastic Limit BS 1377:1990 - Part 2: 4.3 and 5.3	1
Particle Size Distribution Wet Sieve Method BS 1377:1990 - Part 2	2
Pipette Analysis BS 1377:1990 - Part 2: 9.4	2
Triaxial - 100mm single stage	1

Test Description	Number of Tests
Determination of Point Load Value	3
Natural water content of rock	3
BRE Suite D	3
BRE Reduced Suite	2

9.2. Geo-environmental Testing

Selected soil and groundwater samples were sent for geo-environmental laboratory testing which was undertaken by The Environmental Laboratory (ELAB) and i2 analytical Environmental Science, both United Kingdom Accreditation Service (UKAS)

accredited laboratory. ISO17025 and MCERTS accredited methods were specified where applicable and can be seen on the laboratory testing certificates presented in Appendix E.

Tables 9.2.1 and 9.2.2 presents a summary of the scheduled Geo-environmental tests and the results are presented in Appendix D

Table 9.2.1 Geo-Environmental Testing – Laboratory Analyses – Soils

Test Description	Number of Tests
Risk Assessment Suite	7
Speciated Phenols by HPLC	3
Free Cyanide	7
Total Cyanide	7
Speciated VOCs	5
A2SI Metals Leachate Suite – BS12457-1 (single stage 2:1 liquids / solids ratio).	7
A2SI PAH Leachate Suite – BS12457-1 (single stage 2:1 liquids / solids ratio).	7
Leachable Free Cyanide – BS12457-1 (single stage 2:1 liquids / solids ratio).	7
Leachable Total Cyanide – BS12457-1 (single stage 2:1 liquids / solids ratio).	7
TPH CWG	6
Asbestos ID (followed by quantification if required)	9
Speciated PAH (EPA16)	6

Table 9.2.2 Geo-Environmental Testing – Laboratory Analyses – Groundwater

Test Description	Number of Tests
Risk Assessment Suite (Water)	6
Speciated Phenols by HPLC	6
Free Cyanide	6
Total Cyanide	6
Speciated VOCs	6
Speciated SVOCs	6
Dissolved Chromium (III + IV); LOD = 0.5 ug/L.	6

10. Gas, Vapour and Groundwater Monitoring

One round of gas and groundwater monitoring have been undertaken. A summary is provided in Table 10.1 & Table 10.2. The results are presented in Appendix C

10.1. Ground Gas/Vapour

Gas monitoring was undertaken using a calibrated Gas Data GFM436 hand-held gas analyser and a calibrated MiniRae Lite ATEX Photo Ionisation Detector (PID) and a summary is shown in Table 10.1 below;

Table 10.1 Ground Gas/Vapour Monitoring Results

Exploratory Hole Reference	Monitoring Round Date	Minimum O_2 (%)	Maximum CO_2 (%l)	Maximum CH_4 (%)	H_2S (ppm)	CO (ppm)	Maximum PID (ppm)	Barometric Pressure (mb)
RB101	14/03/2022	NR – No access to the locations due to demolition works						
RB102	14/03/2022	NR – No access to the locations due to demolition works						
RB103	14/03/2022	19.3	0.7	<0.1	<0.1	<0.1	-	1016
RB104	14/03/2022	18.1	1.7	<0.1	<0.1	<0.1	-	1016
RB105	14/03/2022	19.7	<0.1	<0.1	<0.1	<0.1	-	1016
RB106	14/03/2022	20.3	<0.1	<0.1	<0.1	<0.1	-	1016
WS09A	14/03/2022	20.2	0.5	<0.1	<0.1	<0.1	-	1016
WS13	14/03/2022	19.7	0.6	<0.1	<0.1	<0.1	-	1016

NR – no reading taken during visit.

10.2. Groundwater

The groundwater levels and any free phase liquids were measured using a calibrated Geotech Oil/Water Interface meter. All Groundwater levels were recorded in the monitoring wells during the monitoring visits and the results are presented in Table 10.2 below; All monitoring wells which groundwater was recorded, a groundwater sample was taken for laboratory analyses.

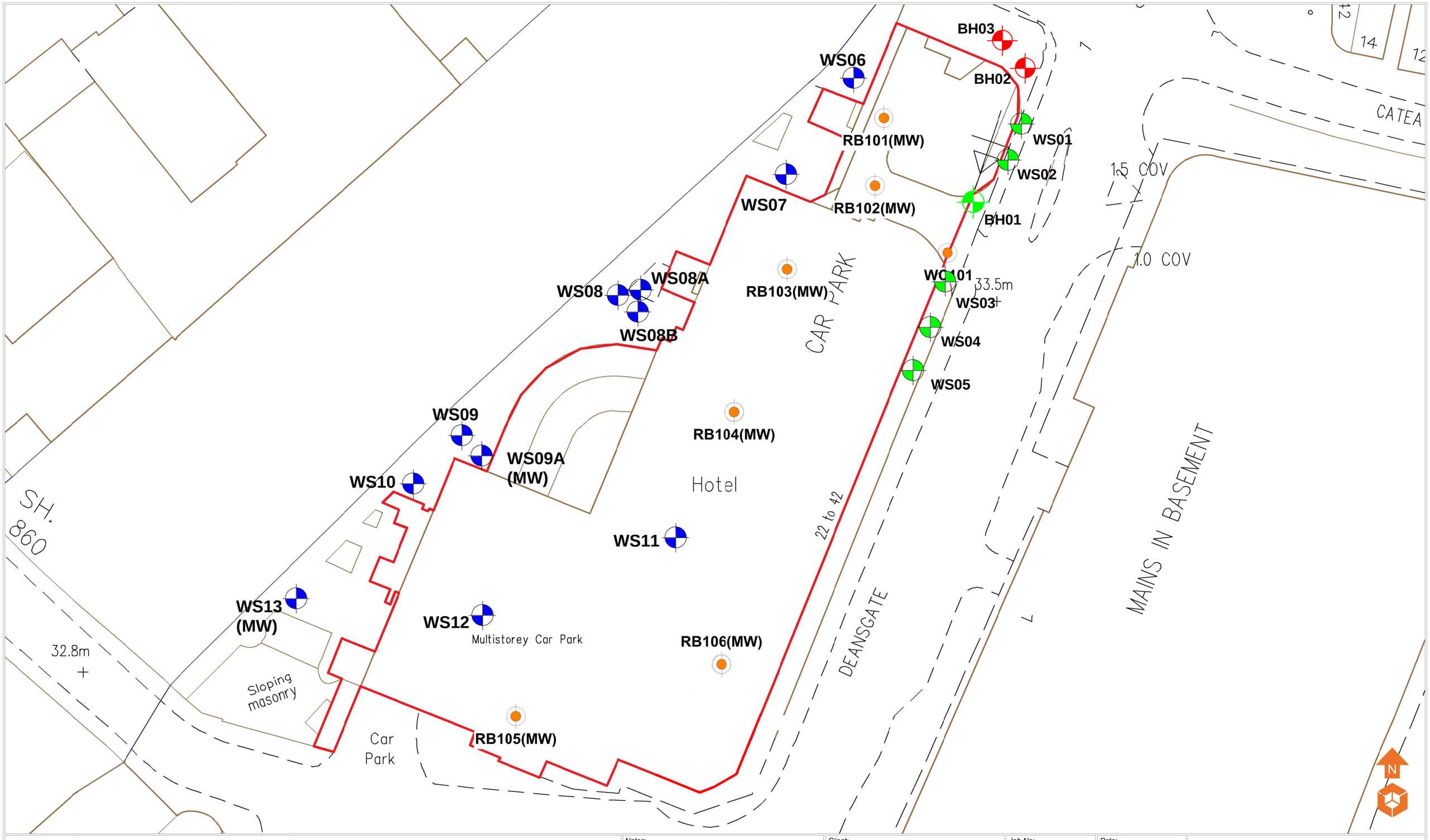
Table 10.2 Groundwater Monitoring Results (mbegl)

Exploratory Hole Reference	Depth of Monitoring Well (mbegl)	Visit 11/11/2021 (mbegl)	Notes
RB101	NR – No access to the locations due to demolition works		
RB102	NR – No access to the locations due to demolition works		
RB103	7.44	3.33	No Free Phase Product Detected
RB104	5.63	2.13	No Free Phase Product Detected
RB105	5.54	2.21	No Free Phase Product Detected
RB106	4.89	2.10	No Free Phase Product Detected
WS09A	3.70	3.41	No Free Phase Product Detected
WS13	4.10	3.41	No Free Phase Product Detected

NR – no reading taken during visit.

Full results of groundwater monitoring can be found in Appendix C.

Appendix A: Exploratory Hole Location Plan



Location Symbols

- Approximate Rotary Borehole Location with Install
- Approximate Rotary Borehole Locations - A2 Phase 1 Site Works
- Approximate Window Sample Borehole Locations - A2 Phase 1 Site Works
- Approximate Window Sample Borehole Locations - A2 Phase 2 Site Works
- Approximate Rotary Borehole Locations - A2 Phase 3 Site Works

Notes:

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 07.04.2021

Drawing No: 018

Scale: NTS

Phase	Issue	Date	Drawn	Checked
P1	REVA	07.04.2021	EB	NS

Job Title: Renaissance Deansgate

Drawing Title: Contamination Issues Plan - Human Health

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

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Appendix B: Exploratory Hole Logs and Photographic Record

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				BH01
Job No: 17321	Start: 20-12-21 Finish: 21-12-21	Ground Level (mOD): 33.38	Co-Ordinates: E 383,783.0 N 398,660.0	Depth (m): 10.5m
Client: BG&E			SPT Energy Ratio: 62%	Sheet: 1 of 2

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
				33.31		0.07	Pavement Slab (MADE GROUND)	
				33.23		0.15	Weak CONCRETE	
				32.98		0.40	Firm black mottled dark brownish grey very sandy gravelly SILT. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick, concrete, quartzite and flint. (MADE GROUND)	
0.40	ES1	VOC-0.0ppm		32.68		(0.30) 0.70	Dense light grey very sandy angular to subangular, coarse GRAVEL of concrete and quartzite of concrete. Sand is fine to coarse. (MADE GROUND)	
1.20	ES2	VOC-0.0ppm				(1.00)	Medium dense greyish brown slighty clayey silty gravelly fine to coarse SAND. Gravel is angular to subangular, fine to coarse of concrete and brick. (MADE GROUND)	
1.50	SPT (s)	(1, 1, 1, 0, 1, 1) N = 3		31.68		1.70		
1.70	ES3	VOC-0.0ppm				(1.30)	Dense reddish brown poorly cemented fine to medium SAND. (WEATHERED CHESTER FORMATION)	
2.50	D4							
2.50	SPT (s)	(2, 3, 4, 6, 6, 7) N = 23		30.38		3.00		
						(1.00)	Stiff to very stiff greyish brown very sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of quartzite. (WEATHERED CHESTER FORMATION)	
4.00	D5			29.38		4.00		
4.00	SPT (s)	(5, 5, 8, 7, 8, 7) N = 30				(0.80)	Dense reddish brown poorly cemented fine to medium SAND. (WEATHERED CHESTER FORMATION)	
				28.58		4.80		
				28.38		5.00	Stiff to very stiff greyish brown very sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of quartzite. (WEATHERED CHESTER FORMATION) ...subangular cobble of sandstone at 4.9m...	
5.00	D6							
5.00	ES7	VOC-0.0ppm				(0.80)	Very dense reddish brown sandy angular to subrounded, fine to coarse GRAVEL of sandstone. Sand is fine to coarse. (WEATHERED CHESTER FORMATION)	
5.00	SPT (s)	(2, 9, 19, 31, 0, 0) N = 50/85 mm		27.58		5.80		

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Vaccum excavated starter pit dug to 1.2m

All dimensions in metres Scale 1:37.5	Contractor: A2 Site Investigation	Method/ Plant Used: Comacchio 305	Logged By: FA	Status: FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				BH01
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	20-12-21 / 21-12-21	33.38	E 383,783.0 N 398,660.0	10.5m
Client			SPT Energy Ratio	Sheet
BG&E			62%	2 of 2

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
							Weak thinly to medium laminated reddish brown medium to coarse grained cemented SANDSTONE. Partially weathered (CHESTER FORMATION). Discontinuities: 1. 0-10° bedding fractures, closely spaced (60/180/450), planar, rough. *(continued)*	
							...layer of medium to coarse SAND from 7.8m to 8.0m...	
						(4.70)	...becomes medium strong and unweathered from 8.0m...	
9.00	SPT (c)	(25, 0, 50, 0, 0, 0) N = 50/30 mm						
				22.88		10.50		
10.50	SPT (c)	(25, 0, 50, 0, 0, 0) N = 50/30 mm					----- *Borehole Terminated at 10.5m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks
21-12-21	10.50	5.00	200		

Chiselling

From	To	Hours

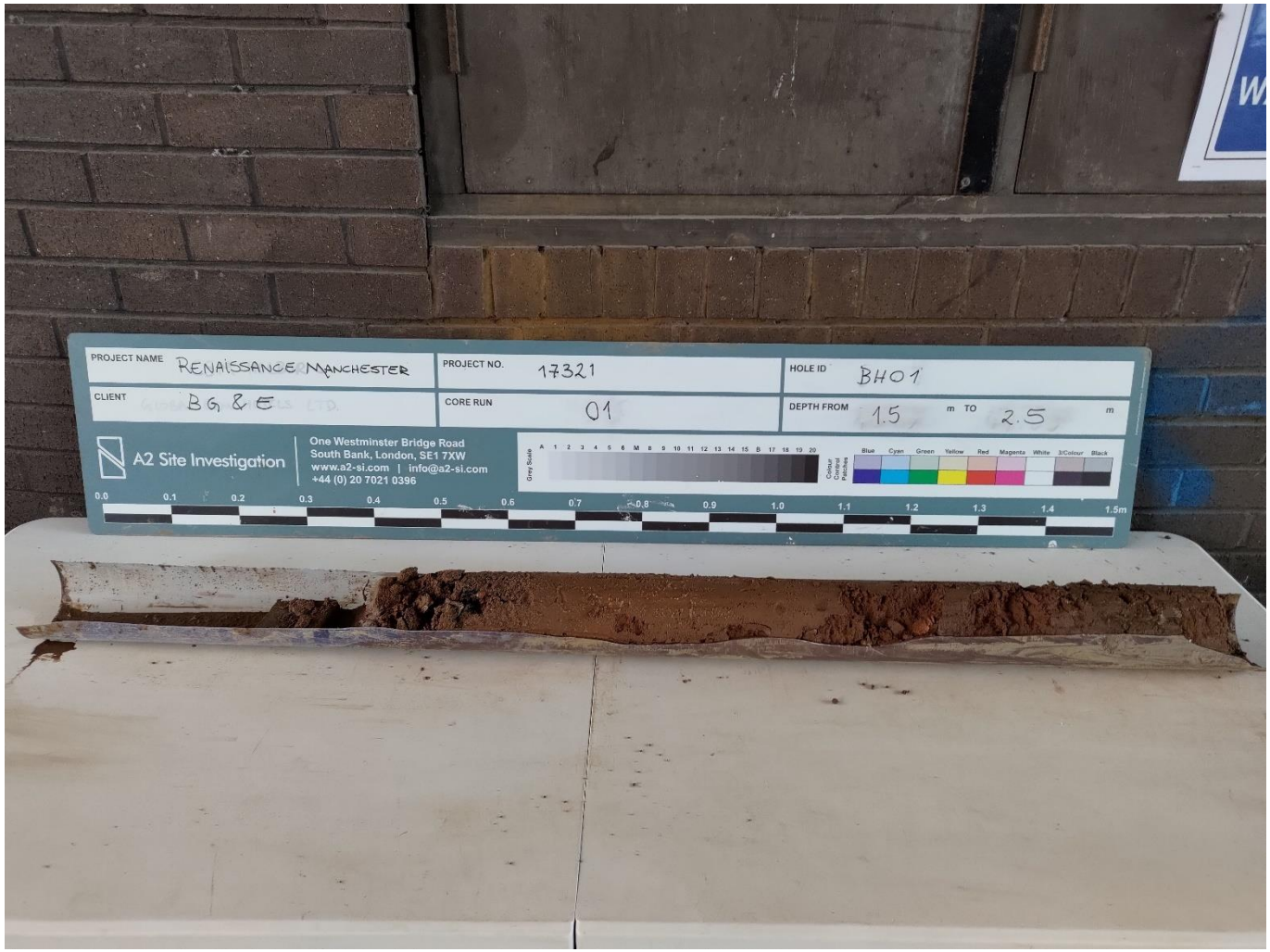
Water Added

From	To

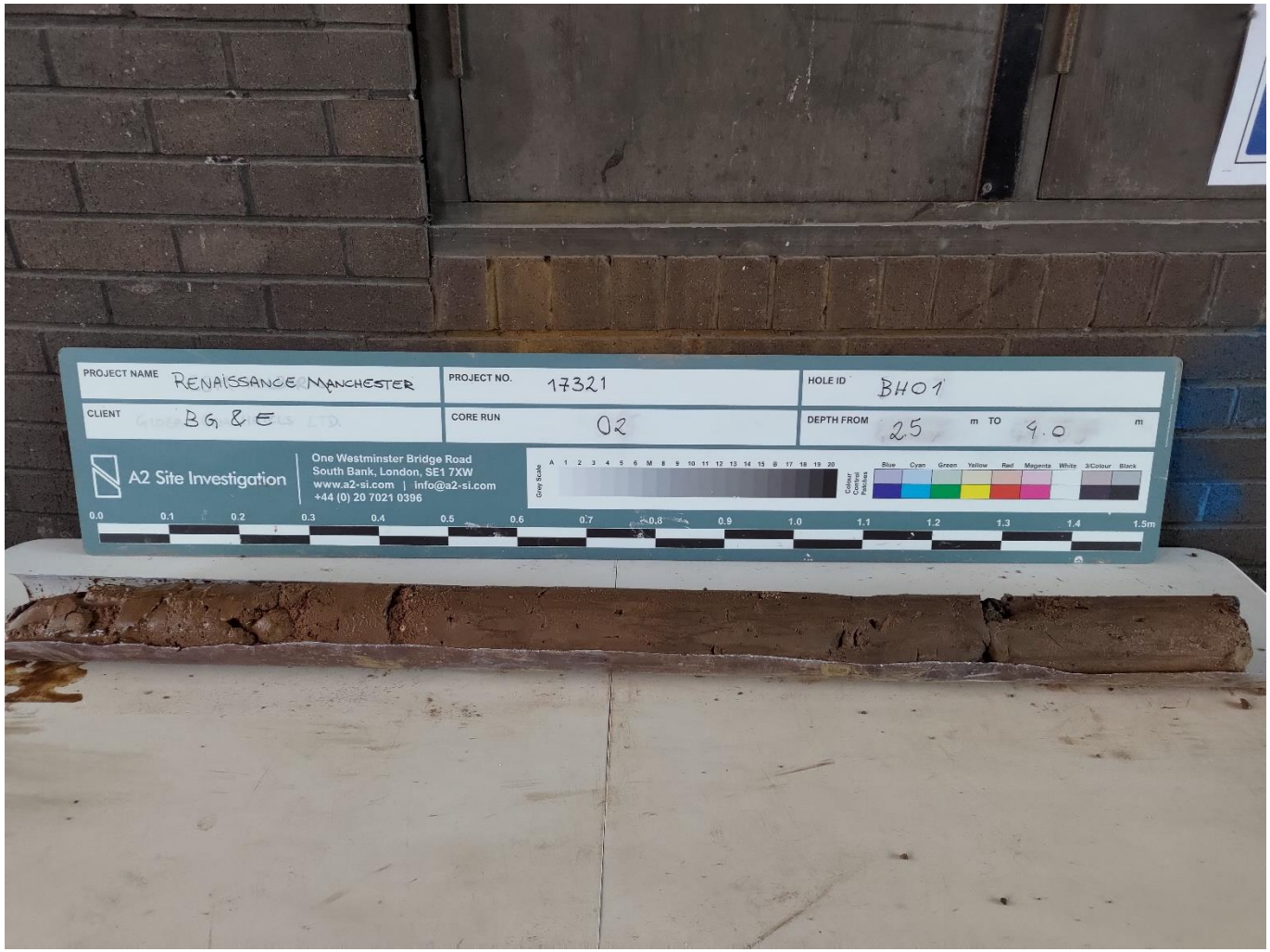
General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Vaccum excavated starter pit dug to 1.2m

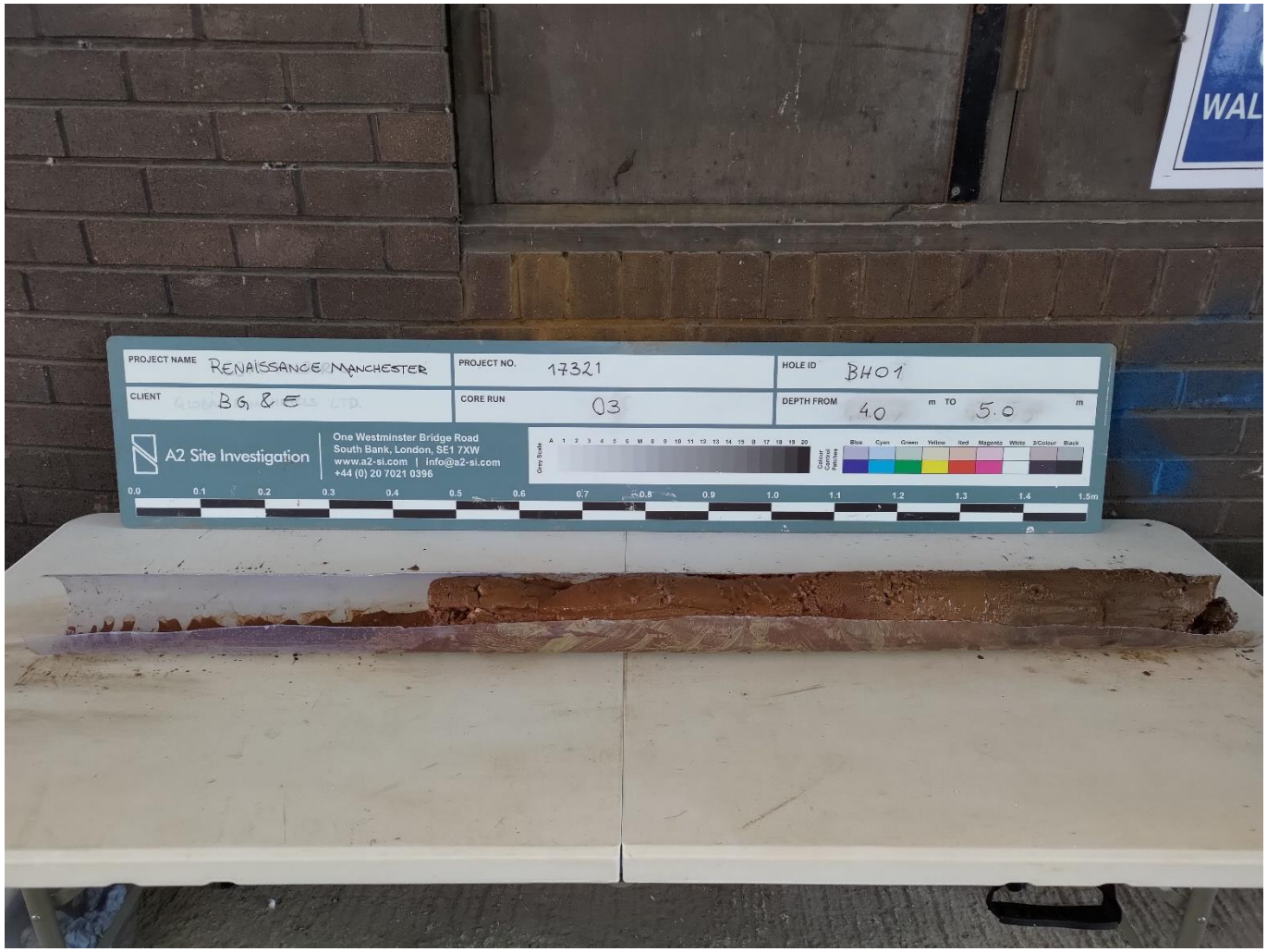
All dimensions in metres Scale 1:37.5	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	Comacchio 305	FA	FINAL



A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title BH01 Photographic Record		Site Renaissance Manchester		
		Core Run 01		Created JS	Checked	Authorised
		Depth From (m) 1.50	Depth To (m) 2.50	Status FINAL	Rev 0	Project No 17321



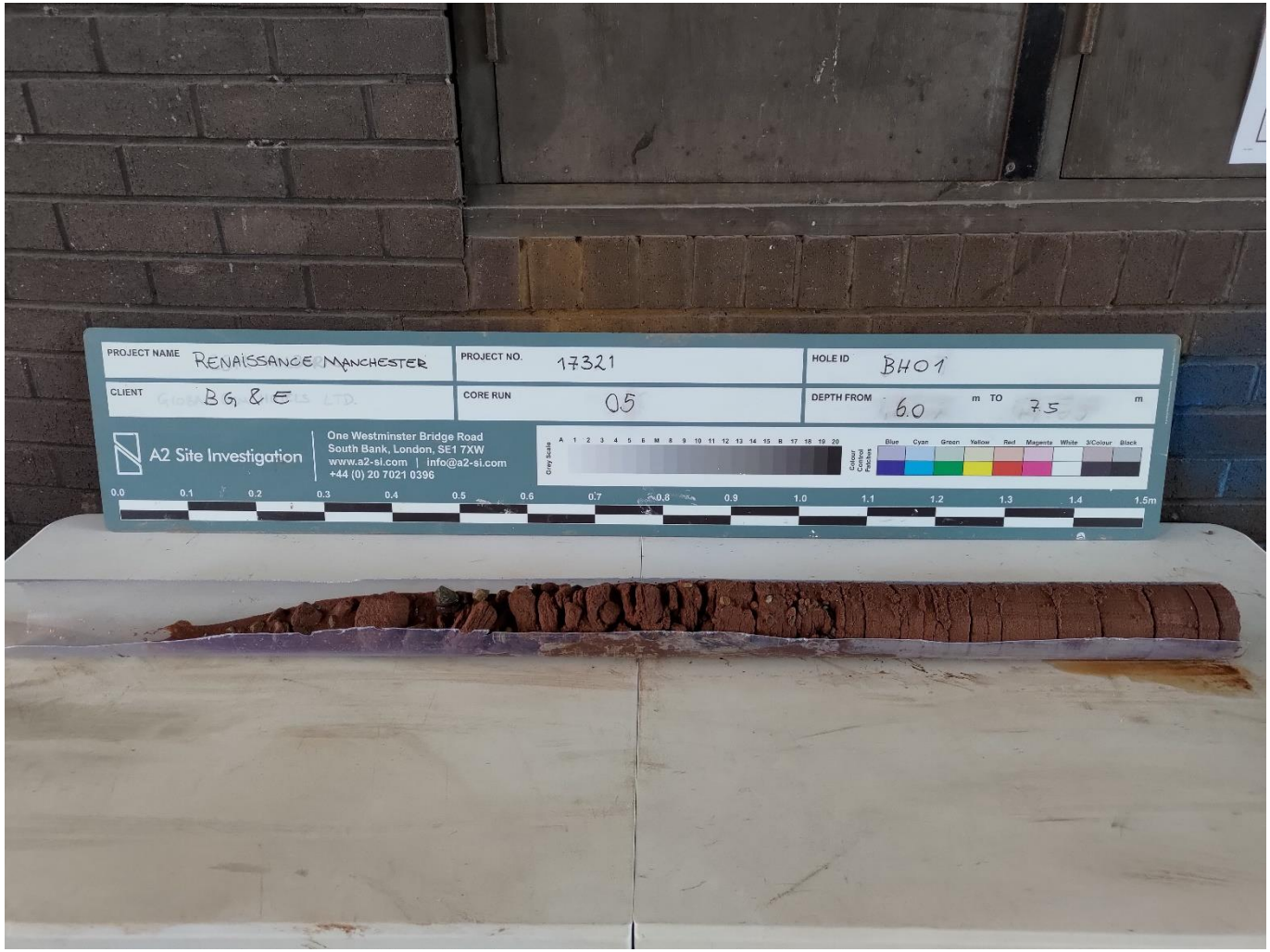
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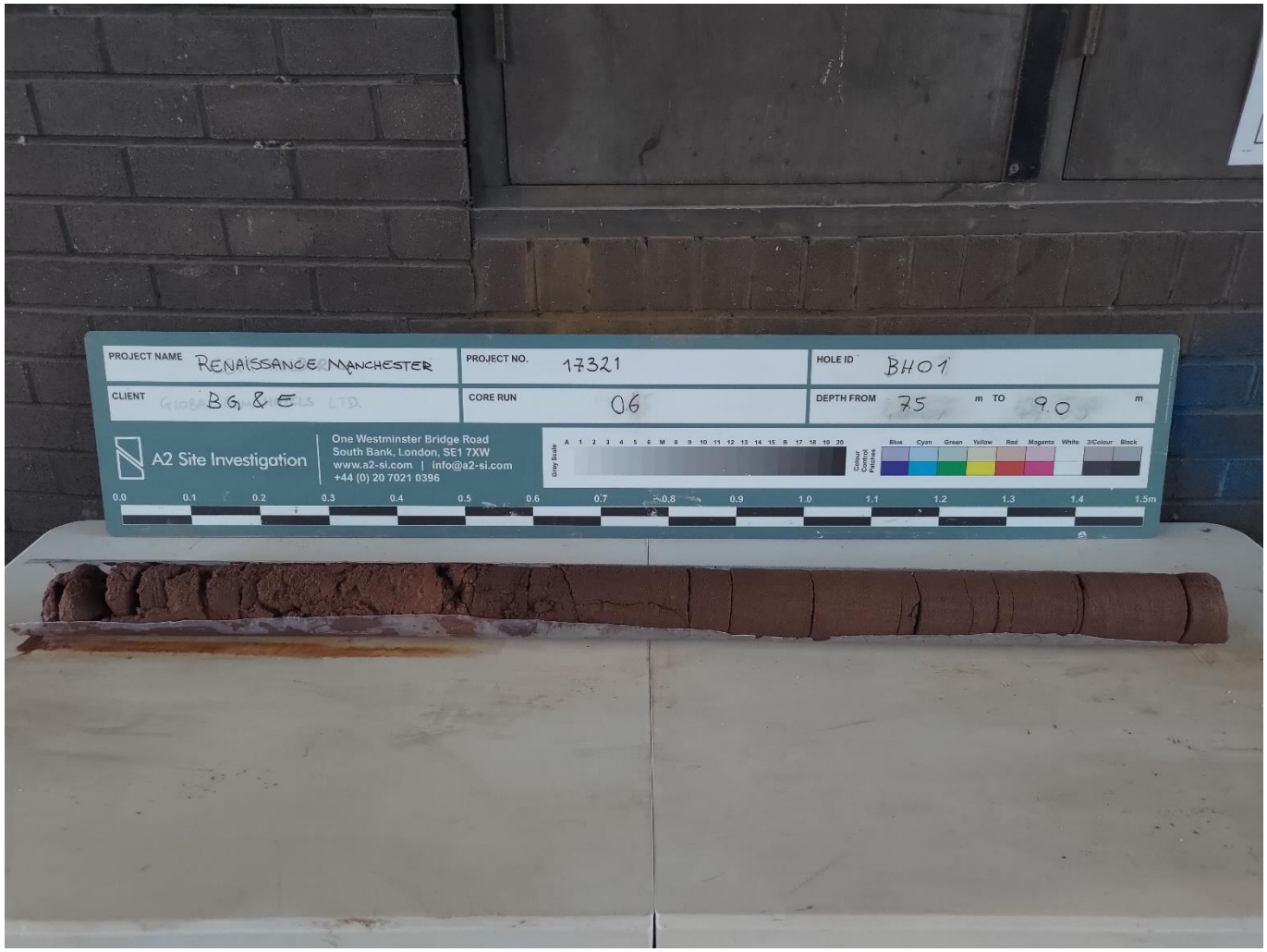
A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title BH01 Photographic Record		Site Renaissance Manchester		
		Core Run 03		Created JS	Checked	Authorised
		Depth From (m) 4.00	Depth To (m) 5.00	Status FINAL	Rev 0	Project No 17321



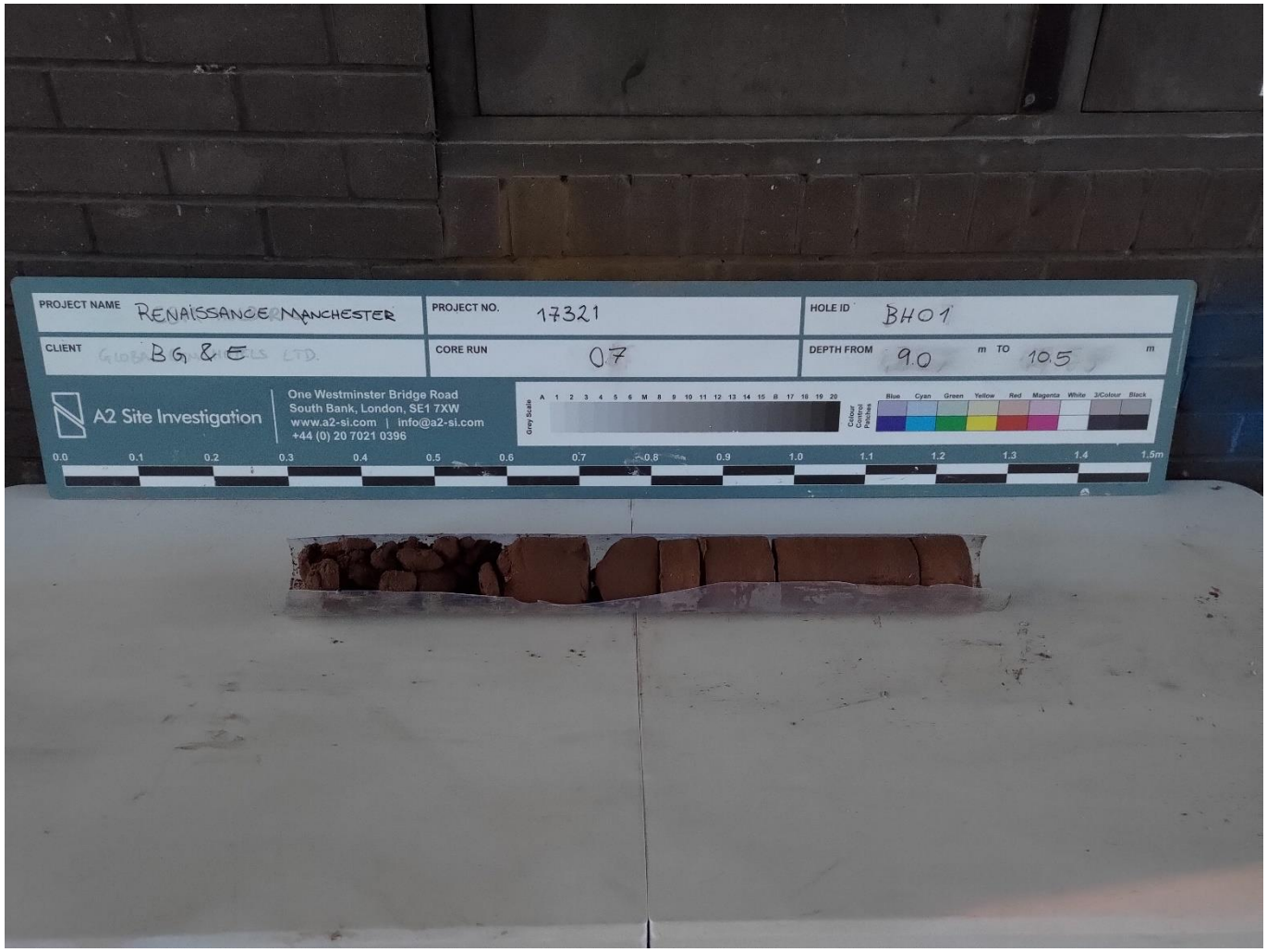
A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title BH01 Photographic Record		Site Renaissance Manchester	
		Core Run 04		Created JS	Checked
		Depth From (m) 5.00	Depth To (m) 6.00	Status FINAL	Rev 0
					Authorised
					Project No 17321



A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title BH01 Photographic Record		Site Renaissance Manchester		
		Core Run 05		Created JS	Checked	Authorised
		Depth From (m) 6.00	Depth To (m) 7.50	Status FINAL	Rev 0	Project No 17321



A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title BH01 Photographic Record		Site Renaissance Manchester		
		Core Run 06		Created JS	Checked	Authorised
		Depth From (m) 7.50	Depth To (m) 9.00	Status FINAL	Rev 0	Project No 17321



A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title BH01 Photographic Record		Site Renaissance Manchester		
		Core Run 07		Created JS	Checked	Authorised
		Depth From (m) 9.00	Depth To (m) 10.5	Status FINAL	Rev 0	Project No 17321

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS01
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	20-12-21 / 21-12-21	32.93	E 383,791.0 N 398,676.0	1.2m
Client			SPT Energy Ratio	Sheet
BG&E			%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
0.40	ES1	VOC 0.0ppm				(1.20)	Soft to firm brown mottled greyish brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular, fine to coarse of brick, flint, concrete, plastic. (MADE GROUND)	
1.20	ES2	VOC 0.0ppm		31.73		1.20	----- *Borehole Terminated at 1.2m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Vaccum excavated starter pit dug to 1.2m
3.Borehole cancelled due to excavation nearby after starter pit was dug. No alternative location was possible due to underground services density in the area.

All dimensions in metres Scale 1:31.25	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	WS Rig	FA	FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS02
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	20-12-21 / 21-12-21	33.29	E 383,786.0 N 398,668.0	4m
Client			SPT Energy Ratio	Sheet
BG&E			67%	1 of 1

SAMPLES & TESTS				STRATA				
Depth (m)	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	Instrument/ Backfill
				33.22		0.07	Pavement Slab (MADE GROUND)	
				32.99		0.30	Loose red fine SAND (MADE GROUND)	
0.50	ES1	VOC 0.0ppm				(0.70)	Dense greyish brown clayey very sandy angular to subrounded, fine to coarse GRAVEL of flint, concrete and brick (MADE GROUND)	
				32.29		1.00		
1.30	ES2	VOC 0.0ppm				(1.80)	Dense light yellowish grey clayey sandy angular to subangular medium to coarse GRAVEL of concrete and quartzite with medium cobble content. Sand is fine to coarse. Cobbles are angular of quartzite. (MADE GROUND)	
2.00	SPT (s)	(2, 2, 1, 1, 0, 1) N = 3						
2.30	ES3	VOC 0.0ppm						
				30.49		2.80		
3.00	ES4	VOC 0.0ppm				(0.80)	Firm to stiff reddish brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular of flint and quartzite. (GLACIOFLUVIAL SHEETS DEPOSITS)	
3.00	SPT (s)	(2, 4, 6, 6, 8, 10) N = 30						
				29.69		3.60		
3.80	ES5	VOC 0.0ppm				(0.40)	Very weak thinly laminated reddish brown poorly cemented medium to coarse SANDSTONE with occasional gravel. Distinctly weathered. (WEATHERED CHESTER FORMATION)	
				29.29		4.00		
4.00	SPT (s)	(11, 14, 24, 26, 0, 0) N = 50/145 mm					----- *Borehole Terminated at 4m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Vaccum excavated starter pit dug to 1.2m

All dimensions in metres Scale 1:31.25	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	WS Rig	FA	FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396



A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title WS02 Photographic Record		Site Renaissance Manchester		
		Core Run -		Created JS	Checked RB	Authorised DS
		Depth From (m) 1.50	Depth To (m) 4.00	Status FINAL	Rev 0	Project No 17321

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS03
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	20-12-21 / 21-12-21	33.75	E 383,781.0 N 398,654.0	1.6m
Client			SPT Energy Ratio	Sheet
BG&E			67%	1 of 1

SAMPLES & TESTS				STRATA				
Depth (m)	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	Instrument/ Backfill
				33.68		0.07	Pavement Slab (MADE GROUND)	
				33.45		0.30	Loose red fine SAND (MADE GROUND)	
0.40	ES1	VOC 0.0ppm				(1.30)	Medium dense greyish brown very clayey sandy angular to subrounded, fine to coarse GRAVEL of brick, concrete, quartzite and flint with low cobble content. Sand is fine to coarse. Cobbles are angular to subangular of brick and quartzite. (MADE GROUND)	
1.30	ES2	VOC 0.0ppm						
1.30	SPT (c)	(12, 13, 12, 14, 14, 10) N = 50/210 mm		32.15		1.60		
1.60	ES3	VOC 0.0ppm					----- *Borehole Terminated at 1.6m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Vaccum excavated starter pit dug to 1.2m
3.Borehole refused at 1.6m on a concrete slab. No alternative location was possible due to underground services density in the area.

All dimensions in metres Scale 1:31.25	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	WS Rig	FA	FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS04
Job No: 17321	Start: 20-12-21 Finish: 21-12-21	Ground Level (mOD): 33.75	Co-Ordinates: E 383,780.0 N 398,652.0	Depth (m): 1.5m
Client: BG&E			SPT Energy Ratio: 67%	Sheet: 1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
0.50	ES1	VOC 0.0ppm				(1.50)	Medium dense greyish brown very clayey sandy angular to subrounded, fine to coarse GRAVEL of brick, concrete, quartzite and flint with low cobble content. Sand is fine to coarse. Cobbles are angular to subangular of brick and quartzite. (MADE GROUND)	
1.30	ES2	VOC 0.0ppm		32.25		1.50		
1.30	SPT (c)	(19, 6, 24, 26, 0, 0) N = 50/85 mm					----- *Borehole Terminated at 1.5m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Vaccum excavated starter pit dug to 1.2m
3.Borehole refused at 1.5m on a concrete slab. No alternative location was possible due to underground services density in the area.

All dimensions in metres Scale 1:31.25	Contractor: A2 Site Investigation	Method/ Plant Used: WS Rig	Logged By: FA	Status: FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS05
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	20-12-21 / 21-12-21	33.75	E 383,778.0 N 398,650.0	1.5m
Client			SPT Energy Ratio	Sheet
BG&E			67%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
							Medium dense greyish brown very clayey sandy angular to subrounded, fine to coarse GRAVEL of brick, concrete, quartzite and flint with low cobble content. Sand is fine to coarse. Cobbles are angular to subangular of brick and quartzite. (MADE GROUND)	
0.50	ES1	VOC 0.0ppm				(1.50)		
1.30	ES2	VOC 0.0ppm		32.25		1.50		
1.30	SPT (c)	(15, 10, 24, 26, 0, 0) N = 50/105 mm					----- *Borehole Terminated at 1.5m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Vaccum excavated starter pit dug to 1.2m
3.Borehole refused at 1.5m on a concrete slab. No alternative location was possible due to underground services density in the area.

All dimensions in metres Scale 1:31.25	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	WS Rig	FA	FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS08
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	22-03-22 / 22-03-22	25.16	E 383,736.8 N 398,645.1	0.95m
Client			SPT Energy Ratio	Sheet
BG&E			%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
				25.09		0.07	CONCRETE Slab	
				25.01		0.15	Compact light red fine to medium SAND with occasional roots (MADE GROUND)	
				24.76		(0.25) 0.40	Loose light grey angular to subangular coarse GRAVEL of type 1 material (MADE GROUND)	
0.50 0.50	ES1	VOC 0.0 ppm		24.51		(0.25) 0.65	Medium dense red slightly silty gravelly fine to coarse SAND with medium cobble content. Gravel is angular to subangular fine to coarse of granite, brick and sandstone. Cobbles are angular of brick and sandstone. (MADE GROUND) 0.50 ...with high cobble content from 0.5m...	
				24.21		(0.30) 0.95	Brickwork (MADE GROUND)	
							----- *Borehole Terminated at 0.95m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Borehole terminated due to refusal

All dimensions in metres Scale 1:31.25	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	Digging tools	FA	FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS08A
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	23-03-22 / 23-03-22	25.16	E 383,739.5 N 398,641.7	0.7m
Client			SPT Energy Ratio	Sheet
BG&E			%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
				25.09		0.07	CONCRETE Slab	
				25.01		0.15	Compact light red fine to medium SAND with occasional roots (MADE GROUND)	
				24.76		(0.25) 0.40	Loose light grey angular to subangular coarse GRAVEL of type 1 material (MADE GROUND)	
0.50 0.50	ES1	VOC 0.0 ppm		24.51		(0.25) 0.65	Medium dense red slightly silty gravelly fine to coarse SAND with medium cobble content. Gravel is angular to subangular fine to coarse of granite, brick and sandstone. Cobbles are angular of brick and sandstone. (MADE GROUND) 0.50 ... with high cobble content from 0.5m...	
				24.46		0.70	Brickwork (MADE GROUND)	
							----- *Borehole Terminated at 0.7m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Borehole terminated due to refusal

All dimensions in metres Scale 1:31.25	Contractor	Method/ Plant Used	Logged By	Status
	A2 Site Investigation	Digging tools	FA	FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS08B
Job No: 17321	Start: 23-03-22 / Finish: 23-03-22	Ground Level (mOD): 25.16	Co-Ordinates: E 383,735.5 N 398,640.3	Depth (m): 1.2m
Client: BG&E			SPT Energy Ratio: 67%	Sheet: 1 of 1

SAMPLES & TESTS							STRATA	
Depth (m)	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	Instrument/ Backfill
				25.09		0.07	CONCRETE Slab	
				25.01		0.15	Loose grey mottled dark grey silty sandy angular to subangular fine to coarse GRAVEL of type 1 material (MADE GROUND)	
				24.76		(0.25) 0.40	Loose light grey mottled white angular to subangular coarse GRAVEL of type 1 material (MADE GROUND)	
0.60 0.60	ES1	VOC 0.0 ppm				(0.80)	Medium dense orangish brown silty very sandy angular to subangular fine to coarse GRAVEL of brick, concrete and sandstone with low cobble content. Sand is fine to coarse. Cobbles are angular of concrete and brick. (MADE GROUND) 0.70 - 0.80 ...layer of brick between 0.7m to 0.8m...	
1.10	SPT (s)	(25, 50, 0, 0, 0, 0) N = 0/0 mm		23.96		1.20	----- *Borehole Terminated at 1.2m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Borehole terminated due to refusal

All dimensions in metres Scale 1:31.25	Contractor: A2 Site Investigation	Method/ Plant Used: WS Rig	Logged By: FA	Status: FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS09
Job No: 17321	Start: 22-03-22 Finish: 22-03-22	Ground Level (mOD): 25.06	Co-Ordinates: E 383,713.1 N 398,623.8	Depth (m): 0.8m
Client: BG&E			SPT Energy Ratio: %	Sheet: 1 of 1

SAMPLES & TESTS							STRATA	
Depth (m)	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	Instrument/ Backfill
				24.99		0.07	CONCRETE slab	
				24.66		(0.33) 0.40	Medium dense grey angular to subangular medium to coarse GRAVEL of concrete, type 1 material and tarmacadam. (MADE GROUND)	
				24.26		(0.40) 0.80	Reinforced CONCRETE with 7mm diameter rebar mesh 40mm spaced.	
							----- *Borehole Terminated at 0.8m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Borehole terminated due to refusal

All dimensions in metres Scale 1:31.25	Contractor: A2 Site Investigation	Method/ Plant Used: Digging tools	Logged By: FA	Status: FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS09A
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	22-03-22 / 22-03-22	25.16	E 383,716.1 N 398,621.1	4m
Client			SPT Energy Ratio	Sheet
BG&E			67%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
				25.09		0.07	CONCRETE slab	
						(0.33)	Medium dense grey angular to subangular medium to coarse GRAVEL of concrete, type 1 material and tarmacadam. (MADE GROUND)	
				24.76		0.40		
0.50 0.50	ES1	VOC 0.0 ppm				(0.30)	Reinforced CONCRETE with 7mm diameter rebar mesh 40mm spaced.	
				24.46		0.70		
							Loose to medium dense red slightly gravelly fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of sandstone and brick. Cobbles are angular of brick and sandstone. (MADE GROUND)	
1.20	SPT (s)	(1, 1, 1, 1, 1, 1) N = 4						
1.50 1.50	ES2	VOC 0.0 ppm				(2.30)		
2.00	SPT (s)	(1, 2, 0, 1, 1, 0) N = 2						
2.50 2.50	ES3	VOC 0.0 ppm						
				22.16		3.00		
3.00	SPT (s)	(2, 1, 2, 1, 4, 4) N = 11					Medium dense reddish brown slightly gravelly fine to coarse SAND. Gravel is angular fine to coarse of sandstone. (Possible GLACIOFLUVIAL DEPOSITS)	
3.50 3.50	ES4	VOC 0.0 ppm				(1.00)		
				21.16		4.00		
4.00	SPT (s)	(1, 0, 1, 1, 1, 0) N = 3					----- *Borehole Terminated at 4m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Groundwater strike at 2.9m

All dimensions in metres Scale 1:31.25	Contractor A2 Site Investigation	Method/ Plant Used WS Rig	Logged By FA	Status FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396



A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title WS09A Photographic Record		Site Renaissance Manchester		
		Core Run -		Created FA	Checked RB	Authorised DS
		Depth From (m) 1.20	Depth To (m) 4.00	Status FINAL	Rev 0	Project No 17321

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS10
Job No: 17321	Start: 23-03-22 / Finish: 23-03-22	Ground Level (mOD): 25.11	Co-Ordinates: E 383,703.7 N 398,616.7	Depth (m): 6m
Client: BG&E			SPT Energy Ratio: 67%	Sheet: 1 of 2

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
				25.04		0.07	CONCRETE slab	
				24.86		0.25	Loose grey mottled dark grey silty sandy angular to subangular fine to coarse GRAVEL of type 1 material and concrete. Sand is fine to coarse (MADE GROUND)	
				24.66		0.45	CONCRETE	
0.50 0.50	ES1	VOC 0.0 ppm					Loose to medium dense dark brownish grey sandy angular to subangular fine to coarse GRAVEL of type 1 material, concrete and brick. Sand is fine to coarse. (MADE GROUND)	
1.20	SPT (s)	(1, 0, 1, 1, 2, 2) N = 6						
1.50 1.50	ES2	VOC 0.0 ppm						
2.00	SPT (s)	(2, 2, 1, 1, 2, 1) N = 5				(3.55)		
2.50 2.50	ES3	VOC 0.0 ppm						
3.00	SPT (s)	(1, 1, 1, 0, 0, 1) N = 2					3.00 ...becomes clayey from 3.0m...	
3.50 3.50	ES4	VOC 0.0 ppm						
				21.11		4.00		
4.00	SPT (s)	(4, 4, 3, 2, 2, 2) N = 9					Medium dense greyish brown clayey slightly gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse of brick, ceramic, glass and sandstone. (MADE GROUND)	
4.50 4.50	ES5	VOC 0.0 ppm						

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny

All dimensions in metres Scale 1:31.25	Contractor A2 Site Investigation	Method/ Plant Used WS Rig	Logged By FA	Status FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS10
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	23-03-22 / 23-03-22	25.11	E 383,703.7 N 398,616.7	6m
Client			SPT Energy Ratio	Sheet
BG&E			67%	2 of 2

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
5.00	SPT (s)	(3, 2, 2, 2, 3, 2) N = 9				(2.00)	Medium dense greyish brown clayey slightly gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse of brick, ceramic, glass and sandstone. (MADE GROUND) *(continued)*	
5.50 5.50	ES6	VOC 0.0 ppm					5.50 ...becomes very clayey from 5.5m...	
				19.11		6.00		
							----- *Borehole Terminated at 6m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny

All dimensions in metres Scale 1:31.25	Contractor A2 Site Investigation	Method/ Plant Used WS Rig	Logged By FA	Status FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396



A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title WS10 Photographic Record		Site Renaissance Manchester		
		Core Run -		Created FA	Checked RB	Authorised DS
		Depth From (m) 1.20	Depth To (m) 6.00	Status FINAL	Rev 0	Project No 17321

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS11
Job No: 17321	Start: 22-03-22 / Finish: 22-03-22	Ground Level (mOD): 25.26	Co-Ordinates: E 383,746.3 N 398,608.6	Depth (m): 0.8m
Client: BG&E			SPT Energy Ratio: 67%	Sheet: 1 of 1

SAMPLES & TESTS							STRATA	
Depth (m)	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	Description	Instrument/ Backfill
				25.01		(0.25) 0.25	Car park CONCRETE slab	
				25.00		0.26	Rubber membrane	
				24.91		0.35	CONCRETE slab	
0.50 0.50 0.60	ES1 SPT (s)	VOC 0.0 ppm (25, 19, 50, 0, 0, 0) N = 50/70 mm		24.46		(0.45) 0.80	Weak thinly to medium laminated reddish brown medium to coarse grained cemented SANDSTONE. Partially weathered (CHESTER FORMATION).	
							----- *Borehole Terminated at 0.8m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Borehole terminated due to refusal

All dimensions in metres Scale 1:31.25	Contractor A2 Site Investigation	Method/ Plant Used WS Rig	Logged By FA	Status FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396



A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title WS11 Photographic Record		Site Renaissance Manchester		
		Core Run -		Created FA	Checked RB	Authorised DS
		Depth From (m) 0.00	Depth To (m) 0.50	Status FINAL	Rev 0	Project No 17321

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS12
Job No: 17321	Start: 22-03-22 / Finish: 22-03-22	Ground Level (mOD): 25.26	Co-Ordinates: E 383,715.9 N 398,596.2	Depth (m): 0.8m
Client: BG&E			SPT Energy Ratio: 67%	Sheet: 1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
				25.01		(0.25) 0.25	Car park CONCRETE slab	
				25.00		0.26	Rubber membrane	
				24.91		0.35	CONCRETE slab	
0.50 0.50 0.60	ES1 SPT (s)	VOC 0.0 ppm (25, 19, 50, 0, 0, 0) N = 50/70 mm		24.46		(0.45) 0.80	Weak thinly to medium laminated reddish brown medium to coarse grained cemented SANDSTONE. Partially weathered (CHESTER FORMATION).	
							----- *Borehole Terminated at 0.8m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Borehole terminated due to refusal

All dimensions in metres Scale 1:31.25	Contractor A2 Site Investigation	Method/ Plant Used WS Rig	Logged By FA	Status FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396



A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title WS12 Photographic Record		Site Renaissance Manchester		
		Core Run -		Created JS	Checked RB	Authorised DS
		Depth From (m) 0.00	Depth To (m) 0.80	Status FINAL	Rev 0	Project No 17321

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS13
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	22-03-22 / 22-03-22	25.08	E 383,688.0 N 398,598.0	6m
Client			SPT Energy Ratio	Sheet
BG&E			67%	1 of 2

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
				25.01		0.07	CONCRETE slab	
						(0.43)	Medium dense grey slightly clayey sandy angular to subangular medium to coarse GRAVEL of type 1 material. Sand is fine to coarse. (MADE GROUND)	
				24.58		0.50		
0.50 0.50	ES1	VOC 0.0 ppm					Medium dense reddish brown slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick and sandstone. (MADE GROUND)	
1.00	SPT (s)	(1, 1, 1, 1, 2, 2) N = 6						
1.50 1.50	ES2	VOC 0.0 ppm				(2.50)		
2.00	SPT (s)	(2, 1, 3, 4, 3, 2) N = 12						
2.50 2.50	ES3	VOC 0.0 ppm						
				22.08		3.00		
3.00	SPT (s)	(2, 1, 1, 0, 0, 1) N = 2					Loose to medium dense brownish grey clayey slightly gravelly fine to medium SAND. Gravel is angular to subangular fine to medium of brick and sandstone. (MADE GROUND)	
3.50 3.50	ES4	VOC 0.0 ppm	1					
4.00 4.00 4.00	ES5 SPT (s)	(4, 6, 2, 2, 2, 3) N = 9 VOC 0.0 ppm				(2.80)		

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Groundwater strike at 3.5m
3.Hole colapsed to 4.0m before installation

All dimensions in metres Scale 1:31.25	Contractor A2 Site Investigation	Method/ Plant Used WS Rig	Logged By FA	Status FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS13
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	22-03-22 / 22-03-22	25.08	E 383,688.0 N 398,598.0	6m
Client			SPT Energy Ratio	Sheet
BG&E			67%	2 of 2

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
5.00 5.00 5.00	ES6 SPT (s)	(2, 0, 1, 0, 1, 0) N = 2 VOC 0.0 ppm					Loose to medium dense brownish grey clayey slightly gravelly fine to medium SAND. Gravel is angular to subangular fine to medium of brick and sandstone. (MADE GROUND) *(continued)*	
				19.28		5.80		
				19.08		6.00	Weak grey medium to coarse grained SANDSTONE (Possible CHESTER FORMATION)	
							----- *Borehole Terminated at 6m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Groundwater strike at 3.5m
3.Hole colapsed to 4.0m before installation

All dimensions in metres Scale 1:31.25	Contractor A2 Site Investigation	Method/ Plant Used WS Rig	Logged By FA	Status FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396



A2 Site Investigation One Westminster Bridge Road London SE1 7XW	Client BG & E	Title WS13 Photographic Record		Site Renaissance Manchester		
		Core Run -		Created JS	Checked RB	Authorised DS
		Depth From (m) 1.20	Depth To (m) 6.00	Status FINAL	Rev 0	Project No 17321

Appendix C: Gas and Groundwater Monitoring Results

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Environmental Monitoring & Sampling Services Limited

Report Number: C0997/4894
Customer: A2 Site Investigation Limited
Site Name: Renaissance, Deansgate, Manchester.
Visit Date: 14/03/2022
Monitoring Technician: Paul Brennan

Installation	Time	Water Level*	Installation Base*	Cover/ pipe height above ground level*	Approx. gas sampling period	Methane (Peak)	Methane (Steady)	Methane (Peak)	Methane (Steady)	Carbon Dioxide (Peak)	Carbon Dioxide (Steady)	Oxygen (Low)	Oxygen (Steady)	Carbon Monoxide	Hydrogen Sulphide	Differential Pressure (Peak)	Differential Pressure (Steady)	Flow Rate (Peak)	Flow Rate (Steady)	Approx. flow rate sampling period	VOC (by PID 10.6ev lamp) (Peak)	VOC (by PID 10.6ev lamp) (Steady)	Atmospheric Pressure	Comments
	(hrs:min)	(m)	(m)	(m)	(sec)	(% Vol)	(% Vol)	(% LEL)	(% LEL)	(% Vol)	(% Vol)	(% Vol)	(% Vol)	(ppm)	(ppm)	(Pa)	(Pa)	(l/hr)	(l/hr)	(sec)	(ppm)	(ppm)	(mb)	
Start	09:57	-	-	-	-	-	<0.1	-	<0.1	-	<0.1	-	20.3	<1	<1	-	0	-	0.0	-	-	<1	1016	
Finish	11:47	-	-	-	-	-	<0.1	-	<0.1	-	<0.1	-	20.4	<1	<1	-	0	-	0.0	-	-	<1	1016	
RB101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No access active demolition taking place where installation located.
RB102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No access. Demolition in progress on floor above and pile of rubble over approx location of installation. No visible evidence on surface slab.
RB103	10:17	3.33	7.44	GL	300	-	<0.1	-	<0.1	-	0.7	-	19.3	<1	<1	-	0	-	0.0	60	-	<1	1016	
RB104	10:40	2.13	5.63	GL	300	-	<0.1	-	<0.1	-	1.7	-	18.1	<1	<1	-	0	-	0.0	60	-	<1	1016	
RB105	11:11	2.21	5.54	GL	300	-	<0.1	-	<0.1	-	<0.1	-	19.7	<1	<1	-	0	-	0.0	60	-	<1	1016	Bung slightly loose on arrival.
RB106	10:55	2.10	4.89	GL	300	-	<0.1	-	<0.1	-	<0.1	-	20.3	<1	<1	-	0	-	0.0	60	-	<1	1016	Backfill around installation collapsed and able to dip to 3.8m bgl outside pipe.
WS09A	11:28	3.41	3.70	GL	300	-	<0.1	-	<0.1	-	0.5	-	20.2	<1	<1	-	0	-	0.0	60	-	<1	1016	
WS13	11:43	3.41	4.10	GL	300	-	<0.1	-	<0.1	-	0.6	-	19.7	<1	<1	-	0	-	0.0	60	-	<1	1016	

Instrument	Manufacturer	Model	S/N	Calibration Date
Infra Red Gas Analyser	Gas Data	GFM430	10167	23/02/2022
Dipmeter	Geotechnical Instruments	DM2.1-60	79964	
Interface Meter	Not utilised	N/A	N/A	
Photoionisation Detector.	RAE Systems	PGM6208	M01C009161	24/01/2022

These works have been undertaken in accordance with the following monitoring & sampling methodologies:

Method Statement for Ground Gas Determinations IRGA & PID v2. Peak ground gas or low oxygen concentrations are reported only when different to steady readings.
Method Statement for Groundwater and Product Level Measurement v2.
* = Water and base level measurements dipped to top of cover or pipe if no cover.
PID concentrations determined over 180 seconds.

Weather Conditions:						**Site Conditions:**
Temperature (°C)	10-12	**Precipitation:**	Dry	**Ground Conditions:**	Dry	
Wind Conditions	Light breeze becoming gentle breeze	**Cloud Cover:**	Clear becoming cloudy			

Results and factual data included in this report are representative of the conditions encountered during the event.
EMSS Ltd cannot be responsible for the suitability of installations installed.



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Environmental Monitoring & Sampling Services Limited

Low Flow Monitoring & Sampling Test Report

Location:	**RB103**	Well diameter:	50
Report Number:	C0997/4895	Project:	Renaissance, Deansgate.
Client:	A2 Site Investigation Limited		
Test Date:	14/03/2022	Operator:	Paul Brennan

Level Measurements taken to:		Top of cover.	
Depth to water (m):	3.32	Total depth (m):	7.42
Depth to LNAPL (m):	ND	Depth to DNAPL (m):	ND
Cover level above ground level (m):	GL	Pipe below cover (m):	0.12
Approximate tube position (m):	3.8	Screen depth (mbgl):	2-10
Cover level (mAOD):	**0.00**		
Initial depth to water (mAOD)	-3.32	Total depth (mAOD)	-7.42

Estimated volume pumped (Ltrs):	17	Flow Rate (ml/min)	410-430
Pump Type - Solinst 410 Peristaltic.		Tubing type: LDPE	
Device Model - SmarTROLL MP		Device S/N - 339309	

Time	pH	Temperature	Electrical Conductivity	Dissolved Oxygen	ORP	Depth	Depth
(hh:mm)	(pH Units)	(°C)	(µS/cm)	(%)	(mV)	(m)	(mAOD)
13:05	7.17	10.7	2345.5	48.6	418	3.40	-
13:10	7.17	11.0	2366.0	10.0	274	3.46	-
13:15	7.16	10.9	2335.8	10.5	254	3.48	-
13:20	7.15	11.0	2317.6	10.1	245	3.49	-
13:25	7.14	11.0	2337.7	8.7	250	3.49	-
13:30	7.14	11.1	2348.1	7.9	252	3.49	-
13:35	7.13	11.1	2376.7	7.0	253	3.49	-
13:40	7.12	11.2	2386.5	5.4	255	3.50	-
13:45	7.11	11.3	2393.2	4.8	252	3.50	-

Sample Description:
Clear, no obvious odour or sheen.

Containers:
1 x 1ltr glass, 1 x 1ltr plastic, 2 x vials, 1 x fixed cyanide, 1 x fixed ammonia & COD.

Comments:
Installation inside demolition area and could only be done 14/3/22.

Laboratory Job Number:
Unknown.

Results and factual data included in this report are representative of the conditions encountered during the event. EMSS Ltd cannot be responsible for the suitability of installations installed.



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Environmental Monitoring & Sampling Services Limited

Low Flow Monitoring & Sampling Test Report

Location:	**RB104**	Well diameter:	50
Report Number:	C0997/4895	Project:	Renaissance, Deansgate.
Client:	A2 Site Investigation Limited		
Test Date:	14/03/2022	Operator:	Paul Brennan

Level Measurements taken to:		Top of cover.	
Depth to water (m):	2.12	Total depth (m):	5.62
Depth to LNAPL (m):	ND	Depth to DNAPL (m):	ND
Cover level above ground level (m):	GL	Pipe below cover (m):	0.10
Approximate tube position (m):	2.6	Screen depth (mbgl):	2-10
Cover level (mAOD):	**0.00**		
Initial depth to water (mAOD)	-2.12	Total depth (mAOD)	-5.62

Estimated volume pumped (Ltrs):	20	Flow Rate (ml/min)	470-500
Pump Type - Solinst 410 Peristaltic.		Tubing type: LDPE	
Device Model - SmarTROLL MP		Device S/N - 339309	

Time	pH	Temperature	Electrical Conductivity	Dissolved Oxygen	ORP	Depth	Depth
(hh:mm)	(pH Units)	(°C)	(µS/cm)	(%)	(mV)	(m)	(mAOD)
14:22	7.10	10.3	1266.7	9.7	476	2.24	-
14:27	7.12	10.5	1263.0	3.0	308	2.36	-
14:32	7.11	10.6	1250.1	2.5	265	2.43	-
14:37	7.13	10.7	1230.1	3.1	241	2.48	-
14:42	7.14	10.7	1207.1	4.5	239	2.53	-
14:47	7.13	10.7	1202.7	6.0	231	2.54	-
14:52	7.13	10.7	1186.3	8.2	236	2.56	-
14:57	7.14	10.8	1153.2	8.7	229	2.58	-
15:02	7.15	10.8	1135.7	10.0	235	2.58	-

Sample Description:
Pale brown, no obvious odour or sheen.

Containers:
1 x 1ltr glass, 1 x 1ltr plastic, 2 x vials, 1 x fixed cyanide, 1 x fixed ammonia & COD.

Comments:
Soft bottom.

Laboratory Job Number:
Unknown.

Results and factual data included in this report are representative of the conditions encountered during the event. EMSS Ltd cannot be responsible for the suitability of installations installed.



emss

Environmental Monitoring & Sampling Services Limited

Low Flow Monitoring & Sampling Test Report

Location:	**RB105**	Well diameter:	50
Report Number:	C0997/4895	Project:	Renaissance, Deansgate.
Client:	A2 Site Investigation Limited		
Test Date:	15/03/2022	Operator:	Paul Brennan

Level Measurements taken to:		Top of cover.	
Depth to water (m):	2.17	Total depth (m):	5.55
Depth to LNAPL (m):	ND	Depth to DNAPL (m):	ND
Cover level above ground level (m):	GL	Pipe below cover (m):	0.25
Approximate tube position (m):	2.7	Screen depth (mbgl):	2-10
Cover level (mAOD):	**0.00**		
Initial depth to water (mAOD)	-2.17	Total depth (mAOD)	-5.55

Estimated volume pumped (Ltrs):	15	Flow Rate (ml/min)	470-480
Pump Type - Solinst 410 Peristaltic.		Tubing type: LDPE	
Device Model - SmarTROLL MP		Device S/N - 339309	

Time	pH	Temperature	Electrical Conductivity	Dissolved Oxygen	ORP	Depth	Depth
(hh:mm)	(pH Units)	(°C)	(µS/cm)	(%)	(mV)	(m)	(mAOD)
07:56	7.34	9.8	381.3	48.4	402	2.27	-
08:01	7.39	10.5	376.5	44.4	237	2.33	-
08:06	7.39	10.5	376.6	44.0	198	2.36	-
08:11	7.41	10.6	376.7	44.9	186	2.39	-
08:16	7.43	10.7	375.1	43.8	176	2.39	-
08:21	7.44	10.7	375.4	43.4	178	2.40	-
08:26	7.45	10.7	376.2	42.7	181	2.40	-

Sample Description:
Clear, no obvious odour or sheen.

Containers:
1 x 1ltr glass, 1 x 1ltr plastic, 2 x vials, 1 x fixed cyanide, 1 x fixed ammonia & COD.

Comments:

Laboratory Job Number:
Unknown.

Results and factual data included in this report are representative of the conditions encountered during the event. EMSS Ltd cannot be responsible for the suitability of installations installed.



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Environmental Monitoring & Sampling Services Limited

Low Flow Monitoring & Sampling Test Report

Location:	**RB106**	Well diameter:	50
Report Number:	C0997/4895	Project:	Renaissance, Deansgate.
Client:	A2 Site Investigation Limited		
Test Date:	14/03/2022	Operator:	Paul Brennan

Level Measurements taken to:		Top of cover.	
Depth to water (m):	2.10	Total depth (m):	4.90
Depth to LNAPL (m):	ND	Depth to DNAPL (m):	ND
Cover level above ground level (m):	GL	Pipe below cover (m):	0.14
Approximate tube position (m):	2.6	Screen depth (mbgl):	2-10
Cover level (mAOD):	**0.00**		
Initial depth to water (mAOD)	-2.10	Total depth (mAOD)	-4.90

Estimated volume pumped (Ltrs):	24	Flow Rate (ml/min)	630-650
Pump Type - Solinst 410 Peristaltic.		Tubing type: LDPE	
Device Model - SmarTROLL MP		Device S/N - 339309	

Time	pH	Temperature	Electrical Conductivity	Dissolved Oxygen	ORP	Depth	Depth
(hh:mm)	(pH Units)	(°C)	(µS/cm)	(%)	(mV)	(m)	(mAOD)
15:36	7.18	10.2	951.2	67.9	406	2.21	-
15:41	7.18	10.3	1060.7	64.7	269	2.26	-
15:46	7.18	10.4	1130.6	64.5	250	2.29	-
15:51	7.17	10.4	1161.3	64.7	235	2.30	-
15:56	7.19	10.5	1194.9	64.6	234	2.30	-
16:01	7.17	10.5	1221.4	64.7	235	2.30	-
16:06	7.17	10.5	1250.5	64.6	228	2.30	-
16:11	7.16	10.5	1264.7	64.3	232	2.31	-
16:16	7.16	10.5	1278.0	64.0	226	2.32	-

Sample Description:
Clear, no obvious odour or sheen.

Containers:
1 x 1ltr glass, 1 x 1ltr plastic, 2 x vials, 1 x fixed cyanide, 1 x fixed ammonia & COD.

Comments:
Soft bottom.

Laboratory Job Number:
Unknown.

Results and factual data included in this report are representative of the conditions encountered during the event. EMSS Ltd cannot be responsible for the suitability of installations installed.



emss

Environmental Monitoring & Sampling Services Limited

Low Flow Monitoring & Sampling Test Report

Location:	**WS09A**	Well diameter:	50
Report Number:	C0997/4895	Project:	Renaissance, Deansgate.
Client:	A2 Site Investigation Limited		
Test Date:	15/03/2022	Operator:	Paul Brennan

Level Measurements taken to:		Top of cover.	
Depth to water (m):	3.41	Total depth (m):	3.71
Depth to LNAPL (m):	ND	Depth to DNAPL (m):	ND
Cover level above ground level (m):	GL	Pipe below cover (m):	0.17
Approximate tube position (m):	Near base	Screen depth (mbgl):	2-3.5
Cover level (mAOD):	**0.00**		
Initial depth to water (mAOD)	-3.41	Total depth (mAOD)	-3.71

Estimated volume pumped (Ltrs):	2	Flow Rate (ml/min)	140
Pump Type - Solinst 410 Peristaltic.		Tubing type: LDPE	
Device Model - SmarTROLL MP		Device S/N - 339309	

Time	pH	Temperature	Electrical Conductivity	Dissolved Oxygen	ORP	Depth	Depth
(hh:mm)	(pH Units)	(°C)	(µS/cm)	(%)	(mV)	(m)	(mAOD)
09:12	7.40	9.4	902.9	32.9	395	3.47	-
09:17	7.41	10.1	875.9	27.5	270	3.51	-
09:22	7.40	10.2	889.4	30.8	251	3.52	-

Sample Description:
Pale brown, no obvious odour or sheen.

Containers:
1 x 1ltr glass, 1 x 1ltr plastic, 2 x vials, 1 x fixed cyanide, 1 x fixed ammonia & COD.

Comments:
Low pump rate due to column depth. Commenced sampling due to falling water level.

Laboratory Job Number:
Unknown.

Results and factual data included in this report are representative of the conditions encountered during the event. EMSS Ltd cannot be responsible for the suitability of installations installed.



emss

Environmental Monitoring & Sampling Services Limited

Low Flow Monitoring & Sampling Test Report

Location:	**WS13**	Well diameter:	50
Report Number:	C0997/4895	Project:	Renaissance, Deansgate.
Client:	A2 Site Investigation Limited		
Test Date:	15/03/2022	Operator:	Paul Brennan

Level Measurements taken to:		Top of cover.	
Depth to water (m):	3.41	Total depth (m):	4.10
Depth to LNAPL (m):	ND	Depth to DNAPL (m):	ND
Cover level above ground level (m):	GL	Pipe below cover (m):	0.14
Approximate tube position (m):	Near base	Screen depth (mbgl):	2-4
Cover level (mAOD):	**0.00**		
Initial depth to water (mAOD)	-3.41	Total depth (mAOD)	-4.10

Estimated volume pumped (Ltrs):	19	Flow Rate (ml/min)	390-440
Pump Type - Solinst 410 Peristaltic.		Tubing type: LDPE	
Device Model - SmarTROLL MP		Device S/N - 339309	

Time	pH	Temperature	Electrical Conductivity	Dissolved Oxygen	ORP	Depth	Depth
(hh:mm)	(pH Units)	(°C)	(µS/cm)	(%)	(mV)	(m)	(mAOD)
10:12	7.37	9.1	851.7	42.9	319	3.48	-
10:17	7.35	8.2	914.1	2.5	235	3.47	-
10:22	7.35	8.2	944.1	1.6	220	3.48	-
10:27	7.36	8.2	951.9	1.4	210	3.48	-
10:32	7.35	8.2	953.8	1.4	201	3.48	-
10:37	7.35	8.3	957.7	1.3	193	3.48	-
10:42	7.35	8.3	955.2	1.3	186	3.48	-
10:47	7.35	8.3	964.4	1.3	182	3.48	-
10:52	7.35	8.3	962.2	1.2	176	3.48	-

Sample Description:
Clear with grey tint, no obvious odour or sheen.

Containers:
1 x 1ltr glass, 1 x 1ltr plastic, 2 x vials, 1 x fixed cyanide, 1 x fixed ammonia & COD.

Comments:
Soft botom. Initial water heavy with sediment and allowed to bypass the flow through cell.

Laboratory Job Number:
Unknown.

Results and factual data included in this report are representative of the conditions encountered during the event. EMSS Ltd cannot be responsible for the suitability of installations installed.

Appendix D: Geotechnical Laboratory Testing

Laboratory Report

2788

GEO Site & Testing Services Ltd

Contract Number: 57522

Client Ref: **17321**
Client PO: **PO503**

Report Date: **04-02-2022**

Client **A2 Site Investigation Limited**
Broom House, 39/43 London Road,
Hadleigh, Benfleet,
Essex
SS7 2QL

Contract Title: **Renaissance Manchester**
For the attention of: **Fernando Afonso**

Date Received: **12-01-2022**
Date Completed: **04-02-2022**

Test Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	1
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	1
PSD Wet Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	2
PSD: Sedimentation by pipette carried out with Wet Sieve (Wet Sieve must also be selected) BS 1377:1990 - Part 2 : 9.4 - * UKAS	2
BRE Reduced Suite **includes pH, water & acid soluble sulphate and total sulphur** Sub-contracted Test - @ Non Accredited Test	2
Quick Undrained Triaxial Compression test - single specimen at one confining pressure (100mm or 38mm diameter) BS 1377:1990 - Part 7 : 8 - * UKAS	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:
Emma Sharp (Business Support Manager) - Paul Evans (Director) - Richard John (Quality/Technical Manager)
Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (Quality Assistant / Administrator / Health and Safety Coordinator)

GEO Site & Testing Services Ltd
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

Laboratory Report

2788

GEO Site & Testing Services Ltd

Contract Number: 57522

Test Description	Qty
Determination of Point Load Value Axial or Diametrical including WC ***Please note GSTL is not accredited for the water content of rock*** ISRM Suggested Method for Point Load Strength - * UKAS	3
Disposal of samples for job	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:
Emma Sharp (Business Support Manager) - Paul Evans (Director) - Richard John (Quality/Technical Manager)
Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (Quality Assistant / Administrator / Health and Safety Coordinator)

GEO Site & Testing Services Ltd
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

GSTL	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.3 & 5.3)	
Contract Number	57522	
Site Name	Renaissance Manchester	
Date Tested	26/01/2022	
	DESCRIPTIONS	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
BH1		D	3.50	-		Brown SAND
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
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				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		

Operators	Checked	04/02/2022	Richard John (Advanced Testing Manager)
Darcy Etheridge	Approved	04/02/2022	Paul Evans (Quality/Technical Manager)

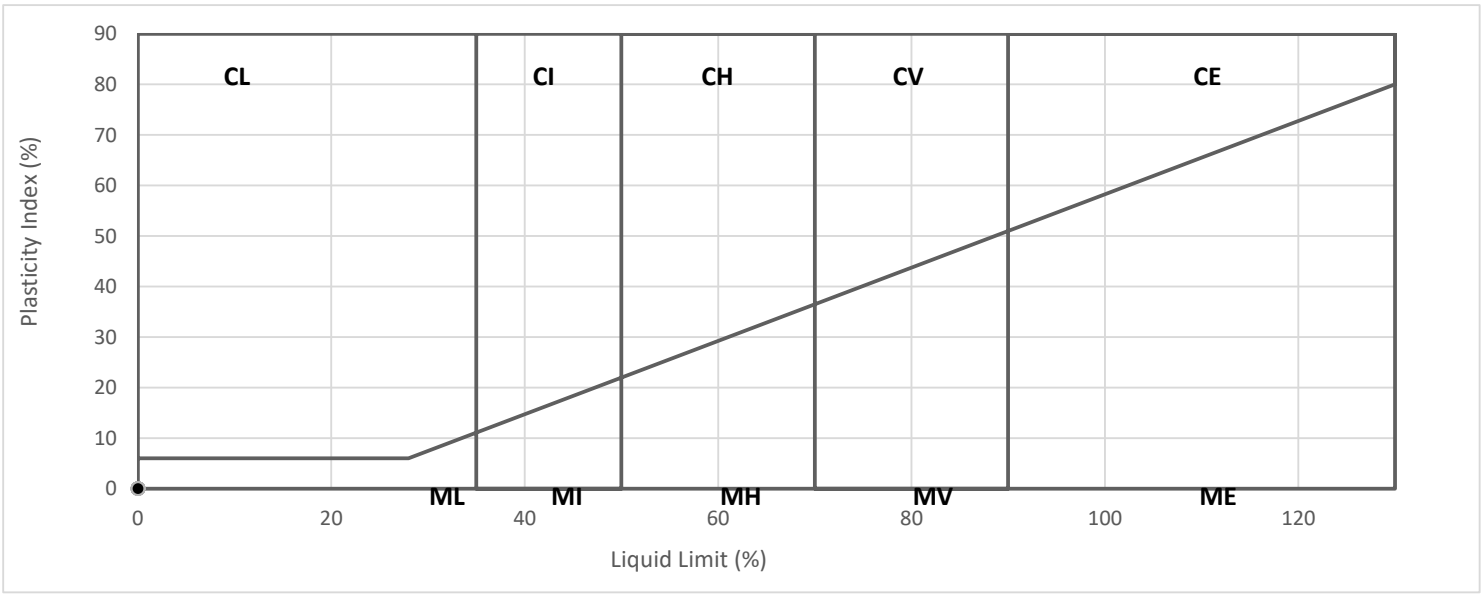
UKAS TESTING
2788

GSTL	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377:1990 - Part 2 : 4.3 & 5.3)	
Contract Number	57522	
Project Location	Renaissance Manchester	
Date Tested	26/01/2022	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
BH1		D	3.50	-		13		NP		100	
				-							
				-							
				-							
				-							
				-							
				-							
				-							
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				-							
				-							

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

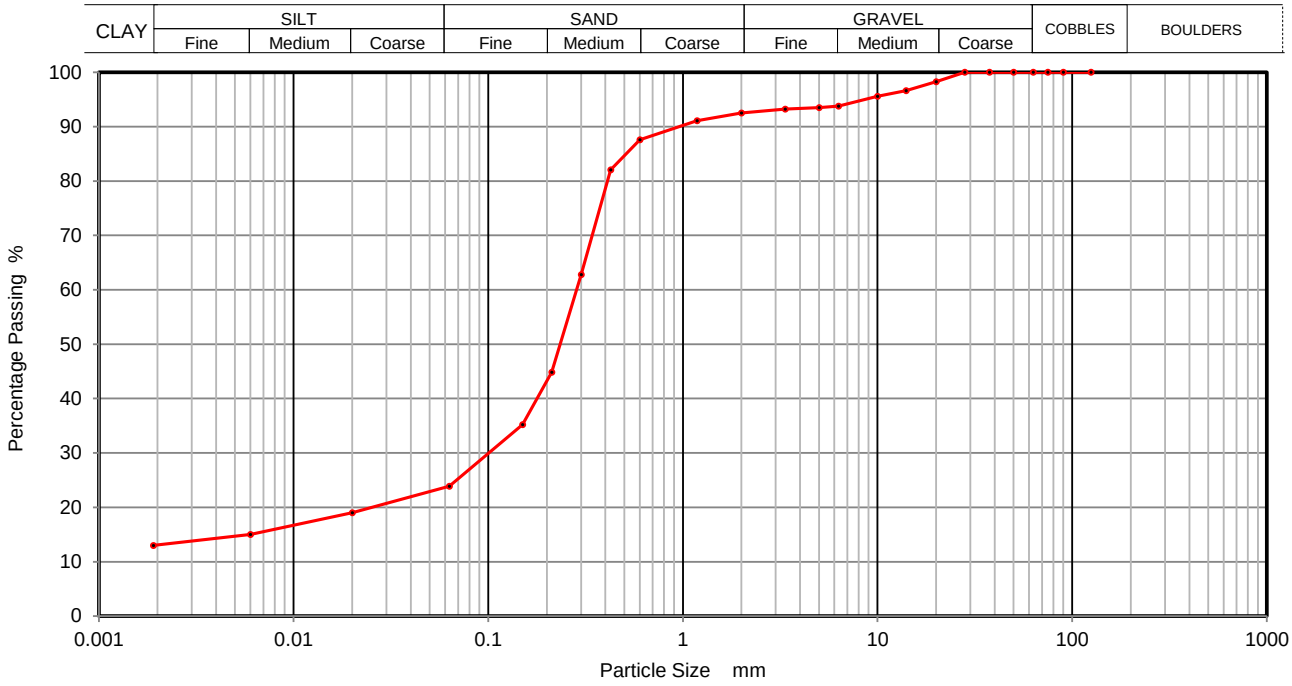
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:1999+A2:2010



Operators	Checked	04/02/2022	Richard John (Advanced Testing Manager)
Darcy Etheridge	Approved	04/02/2022	Paul Evans (Quality/Technical Manager)

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	Renaissance Manchester
		Borehole/Pit No.	BH01
Site Name	57522	Sample No.	
Soil Description	Brown slightly fine to coarse gravelly silty clayey fine to coarse SAND	Depth Top	2.00
		Depth Base	2.50
Date Tested	02/02/2022	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	19
90	100	0.0060	15
75	100	0.0020	13
63	100		
50	100		
37.5	100		
28	100		
20	98		
14	97		
10	96		
6.3	94		
5	94		
3.35	93		
2	93		
1.18	91		
0.6	88		
0.425	82		
0.3	63		
0.212	45		
0.15	35		
0.063	24		

Sample Proportions	% dry mass
Cobbles	0
Gravel	7
Sand	69
Silt	11
Clay	13

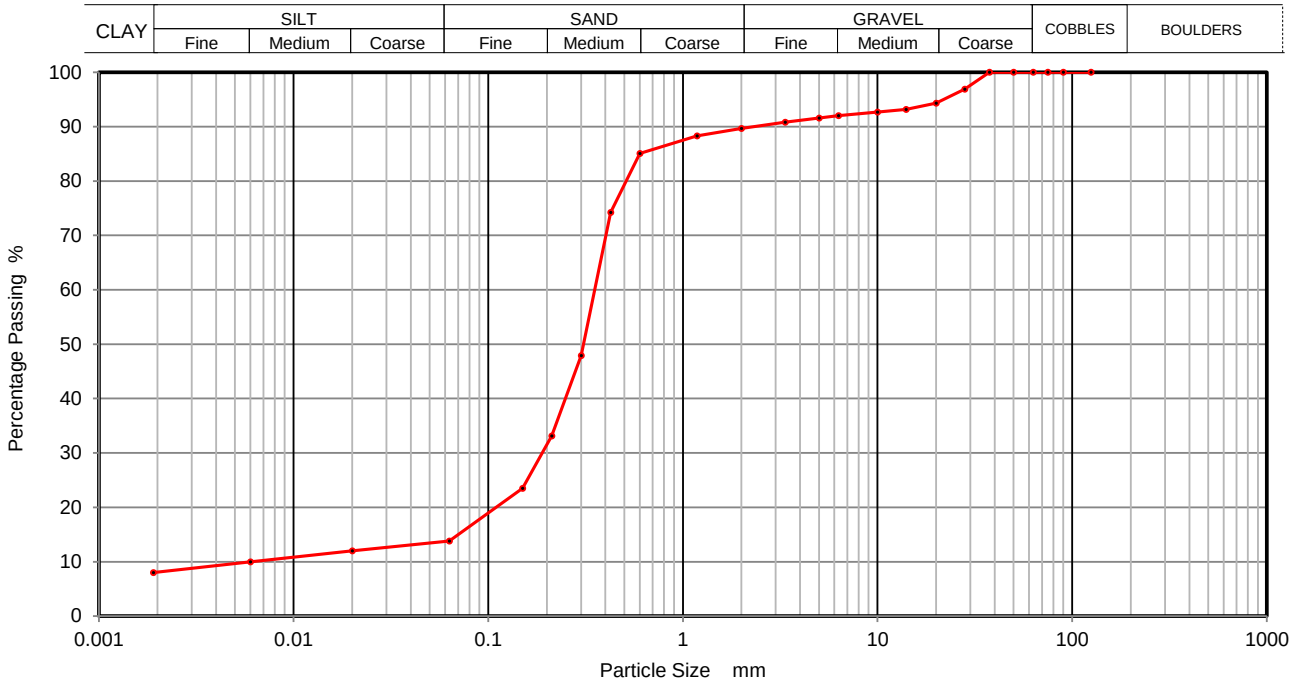
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	03/02/2022	Richard John	
David	Approved	04/02/2022	Paul Evans	

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	Renaissance Manchester
		Borehole/Pit No.	BH01
Site Name	57522	Sample No.	
Soil Description	Brown slightly silty slightly clayey fine to coarse gravelly fine to coarse SAND	Depth Top	4.00
		Depth Base	4.50
Date Tested	02/02/2022	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	12
90	100	0.0060	10
75	100	0.0020	8
63	100		
50	100		
37.5	100		
28	97		
20	94		
14	93		
10	93		
6.3	92		
5	92		
3.35	91		
2	90		
1.18	88		
0.6	85		
0.425	74		
0.3	48		
0.212	33		
0.15	24		
0.063	14		

Sample Proportions	% dry mass
Cobbles	0
Gravel	10
Sand	76
Silt	6
Clay	8

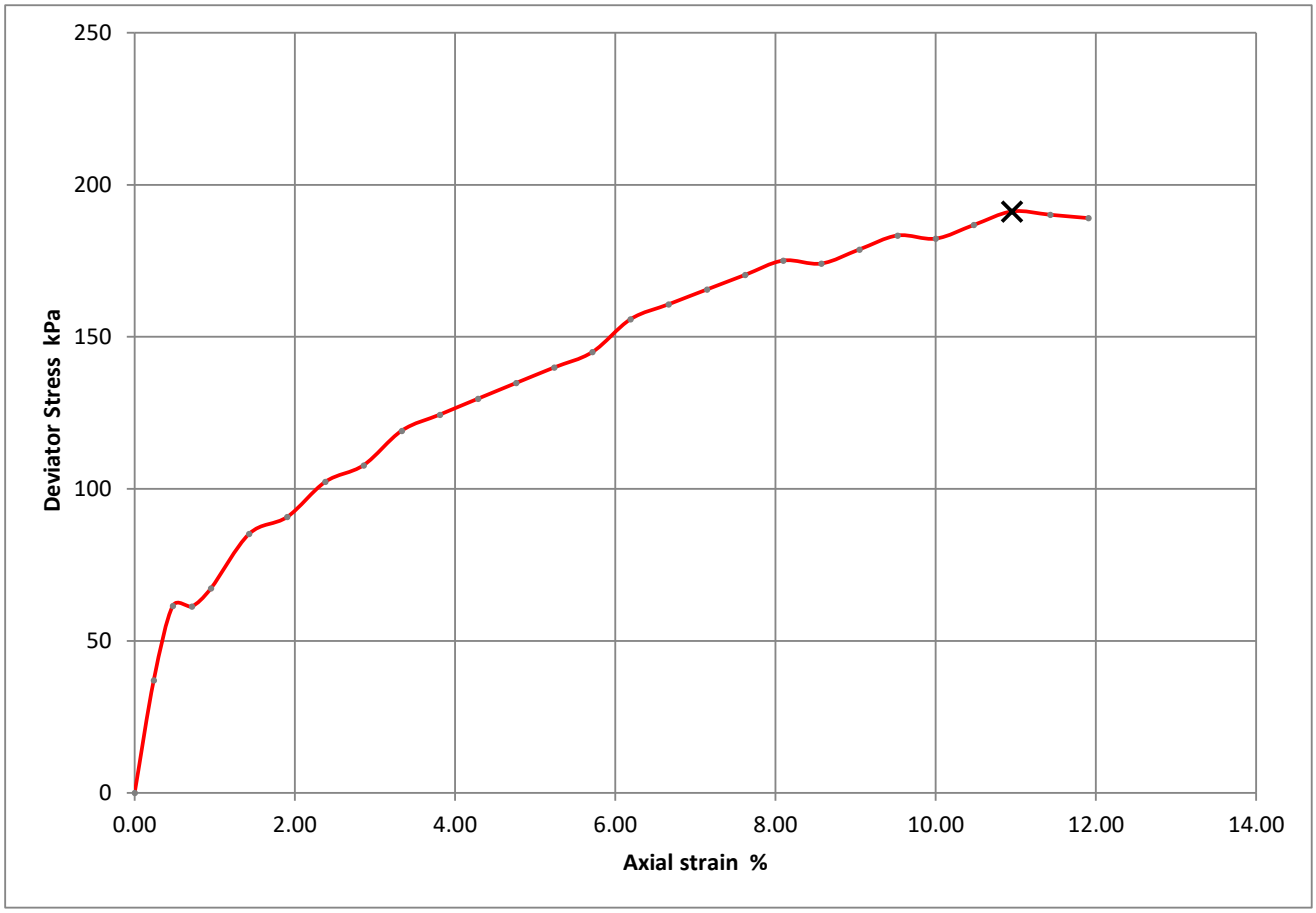
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	03/02/2022	Richard John	
David	Approved	04/02/2022	Paul Evans	

UKAS TESTING
2788

GSTL	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	57522
		Borehole/Pit No.	BH01
Site Name	Renaissance Manchester	Sample No.	
Soil Description	Brown silty CLAY	Depth Top (m)	3.30
		Depth Base (m)	3.60
Date Tested	31/01/2022	Sample Type	U
		Technician	Daniel B



Moisture Content (%)	13
Bulk Density (Mg/m^3)	2.03
Dry Density (Mg/m^3)	1.80
Specimen Length (mm)	210
Specimen Diamteter (mm)	105
Cell Pressure (kPa)	60
Deviator Stress (kPa)	191
Undrained Shear Strength (kPa)	96
Failure Strain (%)	11
Mode Of Failure	Compound
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Checked	03/02/2022	Richard John	
Approved	04/02/2022	Paul Evans	

UKAS TESTING
2788

GSTL	**Point Load Test** **Int. J. Rock Mech. Sci. & Geomech. Abstr. Vol. 22, No. 2, pp. 51 - 60, 1985.**	
Contract Number	57522	
Site Name	Renaissance Manchester	
Sample Type	Core	
Date Tested	12/01/2022	
	*Please note that GSTL is not accredited for the water content of rock	

Hole Reference	Depth (m)			Test Type		Width	Platen Seperation	Failure Load	Equivalent Diameter	Point Load	Size Factor	Point Load Index	Moisture Content	Description	Angle Between Plane of Anisotropy & Core Axis	Type of Anisotropy (Bedding or Cleavage)
				d / a / b / i	I //											
BH01	7.30	-	7.36	a		86	62	0.59	82.39	0.09	1.25	0.11	12.4	SANDSTONE		
BH01	8.80	-	8.92	d			86	0.33		0.04	1.28	0.06	11.3	SANDSTONE		
BH01	10.30	-	10.50	d			84	0.85		0.12	1.26	0.15	12.0	SANDSTONE		

Key	Reported As
Width	(W) mm
Platen Separation	(D) mm
Failure Load	(P) kN
Equivalent Diameter	(De) mm
Point Load	(Is) MPa
Size Factor	(F)
Point Load Index	(Is(50)) MPa
Moisture Content	%
Description	SC

Operators	Checked	03/02/2022	Emma Sharp	
KS	Approved	04/02/2022	Paul Evans	

UKAS TESTING 2788

2531

ANALYTICAL TEST REPORT

Contract no: 104799

Contract name: Renaissance, Manchester

Client reference: 17321

Clients name: Geo Site & Testing Services

Clients address: Unit 3 and 4 Heol Aur
Dafen Industrial Estate, Dafen
Llanelli, Carmarthenshire
SA14 8QN

Samples received: 20 January 2022

Analysis started: 20 January 2022

Analysis completed: 27 January 2022

Report issued: 27 January 2022

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing

Approved by:

Megan Harris

Senior Reporting Administrator

Chemtech Environmental Limited

SOILS

Lab number			104799-1	104799-2
Sample id			BH01	BH01
Depth (m)			2.00-2.50	3.50
Sample Type			B	D
Date sampled			-	-
Test	**Method**	**Units**		
pH	CE004 U	units	8.9	8.9
Sulphate (2:1 water soluble)	CE061 U	mg/l SO_4	<10	24
Sulphate (total)	CE062 U	mg/kg SO_4	<100	<100
Sulphate (total)	CE062 U	% w/w SO_4	<0.01	<0.01
Sulphur (total)	CE119	mg/kg S	<100	<100
Sulphur (total)	CE119	% w/w S	<0.01	<0.01

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO_4
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	U	100	mg/kg SO_4
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	U	0.01	% w/w SO_4
CE119	Sulphur (total)	Acid extraction, ICP-OES	Dry		100	mg/kg S
CE119	Sulphur (total)	Acid extraction, ICP-OES	Dry		0.01	% w/w S

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
104799-1	BH01	2.00-2.50	Y	All (NSD)
104799-2	BH01	3.50	Y	All (NSD)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.
For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones, where applicable.

Appendix E: Geo-Environmental Testing

Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618

cs@elab-uk.co.uk
info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	22-37881
Issue:	1
Date of Issue:	11/01/2022
Contact:	ELAB Results
Customer Details:	A2 Site Investigation Limited One Westminster Bridge Road South Bank London SE1 7XW
Quotation No:	Q20-01974
Order No:	PO507
Customer Reference:	17321
Date Received:	23/12/2021
Date Approved:	11/01/2022
Details:	Reniassance, Manchester
Approved by:	

Mike Varley, General Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683

This report may only be reproduced in full

Sample Summary

Report No.: 22-37881, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
262855	BH01 0.40	20/12/2021	04/01/2022	Loamy sand	g
262856	BH01 1.20	20/12/2021	04/01/2022		
262857	BH01 1.70	21/12/2021	04/01/2022	Sand	
262858	BH01 5.00	21/12/2021	04/01/2022		
262859	BH01 3.00	21/12/2021	04/01/2022	Sand	
262860	BH01 4.00	21/12/2021	04/01/2022	Sandy clay	
262861	WS01 0.40	20/12/2021	04/01/2022		
262862	WS01 1.20	20/12/2021	04/01/2022	Loamy sand	g
262863	WS02 0.50	20/12/2021	04/01/2022	Sandy silty loam	g
262864	WS02 1.30	20/12/2021	04/01/2022		
262865	WS02 2.30	21/12/2021	04/01/2022	Sandy loam	g
262866	WS02 3.00	21/12/2021	04/01/2022		
262867	WS02 3.80	21/12/2021	04/01/2022		
262868	WS03 0.40	20/12/2021	04/01/2022	Loamy sand	g
262869	WS03 1.30	20/12/2021	04/01/2022		
262870	WS04 0.50	20/12/2021	04/01/2022		
262871	WS04 1.30	20/12/2021	04/01/2022	Loamy sand	g
262872	WS05 0.50	20/12/2021	04/01/2022		
262873	WS05 1.30	20/12/2021	04/01/2022	Loamy sand	g

Results Summary

Report No.: 22-37881, issue number 1

				ELAB Reference	262855	262857	262859	262860	262862	262863	262865	262868	262871	262873
				Customer Reference										
				Sample ID										
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Location	BH01	BH01	BH01	BH01	WS01	WS02	WS02	WS03	WS04	WS05
				Sample Depth (m)	0.40	1.70	3.00	4.00	1.20	0.50	2.30	0.40	1.30	1.30
				Sampling Date	20/12/2021	21/12/2021	21/12/2021	21/12/2021	20/12/2021	20/12/2021	21/12/2021	20/12/2021	20/12/2021	20/12/2021
Determinand	**Codes**	**Units**	**LOD**											
Soil sample preparation parameters														
Moisture Content	N	%	0.1		11.9	14.4	17.9	13.1	11.7	4.9	6.4	10.3	12.1	10.5
Material removed	N	%	0.1		42.5	14.8	< 0.1	< 0.1	42.5	68.9	61.3	51.0	41.3	45.7
Description of Inert material removed	N		0		Stones,clinker	Stones	None	None	Stones	Stones	Stones	Stones,clinker	Stones,clinker	Stones
Metals														
Arsenic	M	mg/kg	1		37.5	n/t	n/t	n/t	17.2	8.3	7.8	14.7	22.8	18.9
Barium	U	mg/kg	10		325	n/t	n/t	n/t	238	1090	80.4	169	266	302
Beryllium	U	mg/kg	1		4.0	n/t	n/t	n/t	1.1	1.1	< 1.0	1.4	1.3	1.1
Cadmium	M	mg/kg	0.5		0.6	n/t	n/t	n/t	0.9	2.1	1.8	0.6	1.1	0.9
Chromium	M	mg/kg	5		41.6	n/t	n/t	n/t	26.3	19.6	15.7	25.7	28.3	29.6
Chromium (III)	N	mg/kg	5		41.6	n/t	n/t	n/t	26.3	19.6	15.7	25.7	28.3	29.6
Copper	M	mg/kg	5		154	n/t	n/t	n/t	77.2	29.8	19.8	55.2	128	89.1
Lead	M	mg/kg	5		157	n/t	n/t	n/t	206	95.5	27.2	142	500	220
Mercury	M	mg/kg	0.5		< 0.5	n/t	n/t	n/t	1.1	< 0.5	< 0.5	< 0.5	5.0	1.3
Molybdenum	N	mg/kg	0.5		8.4	n/t	n/t	n/t	2.0	1.8	1.3	2.9	2.2	2.0
Nickel	M	mg/kg	5		69.5	n/t	n/t	n/t	28.2	41.4	26.4	34.8	31.8	28.4
Selenium	M	mg/kg	1		< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	5		72.2	n/t	n/t	n/t	25.5	18.7	11.9	31.2	31.2	27.8
Zinc	M	mg/kg	5		192	n/t	n/t	n/t	144	169	197	129	217	155
Anions														
Water Soluble Sulphate	M	g/l	0.02		n/t	0.02	< 0.02	0.03	n/t	n/t	n/t	n/t	n/t	n/t
Water Soluble Sulphate	M	mg/kg	40		180	n/t	n/t	n/t	41	182	210	166	180	54
Inorganics														
Free Cyanide	N	mg/kg	1		< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexavalent Chromium	N	mg/kg	0.8		< 0.8	n/t	n/t	n/t	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Total Cyanide	M	mg/kg	1		< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	N	%	0.01		n/t	0.02	0.01	0.01	n/t	n/t	n/t	n/t	n/t	n/t
Acid Soluble Sulphate (SO4)	U	%	0.02		n/t	0.02	< 0.02	0.02	n/t	n/t	n/t	n/t	n/t	n/t
Water Soluble Boron	N	mg/kg	0.5		1.9	n/t	n/t	n/t	< 0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5

Results Summary

Report No.: 22-37881, issue number 1

			ELAB Reference	262855	262857	262859	262860	262862	262863	262865	262868	262871	262873
			Customer Reference										
			Sample ID										
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	BH01	BH01	BH01	BH01	WS01	WS02	WS02	WS03	WS04	WS05
			Sample Depth (m)	0.40	1.70	3.00	4.00	1.20	0.50	2.30	0.40	1.30	1.30
			Sampling Date	20/12/2021	21/12/2021	21/12/2021	21/12/2021	20/12/2021	20/12/2021	21/12/2021	20/12/2021	20/12/2021	20/12/2021
Determinand	**Codes**	**Units**	**LOD**										
Miscellaneous													
Fraction of Organic Carbon	N		0.0001	0.0250	n/t	n/t	n/t	0.0100	0.0040	0.0020	0.0080	0.0150	0.0100
pH	M	pH units	0.1	9.7	8.7	8.8	8.5	9.0	8.9	8.8	9.7	9.4	9.2
Soil Organic Matter	U	%	0.1	4.0	n/t	n/t	n/t	1.6	0.5	0.2	1.1	2.4	1.5
Total Organic Carbon	N	%	0.01	2.5	n/t	n/t	n/t	1.0	0.40	0.20	0.80	1.5	1.0
Phenols													
Phenol	M	mg/kg	1	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
M,P-Cresol	N	mg/kg	1	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
O-Cresol	N	mg/kg	1	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
3,4-Dimethylphenol	N	mg/kg	1	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
2,3-Dimethylphenol	M	mg/kg	1	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
2,3,5-trimethylphenol	M	mg/kg	1	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
Total Monohydric Phenols	N	mg/kg	5	< 5	n/t	n/t	n/t	< 5	n/t	n/t	n/t	< 5	n/t
Polyaromatic hydrocarbons													
Naphthalene	M	mg/kg	0.1	< 0.1	n/t	n/t	n/t	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	n/t	n/t	n/t	< 0.1	< 0.1	< 0.1	< 0.1	0.3	< 0.1
Acenaphthene	M	mg/kg	0.1	0.3	n/t	n/t	n/t	0.1	< 0.1	< 0.1	0.2	4.6	0.1
Fluorene	M	mg/kg	0.1	0.2	n/t	n/t	n/t	< 0.1	< 0.1	< 0.1	0.1	2.9	< 0.1
Phenanthrene	M	mg/kg	0.1	2.1	n/t	n/t	n/t	0.8	0.4	< 0.1	1.4	26.1	0.8
Anthracene	M	mg/kg	0.1	0.5	n/t	n/t	n/t	0.2	0.1	< 0.1	0.3	5.7	0.2
Fluoranthene	M	mg/kg	0.1	2.4	n/t	n/t	n/t	0.8	0.7	0.1	2.5	31.4	1.0
Pyrene	M	mg/kg	0.1	2.0	n/t	n/t	n/t	0.8	0.6	0.1	2.0	27.1	0.9
Benzo(a)anthracene	M	mg/kg	0.1	1.0	n/t	n/t	n/t	0.4	0.3	< 0.1	1.0	12.2	0.5
Chrysene	M	mg/kg	0.1	1.3	n/t	n/t	n/t	0.5	0.4	< 0.1	1.3	15.8	0.7
Benzo(b)fluoranthene	M	mg/kg	0.1	1.1	n/t	n/t	n/t	0.5	0.3	< 0.1	1.0	17.1	0.5
Benzo(k)fluoranthene	M	mg/kg	0.1	1.1	n/t	n/t	n/t	0.5	0.3	< 0.1	1.2	10.4	0.5
Benzo(a)pyrene	M	mg/kg	0.1	1.1	n/t	n/t	n/t	0.5	0.3	< 0.1	1.1	13.2	0.5
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	0.7	n/t	n/t	n/t	0.2	0.2	< 0.1	0.7	8.0	0.4
Dibenzo(a,h)anthracene	M	mg/kg	0.1	0.2	n/t	n/t	n/t	< 0.1	< 0.1	< 0.1	0.2	1.6	0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	0.5	n/t	n/t	n/t	0.2	0.2	< 0.1	0.6	7.1	0.3
Total PAH(16)	M	mg/kg	0.4	14.6	n/t	n/t	n/t	5.6	4.1	0.8	13.8	184	6.7

Results Summary

Report No.: 22-37881, issue number 1

				ELAB Reference	262855	262857	262859	262860	262862	262863	262865	262868	262871	262873
				Customer Reference										
				Sample ID										
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sample Location	BH01	BH01	BH01	BH01	WS01	WS02	WS02	WS03	WS04	WS05
				Sample Depth (m)	0.40	1.70	3.00	4.00	1.20	0.50	2.30	0.40	1.30	1.30
				Sampling Date	20/12/2021	21/12/2021	21/12/2021	21/12/2021	20/12/2021	20/12/2021	21/12/2021	20/12/2021	20/12/2021	20/12/2021
Determinand	**Codes**	**Units**	**LOD**											
BTEX														
Benzene	M	ug/kg	10	g < 10.0	n/t	n/t	n/t	g < 10.0	g < 10.0	g < 10.0	g < 10.0	g < 10.0	g < 10.0	
Toluene	M	ug/kg	10	g < 10.0	n/t	n/t	n/t	g < 10.0	g < 10.0	g < 10.0	g < 10.0	g < 10.0	g < 10.0	
Ethylbenzene	M	ug/kg	10	g < 10.0	n/t	n/t	n/t	g < 10.0	g < 10.0	g < 10.0	g < 10.0	g < 10.0	g < 10.0	
Xylenes	M	ug/kg	10	g < 10.0	n/t	n/t	n/t	g < 10.0	g < 10.0	g < 10.0	g < 10.0	g < 10.0	g < 10.0	
MTBE	N	ug/kg	10	g < 10.0	n/t	n/t	n/t	g < 10.0	g < 10.0	g < 10.0	g < 10.0	g < 10.0	g < 10.0	
TPH CWG														
>C5-C6 Aliphatic (HS_1D_MS)	N	mg/kg	0.01	g < 0.01	n/t	n/t	n/t	g < 0.01	g < 0.01	g < 0.01	g < 0.01	g < 0.01	g < 0.01	
>C6-C8 Aliphatic (HS_1D_MS)	N	mg/kg	0.01	g < 0.01	n/t	n/t	n/t	g < 0.01	g < 0.01	g < 0.01	g < 0.01	g < 0.01	g < 0.01	
>C8-C10 Aliphatic (HS_1D_MS+EH_2D_AL)	N	mg/kg	1	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
>C10-C12 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0	
>C12-C16 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	2.9	< 1.0	
>C16-C21 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	4.2	< 1.0	
>C21-C35 Aliphatic (EH_2D_AL)	M	mg/kg	1	7.3	n/t	n/t	n/t	< 1.0	6.4	< 1.0	14.4	11.9	< 1.0	
>C35-C40 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	n/t	n/t	n/t	< 1.0	1.8	< 1.0	4.3	2.8	< 1.0	
Total aliphatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AL)	N	mg/kg	1	8.2	n/t	n/t	n/t	< 1.0	8.8	< 1.0	20.6	23.3	< 1.0	
>C5-C7 Aromatic (HS_1D_MS)	N	mg/kg	0.01	g < 0.01	n/t	n/t	n/t	g < 0.01	g < 0.01	g < 0.01	g < 0.01	g < 0.01	g < 0.01	
>C7-C8 Aromatic (HS_1D_MS)	N	mg/kg	0.01	g < 0.01	n/t	n/t	n/t	g < 0.01	g < 0.01	g < 0.01	g < 0.01	g < 0.01	g < 0.01	
>C8-C10 Aromatic (HS_1D_MS+EH_2D_AR)	N	mg/kg	1	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0	
>C10-C12 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	11.9	< 1.0	
>C12-C16 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	1.6	34.4	< 1.0	
>C16-C21 Aromatic (EH_2D_AR)	M	mg/kg	1	2.8	n/t	n/t	n/t	1.1	1.2	< 1.0	3.1	80.7	< 1.0	
>C21-C35 Aromatic (EH_2D_AR)	M	mg/kg	1	8.9	n/t	n/t	n/t	4.4	11.6	< 1.0	29.3	127	2.7	
>C35-C40 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	n/t	n/t	n/t	1.0	3.0	< 1.0	14.5	8.7	< 1.0	
Total aromatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AR)	N	mg/kg	1	13.1	n/t	n/t	n/t	6.9	16.2	1.5	48.9	264	3.9	
Total petroleum hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_Total)	N	mg/kg	1	21.3	n/t	n/t	n/t	7.3	25.0	1.6	69.5	287	4.0	

Results Summary

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			ELAB Reference	262855	262862	262871
			Customer Reference			
			Sample ID			
			Sample Type	SOIL	SOIL	SOIL
			Sample Location	BH01	WS01	WS04
			Sample Depth (m)	0.40	1.20	1.30
			Sampling Date	20/12/2021	20/12/2021	20/12/2021
Determinand	**Codes**	**Units**	**LOD**			
VOC						
Heptane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Octane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Nonane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
m+p-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
o-xylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
cis-1,2-dichloroethene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1-Dichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Chloroform	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Tetrachloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1,1-Trichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Trichloroethylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Tetrachloroethylene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1,1,2-Tetrachloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1,2,2-Tetrachloroetha	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Chlorobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Bromobenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Bromodichloromethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Methylethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Trans - 1-2 -dichloroethylene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
2,2-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Bromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-Dichloroethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Dibromomethane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-Dichloropropane	M	ug/kg	10	< 10.0	< 10.0	< 10.0
cis-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
trans-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
1,1,2-Trichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Dibromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,3-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-dibromoethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Styrene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Propylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
2-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2,4-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
4-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
t-butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,3,5-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1-methylpropylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
p-cymene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,3-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-Dibromo-3-chloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Hexachlorobutadiene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1-2-3 - Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Naphthalene	N	ug/kg	10	< 10.0	< 10.0	15.3
1-2-4 - Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,4-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Bromoform	N	ug/kg	10	< 10.0	< 10.0	< 10.0

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 22-37881, issue number 1

			ELAB Reference	262855	262862	262863	262865	262868	262871	262873
			Customer Reference							
			Sample ID							
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	BH01	WS01	WS02	WS02	WS03	WS04	WS05
			Sample Depth (m)	0.40	1.20	0.50	2.30	0.40	1.30	1.30
			Sampling Date	20/12/2021	20/12/2021	20/12/2021	21/12/2021	20/12/2021	20/12/2021	20/12/2021
Determinand	**Codes**	**Units**	**LOD**							
Metals										
Chromium (III)	N	ug/l	5	15	< 5	< 5	< 5	< 5	< 5	6
Arsenic 2:1 extract	N	ug/l	5	99	22	< 5	< 5	6	11	24
Barium 2:1 extract	N	ug/l	5	17	5	33	25	15	11	< 5
Beryllium 2:1 extract	N	ug/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Boron 2:1 extract	N	ug/l	5	89	< 5	10	< 5	< 5	7	< 5
Cadmium 2:1 extract	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chromium 2:1 extract	N	ug/l	5	15	< 5	< 5	< 5	< 5	< 5	6
Copper 2:1 extract	N	ug/l	5	86	56	63	44	44	42	37
Lead 2:1 extract	N	ug/l	5	10	< 5	< 5	< 5	< 5	< 5	< 5
Mercury 2:1 extract	N	ug/l	0.1	0.2	0.1	0.1	0.1	< 0.1	0.2	0.1
Molybdenum 2:1 extract	N	ug/l	5	8	< 5	< 5	< 5	< 5	< 5	< 5
Nickel 2:1 extract	N	ug/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium 2:1 extract	N	ug/l	5	9	< 5	< 5	< 5	< 5	< 5	< 5
Vanadium 2:1 extract	N	ug/l	5	62	6	< 5	< 5	5	< 5	8
Zinc 2:1 extract	N	ug/l	5	20	11	8	23	14	9	8

Results Summary

Report No.: 22-37881, issue number 1

			ELAB Reference	262855	262862	262863	262865	262868	262871	262873
			Customer Reference							
			Sample ID							
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	BH01	WS01	WS02	WS02	WS03	WS04	WS05
			Sample Depth (m)	0.40	1.20	0.50	2.30	0.40	1.30	1.30
			Sampling Date	20/12/2021	20/12/2021	20/12/2021	21/12/2021	20/12/2021	20/12/2021	20/12/2021
Determinand	**Codes**	**Units**	**LOD**							
Inorganics										
Hexavalent chromium	N	ug/l	100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Free Cyanide	N	ug/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Total Cyanide	N	ug/l	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Polyaromatic hydrocarbons										
Naphthalene Leachate GCMS	N	ug/l	0.01	0.02	0.02	0.02	0.01	0.04	< 0.01	0.02
Acenaphthylene Leachate GCMS	N	ug/l	0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Acenaphthene Leachate GCMS	N	ug/l	0.01	0.01	0.03	0.01	0.01	0.14	0.01	0.01
Fluorene Leachate GCMS	N	ug/l	0.01	< 0.01	0.01	< 0.01	< 0.01	0.02	< 0.01	0.01
Phenanthrene Leachate GCMS	N	ug/l	0.01	0.04	0.19	0.05	0.06	1.29	0.03	0.08
Anthracene Leachate GCMS	N	ug/l	0.01	0.01	0.05	< 0.01	0.01	0.13	0.01	0.03
Fluoranthene Leachate GCMS	N	ug/l	0.01	0.02	0.18	0.02	0.02	0.22	0.05	0.09
Pyrene Leachate GCMS	N	ug/l	0.01	0.04	0.22	0.02	0.02	2.12	0.06	0.10
Benzo (a) anthracene Leachate GCMS	N	ug/l	0.01	0.01	0.04	0.01	< 0.01	0.27	0.03	0.05
Chrysene Leachate GCMS	N	ug/l	0.01	0.02	0.11	0.01	< 0.01	0.38	0.02	0.05
Benzo (b) fluoranthene Leachate GCMS	N	ug/l	0.01	0.02	0.06	0.01	< 0.01	0.34	0.02	0.04
Benzo (k) fluoranthene Leachate GCMS	N	ug/l	0.01	0.02	0.06	0.01	< 0.01	0.30	0.02	0.03
Benzo (a) pyrene Leachate GCMS	N	ug/l	0.01	0.04	0.07	0.01	< 0.01	0.25	0.02	0.04
Indeno (1,2,3-cd) pyrene Leachate GCMS	N	ug/l	0.01	0.01	0.03	< 0.01	< 0.01	0.26	< 0.01	0.02
Dibenzo(a,h)anthracene Leachate GCMS	N	ug/l	0.01	0.01	0.02	< 0.01	< 0.01	0.18	< 0.01	0.01
Benzo(ghi)perylene Leachate GCMS	N	ug/l	0.01	0.02	0.04	0.01	< 0.01	0.38	0.01	0.03
Total PAH(16) Leachate GCMS	N	ug/l	0.01	0.32	1.15	0.22	0.18	6.31	0.32	0.62

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Results Summary

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Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
262855	0.40	BH01	Brown sandy soil with stones,brick,clinker	No asbestos detected	n/t	n/t	n/t	n/t
262862	1.20	WS01	Brown sandy soil with stones,brick,clinker	No asbestos detected	n/t	n/t	n/t	n/t
262863	0.50	WS02	Brown soil with stones	No asbestos detected	n/t	n/t	n/t	n/t
262865	2.30	WS02	Brown soil with stones	No asbestos detected	n/t	n/t	n/t	n/t
262868	0.40	WS03	Brown sandy soil with stones,clinker	No asbestos detected	n/t	n/t	n/t	n/t
262871	1.30	WS04	Brown sandy soil with stones,brick,clinker	No asbestos detected	n/t	n/t	n/t	n/t
262873	1.30	WS05	Brown sandy soil with stones,clinker	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 22-37881, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Leachate cyanide 10:1 extract	N		10/01/2022		Colorimetry
Leachate metals 2:1 extract	N		11/01/2022	101	ICPMS
Free cyanide	N	As submitted sample	05/01/2022	107	Colorimetry
Hexavalent chromium	N	As submitted sample	05/01/2022	110	Colorimetry
pH	M	Air dried sample	05/01/2022	113	Electromeric
Acid Soluble Sulphate	U	Air dried sample	07/01/2022	115	Ion Chromatography
Aqua regia extractable metals	M	Air dried sample	05/01/2022	118	ICPMS
Phenols in solids	M	As submitted sample	05/01/2022	121	HPLC
PAH (GC-FID)	M	As submitted sample	05/01/2022	133	GC-FID
PAHs and/or PCBs in leachates	N		10/01/2022	135	GC-MS
Water soluble anions	M	Air dried sample	05/01/2022	172	Ion Chromatography
Low range Aliphatic hydrocarbons soil	N	As submitted sample	05/01/2022	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	05/01/2022	181	GC-MS
VOC in solids	M	As submitted sample	05/01/2022	181	GC-MS
BTEX in solids	M	As submitted sample	05/01/2022	181A	GC-MS
Water soluble boron	N	Air dried sample	06/01/2022	202	Colorimetry
Total cyanide	M	As submitted sample	05/01/2022	204	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	06/01/2022	210	IR
TPH CWG soil by gc-gc	M	As submitted sample	05/01/2022	271	
Asbestos identification	U	Air dried sample	06/01/2022	280	Microscopy
Soil organic matter	U	Air dried sample	06/01/2022	BS1377:P3	Titrimetry

Tests marked N are not UKAS accredited

Report Information

Report No.: 22-37881, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.
	Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.
	ELAB are unable to provide an interpretation or opinion on the content of this report.
	The results relate only to the sample received.
	PCB congener results may include any coeluting PCBs
	Uncertainty of measurement for the determinands tested are available upon request
	Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	22-38986
Issue:	1
Date of Issue:	04/03/2022
Contact:	LAB@A2 SI
Customer Details:	A2 Site Investigation Limited One Westminster Bridge Road South Bank London SE1 7XW
Quotation No:	Q20-01974
Order No:	PO507
Customer Reference:	17321
Date Received:	25/02/2022
Date Approved:	04/03/2022
Details:	Renaisance, Manchester
Approved by:	

Mike Varley, General Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683

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Sample Summary

Report No.: 22-38986, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
269593	WS08 0.50	23/02/2022	25/02/2022	Loamy sand	
269594	WS08A 0.50	23/02/2022	25/02/2022		
269595	WS08B 0.60	23/02/2022	25/02/2022		
269596	WS09A 0.50	23/02/2022	25/02/2022	Sand	
269597	WS09A 1.50	23/02/2022	25/02/2022		
269598	WS09A 2.50	23/02/2022	25/02/2022		
269599	WS09A 3.50	23/02/2022	25/02/2022		
269600	WS13 0.50	22/02/2022	25/02/2022	Loamy sand	
269601	WS13 1.50	22/02/2022	25/02/2022	Loamy sand	
269602	WS13 2.50	22/02/2022	25/02/2022		
269603	WS13 3.50	22/02/2022	25/02/2022		
269604	WS13 4.00	22/02/2022	25/02/2022		
269605	WS13 5.00	22/02/2022	25/02/2022		
269606	WS11 0.50	22/02/2022	25/02/2022		
269607	WS12 0.50	22/02/2022	25/02/2022		
269608	WS10 0.50	23/02/2022	25/02/2022	Loamy sand	
269609	WS10 1.50	23/02/2022	25/02/2022	Loamy sand	
269610	WS10 2.50	23/02/2022	25/02/2022		
269611	WS10 3.50	23/02/2022	25/02/2022		
269612	WS10 4.50	23/02/2022	25/02/2022		
269613	WS10 5.50	23/02/2022	25/02/2022		
269614	WS07 0.50	23/02/2022	25/02/2022		
269615	WS07A 0.40	23/02/2022	25/02/2022		

Results Summary

Report No.: 22-38986, issue number 1

			ELAB Reference	269593	269596	269600
			Customer Reference			
			Sample ID			
			Sample Type	SOIL	SOIL	SOIL
			Sample Location	WS08	WS09A	WS13
			Sample Depth (m)	0.50	0.50	0.50
			Sampling Date	23/02/2022	23/02/2022	22/02/2022
Determinand	**Codes**	**Units**	**LOD**			
Soil sample preparation parameters						
Moisture Content	N	%	0.1	11.9	8.5	16.9
Polyaromatic hydrocarbons						
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	< 0.1	< 0.1	0.1
Anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	0.3
Pyrene	M	mg/kg	0.1	< 0.1	< 0.1	0.3
Benzo(a)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	0.1
Chrysene	M	mg/kg	0.1	< 0.1	< 0.1	0.2
Benzo(b)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	0.2
Benzo(k)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	0.2
Benzo(a)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	0.2
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	0.1
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Total PAH(16)	M	mg/kg	0.4	< 0.4	< 0.4	1.9
BTEX						
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Xylenes	M	ug/kg	10	< 10.0	< 10.0	< 10.0
MTBE	N	ug/kg	10	< 10.0	< 10.0	< 10.0
TPH CWG						
>C5-C6 Aliphatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic (HS_1D_MS+EH_2D_AL)	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C21-C35 Aliphatic (EH_2D_AL)	M	mg/kg	1	2.3	< 1.0	< 1.0
>C35-C40 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
Total aliphatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AL)	N	mg/kg	1	3.7	< 1.0	< 1.0
>C5-C7 Aromatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic (HS_1D_MS+EH_2D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C21-C35 Aromatic (EH_2D_AR)	M	mg/kg	1	1.8	< 1.0	< 1.0
>C35-C40 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
Total aromatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AR)	N	mg/kg	1	3.2	< 1.0	< 1.0
Total petroleum hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_Total)	N	mg/kg	1	6.9	< 1.0	< 1.0

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 22-38986, issue number 1

				ELAB Reference	269601	269608	269609
				Customer Reference			
				Sample ID			
				Sample Type	SOIL	SOIL	SOIL
				Sample Location	WS13	WS10	WS10
				Sample Depth (m)	1.50	0.50	1.50
				Sampling Date	22/02/2022	23/02/2022	23/02/2022
Determinand	**Codes**	**Units**	**LOD**			
Soil sample preparation parameters						
Moisture Content	N	%	0.1	11.2	24.0	18.4
Polyaromatic hydrocarbons						
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	0.1	< 0.1	< 0.1
Pyrene	M	mg/kg	0.1	0.1	< 0.1	< 0.1
Benzo(a)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Chrysene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Total PAH(16)	M	mg/kg	0.4	< 0.4	< 0.4	< 0.4
BTEX						
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0
Xylenes	M	ug/kg	10	< 10.0	< 10.0	< 10.0
MTBE	N	ug/kg	10	< 10.0	< 10.0	< 10.0
TPH CWG						
>C5-C6 Aliphatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic (HS_1D_MS+EH_2D_AL)	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C21-C35 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0	3.4
>C35-C40 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
Total aliphatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AL)	N	mg/kg	1	< 1.0	< 1.0	5.3
>C5-C7 Aromatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic (HS_1D_MS+EH_2D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
>C21-C35 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0	8.2
>C35-C40 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0	< 1.0	< 1.0
Total aromatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AR)	N	mg/kg	1	< 1.0	< 1.0	10.1
Total petroleum hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_Total)	N	mg/kg	1	< 1.0	< 1.0	15.4

Results Summary

Report No.: 22-38986, issue number 1

ELAB Reference	269600	269608
Customer Reference		
Sample ID		
Sample Type	SOIL	SOIL
Sample Location	WS13	WS10
Sample Depth (m)	0.50	0.50
Sampling Date	22/02/2022	23/02/2022

Determinand	Codes	Units	LOD		
VOC					
Heptane	N	ug/kg	10	< 10.0	< 10.0
Octane	N	ug/kg	10	< 10.0	< 10.0
Nonane	N	ug/kg	10	< 10.0	< 10.0
Benzene	M	ug/kg	10	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0
m+p-xylene	M	ug/kg	10	< 10.0	< 10.0
o-xylene	M	ug/kg	10	< 10.0	< 10.0
cis-1,2-dichloroethene	N	ug/kg	10	< 10.0	< 10.0
1,1-Dichloroethane	M	ug/kg	10	< 10.0	< 10.0
Chloroform	M	ug/kg	10	< 10.0	< 10.0
Tetrachloromethane	M	ug/kg	10	< 10.0	< 10.0
1,1,1-Trichloroethane	M	ug/kg	10	< 10.0	< 10.0
Trichloroethylene	M	ug/kg	10	< 10.0	< 10.0
Tetrachloroethylene	M	ug/kg	10	< 10.0	66.4
1,1,1,2-Tetrachloroethane	M	ug/kg	10	< 10.0	< 10.0
1,1,2,2-Tetrachloroetha	M	ug/kg	10	< 10.0	< 10.0
Chlorobenzene	M	ug/kg	10	< 10.0	< 10.0
Bromobenzene	M	ug/kg	10	< 10.0	< 10.0
Bromodichloromethane	M	ug/kg	10	< 10.0	< 10.0
Methylethylbenzene	M	ug/kg	10	< 10.0	< 10.0
1,1-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0
Trans - 1-2 -dichloroethylene	N	ug/kg	10	< 10.0	< 10.0
2,2-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0
Bromochloromethane	N	ug/kg	10	< 10.0	< 10.0
1,2-Dichloroethane	M	ug/kg	10	< 10.0	< 10.0
Dibromomethane	M	ug/kg	10	< 10.0	< 10.0
1,2-Dichloropropane	M	ug/kg	10	< 10.0	< 10.0
cis-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0
trans-1,3-Dichloro-1-propene	M	ug/kg	10	< 10.0	< 10.0
1,1,2-Trichloroethane	N	ug/kg	10	< 10.0	< 10.0
Dibromochloromethane	N	ug/kg	10	< 10.0	< 10.0
1,3-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0
1,2-dibromoethane	N	ug/kg	10	< 10.0	< 10.0
Styrene	N	ug/kg	10	< 10.0	< 10.0
Propylbenzene	N	ug/kg	10	< 10.0	< 10.0
2-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0
1,2,4-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0
4-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0
t-butylbenzene	N	ug/kg	10	< 10.0	< 10.0
1,3,5-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0
1-methylpropylbenzene	N	ug/kg	10	< 10.0	< 10.0
p-cymene	N	ug/kg	10	< 10.0	< 10.0
1,3-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
Butylbenzene	N	ug/kg	10	< 10.0	< 10.0
1,2-Dibromo-3-chloropropane	N	ug/kg	10	< 10.0	< 10.0
Hexachlorobutadiene	N	ug/kg	10	< 10.0	< 10.0
1-2-3 - Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
Naphthalene	N	ug/kg	10	< 10.0	< 10.0
1-2-4 - Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
1,4-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
1,2-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
Bromoform	N	ug/kg	10	< 10.0	< 10.0

Tests marked N are not UKAS accredited.

Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY
Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary

Report No.: 22-38986, issue number 1

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos	Gravimetric Analysis Total	Gravimetric Analysis by ACM Type	Free Fibre Analysis	Total Asbestos
269593	0.50	WS08	Brown Sandy	No asbestos detected	n/t	n/t	n/t	n/t
269596	0.50	WS09A	Brown Sandy Soil,Stones	No asbestos detected	n/t	n/t	n/t	n/t
269600	0.50	WS13	Brown sandy Soil,Stones,Concrete,Brick	No asbestos detected	n/t	n/t	n/t	n/t
269601	1.50	WS13	brown sandy soil,Stones,Clinker	No asbestos detected	n/t	n/t	n/t	n/t
269606	0.50	WS11	Brown sandy Soil	No asbestos detected	n/t	n/t	n/t	n/t
269607	0.50	WS12	Brown sandy Soil	No asbestos detected	n/t	n/t	n/t	n/t
269608	0.50	WS10	Brown sandy Soil,Stones,Clinker	No asbestos detected	n/t	n/t	n/t	n/t
269609	1.50	WS10	Brown Sandy Soil,Stones,Clinker	No asbestos detected	n/t	n/t	n/t	n/t
269614	0.50	WS07	Brown sandy Soil,Stones,Clinker	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 22-38986, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
PAH (GC-FID)	M	As submitted sample	01/03/2022	133	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	04/03/2022	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	04/03/2022	181	GC-MS
VOC in solids	M	As submitted sample	04/03/2022	181	GC-MS
BTEX in solids	M	As submitted sample	04/03/2022	181A	GC-MS
TPH CWG soil by gc-gc	M	As submitted sample	28/02/2022	271	
Asbestos identification	U	Air dried sample	04/03/2022	280	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 22-38986, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.
	Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.
	ELAB are unable to provide an interpretation or opinion on the content of this report.
	The results relate only to the sample received.
	PCB congener results may include any coeluting PCBs
	Uncertainty of measurement for the determinands tested are available upon request
	Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

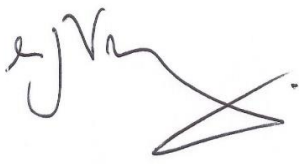
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

Unit A2
Windmill Road
Ponswood Industrial Estate
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UKAS TESTING
2683

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	22-39468
Issue:	2. Replaces Analytical Report number 22-39468; issue no.1
Date of Issue:	29/03/2022
Contact:	Fernando Afonso
Customer Details:	A2 Site Investigation Limited One Westminster Bridge Road South Bank London SE1 7XW
Quotation No:	Q20-01974
Order No:	PO695
Customer Reference:	17321
Date Received:	21/03/2022
Date Approved:	29/03/2022
Details:	Renaissance, Manchester
Approved by:	

Mike Varley, General Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683

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Sample Summary

Report No.: 22-39468, issue number 2

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
272020	RB103 3.32	15/03/2022	21/03/2022		
272021	RB104 2.12	15/03/2022	21/03/2022		
272022	RB105 2.17	15/03/2022	21/03/2022		
272023	RB106 2.10	15/03/2022	21/03/2022		
272024	WS09A 3.41	15/03/2022	21/03/2022		
272025	WS13 3.41	15/03/2022	21/03/2022		

Results Summary

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Report No.: 22-39468, issue number 2

			ELAB Reference	272020	272021	272022	272023	272024	272025
			Customer Reference						
			Sample ID						
			Sample Type	WATER	WATER	WATER	WATER	WATER	WATER
			Sample Location	RB103	RB104	RB105	RB106	WS09A	WS13
			Sample Depth (m)	3.32	2.12	2.17	2.10	3.41	3.41
			Sampling Date	15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022
Determinand	**Codes**	**Units**	**LOD**						
Dissolved Metals									
Arsenic	U	ug/l	0.5	< 0.5	3.0	0.6	< 0.5	2.3	1.8
Boron	N	ug/l	5	206	111	45	13	83	87
Barium	U	ug/l	1	38	90	41	191	38	80
Beryllium	U	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	U	ug/l	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	U	ug/l	0.5	< 0.5	1.0	1.2	0.6	2.4	< 0.5
Chromium (III)	N	ug/l	0.5	<0.5	≤ 1.0	≤ 1.2	≤ 0.6	≤ 2.4	<0.5
Copper	U	ug/l	0.5	0.6	7.4	< 0.5	0.5	3.4	2.9
Mercury	U	ug/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	U	ug/l	1	< 1	6	< 1	< 1	7	4
Nickel	U	ug/l	0.5	2.1	8.3	< 0.5	1.8	1.2	2.3
Lead	U	ug/l	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.1
Selenium	U	ug/l	1	< 1	4	< 1	2	2	< 1
Vanadium	U	ug/l	0.5	< 0.5	7.0	< 0.5	< 0.5	1.6	< 0.5
Zinc	U	ug/l	1.2	10.9	23.3	< 1.2	16.8	3.0	13.8
Anions									
Sulphate	U	mg/l	0.5	416	175	23.1	146	69.1	63.2
Inorganics									
Free Cyanide	N	ug/l	5	< 5	< 5	< 5	< 5	< 5	< 5
Hexavalent Chromium (Dissolved)	N	ug/l	0.5	<0.5	≤ 1.0	≤ 1.2	≤ 0.6	≤ 2.4	<0.5
Total Cyanide	U	ug/l	5	6	< 5	< 5	< 5	< 5	< 5
Miscellaneous									
Dissolved organic carbon	N	mg/l	1.5	3.3	11	2.2	2.7	3.0	3.5
pH	U	pH units	0.1	6.7	7.3	8.3	7.4	7.4	7.0
Suspended Solids	N	mg/l	0.1	26	120	8.0	24	12	74
Total Organic Carbon	N	mg/l	0.9	3	18	2	3	3	4

Results Summary

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Report No.: 22-39468, issue number 2

ELAB Reference				272020	272021	272022	272023	272024	272025
Customer Reference									
Sample ID									
Sample Type				WATER	WATER	WATER	WATER	WATER	WATER
Sample Location				RB103	RB104	RB105	RB106	WS09A	WS13
Sample Depth (m)				3.32	2.12	2.17	2.10	3.41	3.41
Sampling Date				15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022
Determinand	**Codes**	**Units**	**LOD**						
Phenols									
Phenol	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
M,P-Cresol	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
O-Cresol	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
3,4-Dimethylphenol	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
2,3-Dimethylphenol	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
2,3,5-trimethylphenol	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Total Monohydric Phenols	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Polyaromatic hydrocarbons									
Naphthalene GCMS	N	ug/l	0.01	0.01	0.02	0.02	0.01	0.02	0.01
Acenaphthylene GCMS	N	ug/l	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene GCMS	N	ug/l	0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene GCMS	N	ug/l	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene GCMS	N	ug/l	0.01	0.02	0.06	0.01	< 0.01	0.02	0.05
Anthracene GCMS	N	ug/l	0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	0.01
Fluoranthene GCMS	N	ug/l	0.01	0.02	0.06	< 0.01	< 0.01	0.02	0.12
Pyrene GCMS	N	ug/l	0.01	0.02	0.06	< 0.01	< 0.01	0.02	0.13
Benzo (a) anthracene GCMS	N	ug/l	0.01	0.02	0.03	< 0.01	< 0.01	< 0.01	0.06
Chrysene GCMS	N	ug/l	0.01	0.02	0.04	< 0.01	< 0.01	0.01	0.07
Benzo (b) fluoranthene GCMS	N	ug/l	0.01	0.04	0.33	< 0.01	< 0.01	< 0.01	0.16
Benzo (k) fluoranthene GCMS	N	ug/l	0.01	0.03	0.26	< 0.01	< 0.01	< 0.01	0.42
Benzo (a) pyrene GCMS	N	ug/l	0.01	0.04	0.03	< 0.01	< 0.01	0.01	0.09
Indeno (1,2,3-cd) pyrene GCMS	N	ug/l	0.01	0.08	0.02	0.01	0.02	< 0.01	0.05
Dibenzo(a,h)anthracene GCMS	N	ug/l	0.01	0.08	< 0.01	< 0.01	0.01	< 0.01	0.02
Benzo(ghi)perylene GCMS	N	ug/l	0.01	0.08	0.03	< 0.01	< 0.01	< 0.01	0.06
Total PAH(16) GCMS	N	ug/l	0.01	0.48	0.98	0.13	0.09	0.15	1.26

Results Summary

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Report No.: 22-39468, issue number 2

			ELAB Reference	272020	272021	272022	272023	272024	272025
			Customer Reference						
			Sample ID						
			Sample Type	WATER	WATER	WATER	WATER	WATER	WATER
			Sample Location	RB103	RB104	RB105	RB106	WS09A	WS13
			Sample Depth (m)	3.32	2.12	2.17	2.10	3.41	3.41
			Sampling Date	15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022
Determinand	**Codes**	**Units**	**LOD**						
BTEX									
Benzene	U	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Toluene	U	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Ethylbenzene	U	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Xylenes	U	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
MTBE	U	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
TPH CWG									
>C5-C6 Aliphatic (HS_1D_MS)	N	ug/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C6-C8 Aliphatic (HS_1D_MS)	N	ug/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	7.8	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C10-C12 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C12-C16 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C16-C21 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C21-C35 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	5.5	76.4	< 5.0	17.6	< 5.0	6.2
>C35-C40 Aliphatic (EH_CU_1D_AL)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total (>C5-C40) Aliphatic (HS_1D_MS+EH_CU_1D_AL)	N	ug/l	5	13.2	76.4	< 5.0	17.6	< 5.0	6.2
>C5-C7 Aromatic (HS_1D_MS)	N	ug/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C7-C8 Aromatic (HS_1D_MS)	N	ug/l	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aromatic (EH_CU_1D_AR)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C10-C12 Aromatic (EH_CU_1D_AR)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C12-C16 Aromatic (EH_CU_1D_AR)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
>C16-C21 Aromatic (EH_CU_1D_AR)	N	ug/l	5	< 5.0	5.6	< 5.0	< 5.0	< 5.0	< 5.0
>C21-C35 Aromatic (EH_CU_1D_AR)	N	ug/l	5	< 5.0	69.8	< 5.0	8.3	< 5.0	< 5.0
>C35-C40 Aromatic (EH_CU_1D_AR)	N	ug/l	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total (>C5-C40) Aromatic (HS_1D_MS+EH_CU_1D_AR)	N	ug/l	5	< 5.0	75.4	< 5.0	8.3	< 5.0	< 5.0
Total (>C5-C40) Ali/Aro (HS_1D_MS+EH_CU_1D_Total)	N	ug/l	5	13.2	152	< 5.0	25.9	< 5.0	6.2

Results Summary

Report No.: 22-39468, issue number 2

			ELAB Reference	272020	272021	272022	272023	272024	272025
			Customer Reference						
			Sample ID						
			Sample Type	WATER	WATER	WATER	WATER	WATER	WATER
			Sample Location	RB103	RB104	RB105	RB106	WS09A	WS13
			Sample Depth (m)	3.32	2.12	2.17	2.10	3.41	3.41
			Sampling Date	15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022
Determinand	**Codes**	**Units**	**LOD**						
VOC									
MTBE	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Heptane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Octane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Nonane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Benzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Toluene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Ethylbenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
m+p-xylene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
o-xylene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-dichloroethene	N	ug/l	1	8	< 1	< 1	< 1	2	1
1,1-Dichloroethane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Chloroform	N	ug/l	1	< 1	< 1	8	2	< 1	< 1
Tetrachloromethane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Trichloroethylene	N	ug/l	1	27	< 1	< 1	< 1	1	< 1
Tetrachloroethylene	N	ug/l	1	79	< 1	< 1	< 1	13	< 1
1,1,1,2-Tetrachloroethane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,2,2-Tetrachloroetha	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Chlorobenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Bromobenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Bromodichloromethane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Methylethylbenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloro-1-propene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Trans - 1-2 -dichloroethylene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
2,2-Dichloropropane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Bromochloromethane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-Dichloroethane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Dibromomethane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-Dichloropropane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,3-Dichloro-1-propene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
trans-1,3-Dichloro-1-propene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,2-Trichloroethane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Dibromochloromethane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,3-Dichloropropane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Dibromoethane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Styrene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Propylbenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
2-Chlorotoluene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,2,4-Trimethylbenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
4-Chlorotoluene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
t-butylbenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,3,5-Trimethylbenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1-methylpropylbenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
p-cymene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,3-Dichlorobenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Butylbenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-Dibromo-3-chloropropane	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Hexachlorobutadiene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1-2-3 - Trichlorobenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Naphthalene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1-2-4 - Trichlorobenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,4-Dichlorobenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
1,2-Dichlorobenzene	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1
Bromoform	N	ug/l	1	< 1	< 1	< 1	< 1	< 1	< 1

Results Summary

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Report No.: 22-39468, issue number 2

			ELAB Reference	272020	272021	272022	272023	272024	272025
			Customer Reference						
			Sample ID						
			Sample Type	WATER	WATER	WATER	WATER	WATER	WATER
			Sample Location	RB103	RB104	RB105	RB106	WS09A	WS13
			Sample Depth (m)	3.32	2.12	2.17	2.10	3.41	3.41
			Sampling Date	15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022
Determinand	**Codes**	**Units**	**LOD**						
SVOC									
Phenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Aniline	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Bis(2-chloroethyl)ether	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2-Chlorophenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,3-Dichlorobenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,4-Dichlorobenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Benzyl Alcohol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,2-Dichlorobenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2-Methylphenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Bis(2-chloroisopropyl)ether	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
3 and 4-methylphenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
N-Nitrosodi-n-propylamine	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Hexachloroethane	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Nitrobenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Isophorone	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2-Nitrophenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2,4-Dimethylphenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Bis(2-chloroethoxy)methane	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2,4-Dichlorophenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,3,5-Trichlorobenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Naphthalene	N	ug/l	0.01	0.01	0.02	0.02	0.01	0.02	0.01
3-Chloroaniline	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Hexachloro-1,3-butadiene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
4-Chloro-3-methylphenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2-Methynaphthalene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1-Methylnaphthalene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Hexachlorocyclopentadiene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2,4,6-Trichlorophenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2,4,5-Trichlorophenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1-Chloronaphthalene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2-Nitroaniline	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,4-Dinitrobenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Dimethyl phthalate	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1-3-dinitrobenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2-6-dinitrotoluene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Acenaphthylene	N	ug/l	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01
1,2-Dinitrobenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
3-Nitroaniline	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Acenaphthene	N	ug/l	0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01
4-nitrophenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Dibenzofuran	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2,3,5,6-Tetrachlorophenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
2,3,4,6-Tetrachlorophenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Diethyl phthalate	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1-chloro-4-phenoxybenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Fluorene	N	ug/l	0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
4-Nitroaniline	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Dinitro-o-cresol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Diphenylamine	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Azobenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1-bromo-4-phenoxybenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Hexachlorobenzene	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Pentachlorophenol	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 22-39468, issue number 2

				ELAB Reference	272020	272021	272022	272023	272024	272025
				Customer Reference						
				Sample ID						
				Sample Type	WATER	WATER	WATER	WATER	WATER	WATER
				Sample Location	RB103	RB104	RB105	RB106	WS09A	WS13
				Sample Depth (m)	3.32	2.12	2.17	2.10	3.41	3.41
				Sampling Date	15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022	15/03/2022
Determinand	**Codes**	**Units**	**LOD**							
SVOC										
Phenanthrene	N	ug/l	0.01	0.02	0.06	0.01	< 0.01	0.02	0.05
Anthracene	N	ug/l	0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.01
Carbazole	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Dibutyl phthalate	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Fluoranthene	N	ug/l	0.01	0.02	0.06	< 0.01	< 0.01	0.02	0.15
Pyrene	N	ug/l	0.01	0.03	0.06	< 0.01	< 0.01	0.02	0.16
Butyl benzyl phthalate	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Bis-2-ethylhexyladipate	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Diisooctyl phthalate	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Benzo(a)anthracene	N	ug/l	0.01	0.03	0.04	< 0.01	< 0.01	< 0.01	0.08
Chrysene	N	ug/l	0.01	0.03	0.04	< 0.01	< 0.01	0.01	0.10
Bis(2-ethylhexyl)phthalate	N	ug/l	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Benzo(b)fluoranthene	N	ug/l	0.01	0.05	0.03	0.01	< 0.01	< 0.01	0.08
Benzo(k)fluoranthene	N	ug/l	0.01	0.05	0.03	0.01	< 0.01	0.01	0.08
Benzo(a)pyrene	N	ug/l	0.01	0.04	0.03	< 0.01	< 0.01	< 0.01	0.10
Indeno(1,2,3-CD)pyrene	N	ug/l	0.01	0.08	0.02	< 0.01	0.02	< 0.01	0.05
Dibenzo(a,h)anthracene	N	ug/l	0.01	0.09	< 0.01	< 0.01	0.01	< 0.01	0.02
Benzo(ghi)perylene	N	ug/l	0.01	0.09	0.03	0.01	0.01	0.01	0.06

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Method Summary

Report No.: 22-39468, issue number 2

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Water					
Aliphatic/Aromatic hydrocarbons in water	N		25/03/2022		GC-FID
Phenols in waters	N		23/03/2022		HPLC
Dissolved metals by ICP in waters	U		23/03/2022	101	ICPMS
Dissolved organic carbon	N		24/03/2022	102	IR
pH of waters	U		23/03/2022	113	Electromeric
Chromium Hexavalent in waters	N		25/03/2022	123	Colorimetry
Cyanide in waters	U		23/03/2022	132	Colorimetry
PAHs and/or PCBs in waters	N		24/03/2022	135	GC-MS
Suspended Solids in waters	N		28/03/2022	155	Gravimetry
SVOC in waters	N		24/03/2022	167	GC-MS
BTEX in waters	U		23/03/2022	200	GC-MS
Low range Aliphatic hydrocarbons water	N		23/03/2022	200	GC-MS
Low range Aromatic hydrocarbons water	N		23/03/2022	200	GC-MS
VOC in waters	N		22/03/2022	200	GC-MS
Cyanide in waters	U		23/03/2022	205	Colorimetry
Aliphatic hydrocarbons in water	N		24/03/2022	215	GC-FID
Aromatic hydrocarbons in water	N		24/03/2022	215	GC-FID
Anions	U		23/03/2022	270	Ion Chromatography
Dissolved metals by ICP in waters	U		23/03/2022	301	ICPMS
Total metals by ICP	U		29/03/2022	301	ICPMS

Tests marked N are not UKAS accredited

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Report Information

Report No.: 22-39468, issue number 2

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.

Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.

ELAB are unable to provide an interpretation or opinion on the content of this report.

The results relate only to the sample received.

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

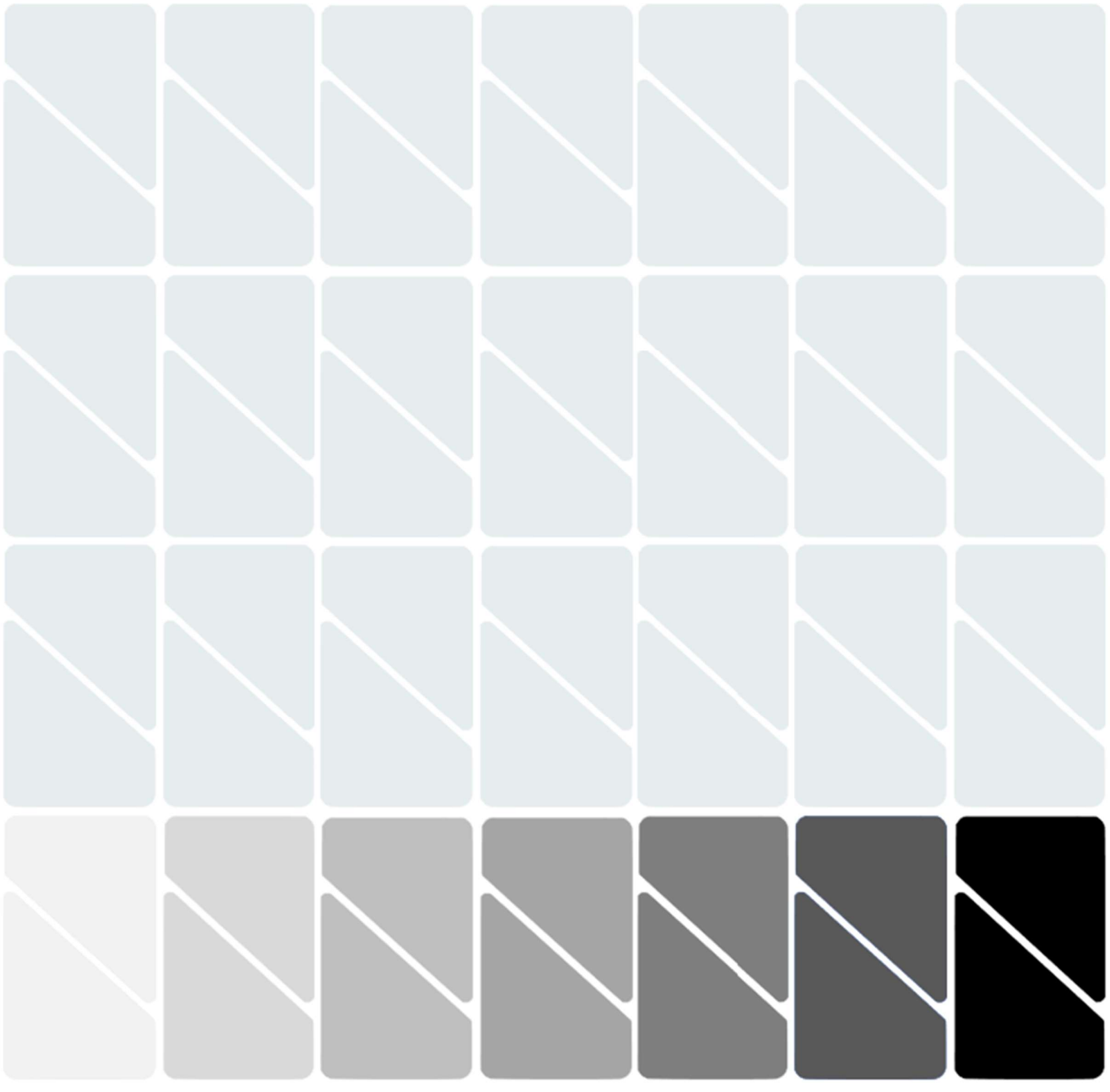
TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

A2 Site Investigation

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Appendix C: A2SI (2023) Factual Report

A2 Site Investigation

Renaissance Water Sampling

Factual Report

July 2024

49224-A2SI-XX-XX-RP-X-0001-00

Project Name	Renaissance Water Sampling
Project Number	49224
Client	Property Alliance Group Ltd
Document Name	Factual Report

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Document Reference	Status	Notes	Revision	Issued by	Date
49224-A2SI-XX-XX-RP-X-0001-00	First Issue		00	FA	08/07/24

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Appendices

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Appendix B: Historic Exploratory Hole Logs

Appendix C: Photographic Record

Appendix D: Geoenvironmental Laboratory Testing Results

Appendix E: Groundwater Sampling Results

Abbreviations

Abbreviation	Full name	Abbreviation	Full name
ACM	Asbestos-containing Material	PL	Plastic Limit
BGS	British Geological Survey	PI	Plasticity Index
BH	Borehole	PSD	Particle Size Distribution
BRE	Building Research Establishment	SGV	Soil Guideline Value
BSI	British Standards Institution	SOM	Soil Organic Matter
BS	British Standard	SPT	Standard Penetration Test
CIRIA	Construction Industry Research and Information Association	SPZ	Source Protection Zone
GAC	Generic Assessment Criteria	SVOC	Semi-volatile Organic Compounds
LL	Liquid Limit	TPH	Total Petroleum Hydrocarbon
m bgl	Metres Below Ground Level	UST	Underground Storage Tank
m OD	Metres Ordnance Datum	UXO	Unexploded Ordnance
PAH	Polycyclic Aromatic Hydrocarbons	VOC	Volatile Organic Compound
PCB	Polychlorinated Biphenyl	WAC	Waste Acceptance Criteria
PID	Photo Ionisation Detector		

1. Introduction

A2 Site Investigation (A2SI) were appointed undertake a groundwater sampling at investigation 6 Deansgate, Manchester M3 1RH (herein called the ‘site’). was specified by A-squared Studio.

2. Site Location

The site is located within the Central Retail District of Manchester City Centre, Manchester, M3 1RH. The site is roughly triangular with Deansgate to the east, River Irwell to the west, Victoria Bridge Street to the north and Blackfriars Street to the south. The site forms part of a wider development associated with the existing hotel. The River Irwell is situated within a man-made channel understood to be supported by concrete and masonry walls.

The site is currently occupied by a 13-storey hotel, four-storey office building and multi-storey car park. There is an approximately 9.5 m difference in level across the site between Deansgate and the River Irwell, with an existing retaining wall along the Deansgate side.



Figure 2.1 Site location and extent shown in red

3. Scope and Purpose of the Investigation

A2SI have been commissioned to undertake a site investigation at the site comprising:

- 2 no. groundwater sampling visits in the 8 No. historic monitoring wells and 2 No. superficial water sampling in the River Irwell, upstream and downstream from the site.

3.1. Investigation Strategy

Table 3.1 summarises the strategy for the phases of the intrusive investigation.

Table 3.1 Summary of investigation strategy

Location ID	Method	Purpose/Comments
RBH01-06, WS09A and WS13	Sampling groundwater samples from monitoring wells using a peristaltic pump.	To determine the groundwater conditions across the site and obtain samples.
Upstream and Downstream Superficial water sampling from the River Irwell	Sampling of superficial water over the bridges with a bucket	To determine the superficial water conditions from upstream and downstream river near the site and obtain samples.

4. Limitations of Report

This report has been prepared in accordance with the specification provided by the client. The data reported relates to the specific locations where each exploratory hole was formed and may not represent the ground and groundwater conditions of the site as a whole. Furthermore, it should be considered that groundwater levels may vary throughout the year due to seasonal conditions and other influences such as flooding, leaking mains, storm drainage and foul water systems.

5. Standards

The site investigation, soil descriptions and laboratory testing were undertaken in accordance with following standards:

- AGS Assessment and Control of Asbestos Risk in Soil – Part 1: Protection of Personnel working on Ground Investigations, May 2021.
- BGS Geology Viewer: 2022. https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/. British Geological Survey.
- BGS GeoIndex: 2022. https://www.bgs.ac.uk/map-viewers/geoindex-onshore/. British Geological Survey.
- British Standards Institution BS 10175:2011+A2:2017, Investigation of potentially contaminated sites – code of practice.
- British Standards Institution BS 5930:2015+A1:2020, Code of practice for site investigations.
- British Standards Institution BS 1377-2:2022, Methods of test for soils for civil engineering purposes – Part 2: Classification tests and determination of geotechnical properties.
- British Standards Institution BS 1377-9:1990, Methods for test for soils for civil engineering purposes - In-situ tests.
- British Standards Institution BS 8576:2013 Guidance on investigations for ground gas - permanent gases and volatile organic compounds (VOCs).
- British Standards Institution BS EN ISO 14688-1:2018, Geotechnical investigation and testing – identification and classification of soil. Identification and description.
- British Standards Institution BS EN ISO 22475-1: 2021 : Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 Technical principles for execution.

- British Standards Institution BS EN ISO 5667-1:2023 Water quality. Sampling - Guidance on the design of sampling programmes and sampling techniques.
- UK Specification for Ground Investigation 3rd Edition, published by ICE Publishing (2022).

6. Ground Investigation Summary

6.1. Fieldwork Overview

The fieldwork was carried out on 5th June 2024 and 13th June 2024. A site walkover was conducted during the first day of the ground investigation to confirmed the anticipated layout of the site. During the site walkover, three monitoring wells (RB101, RB102 and RB103) were no longer present at the site. Those might have been destroyed following demolition/construction works. Photographs of the current state of the site can be found on Appendix B

A2 Site Investigation Limited have been commissioned to undertake a ground investigation at the site comprising:

- 2 no. groundwater sampling visits in 5 No. historic monitoring wells and superficial water sampling in the River Irwell, upstream and downstream from the site.

Exploratory hole location information is provided in Appendix A.

6.2. Monitoring well Installations

Groundwater monitoring pipes (RBH101-106) were installed during Phase II Geoenvironmental Site Assessment conducted by E3P (E3P, Phase II Geoenvironmental Site Assessment, Renaissance, Manchester, Reference:14-261-R2-1, dated 1st May 2021). Groundwater monitoring pipes (WS09A and WS13) were installed during Geotechnical Ground Investigation conducted by A2 Site Investigation Ltd (Renaissance, Manchester; Reference 17321-A2SI-XX-XX-RP-X-0001-01; dated April 2022). The monitoring wells are each comprised of one 50mm internal diameter PVC casing and well screen. Details of all installations are shown in Table 6.1 below.

Table 6.1 Historic Monitoring Installation details

Location Ref	Base of Borehole (m bgl)	Installation Diameter (m bgl)	Type of Installation	Bottom of Response Zone (m bgl)	Top of Response Zone (m bgl)	Strata
RBH101*	**10.00**	**50mm**	**SP/G**	**10.00**	**2.00**	**Chester Formation**
RBH102*	**10.00**	**50mm**	**SP/G**	**1.50**	**0.50**	**Made Ground**
RBH103*	**10.00**	**50mm**	**SP/G**	**10.00**	**2.00**	**Chester Formation**
RBH104	10.00	50mm	SP/G	10.00	2.00	Chester Formation
RBH105	10.00	50mm	SP/G	10.00	2.00	Chester Formation
RBH106	10.00	50mm	SP/G	10.00	2.00	Chester Formation
WS09A	4.00	50mm	SP/G	3.50	2.00	Made Ground/Possible Glaciofluvial Deposits

Location Ref	Base of Borehole (m bgl)	Installation Diameter (m bgl)	Type of Installation	Bottom of Response Zone (m bgl)	Top of Response Zone (m bgl)	Strata
WS13	6.00	50mm	SP/G	4.00	2.00	Made Ground

SP/G – Standpipe with Gas Monitoring Valve

*** - Monitoring well not found**

6.2.1. Groundwater

The groundwater levels and any free phase liquids were measured using a calibrated Geotech Oil/Water Interface meter. All Groundwater levels were recorded in the monitoring wells during the monitoring visits and the results are presented in Table 6.2 below; All monitoring wells which groundwater was recorded, a groundwater sample was taken for laboratory analyses.

Table 6.2 Groundwater Monitoring Results (mbegl)

Exploratory Hole Reference	Depth of Monitoring Well (m bgl)	Visit 05/06/2024 (m bgl)	Visit 13/06/2024 (m bgl)	Notes
RB101	Monitoring well not found			
RB102	Monitoring well not found			
RB103	Monitoring well not found			
RB104	5.65	2.41	2.43	No Free Phase Product Detected
RB105	5.60	3.01	3.01	No Free Phase Product Detected
RB106	4.61	2.86	2.83	No Free Phase Product Detected
WS09A	3.70	3.43	3.49	No Free Phase Product Detected
WS13	4.09	3.41	3.47	No Free Phase Product Detected

6.1. Groundwater Sampling

Water sampling was undertaken in accordance with the latest version of BS EN ISO 5667-1:2023. On each occasion groundwater was sampled using low-flow methods. Any evidence / absence of potential contamination was recorded. New tubing was used for each monitoring well where water was present. Tubing was inserted into the middle of the water column with the pump intake located at a depth of 1.00m to 2.00m below the lowest level of groundwater fluctuation, where possible, before the peristaltic pump was turned on. Groundwater was run through YSI multiparameter probe. The water purged from the well before sampling was collected and disposed of appropriately. Groundwater sampling summary can are presented in Appendix E.

7. Laboratory Testing

7.1. Geoenvironmental Laboratory Testing

Selected groundwater samples were sent for geo-environmental laboratory testing which was undertaken by i2 analytical Environmental Science, United Kingdom Accreditation Service (UKAS)

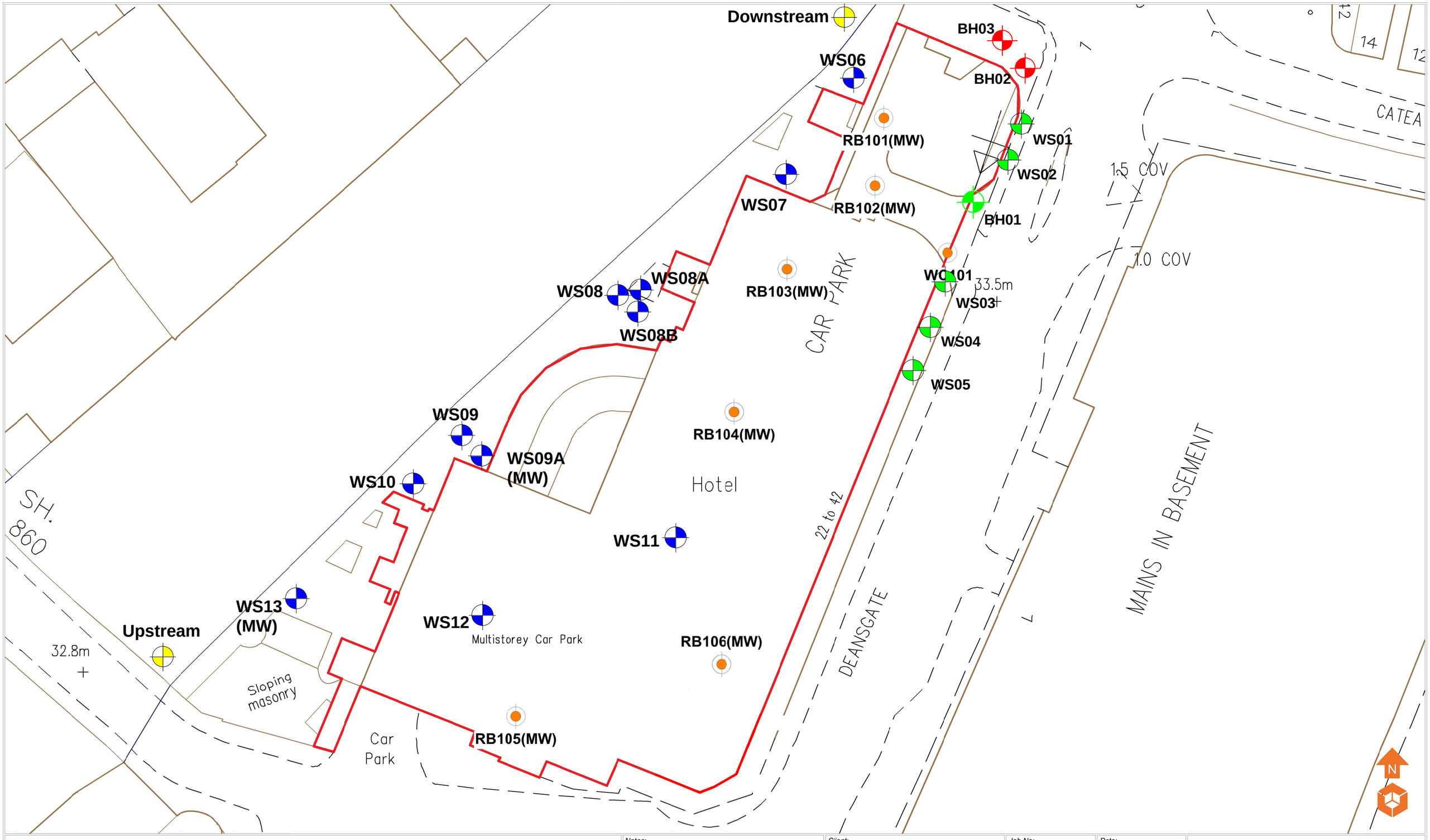
Table 7.1 presents a summary of the scheduled Geo-environmental tests and the results are presented in Appendix D.

Table 7.1 Geo-Environmental Testing – Laboratory Analyses – Groundwater

Test Description	Number of Tests
Risk Assessment Suite (Water)	14
Phenolics by HPLC	14
Free Cyanide	14
Total Cyanide	14
Speciated VOCs	14
Speciated SVOCs	14
Dissolved Calcium	14

(1) A2SI Water Suite includes: *pH, heavy metals (including Arsenic, Barium, Beryllium, Boron (water soluble), Cadmium, Chromium III, Chromium VI, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Vanadium, Zinc); TPH Criteria Working Group including BTEX and MTBE; Speciated PAH (EPA16); Ammoniacal Nitrogen as N; Speciated VOCs Suite; Speciated SVOCs Suite; Speciated phenols by HPLC; Total Suspended Solids; Sulphate; PCB suite (WHO 12); Dissolved Organic Carbon; Total Organic Carbon*

Appendix A: Exploratory Hole Location Plan



Location Symbols

- Approximate Rotary Borehole Location with Install
- Approximate Rotary Borehole Locations - A2 Phase 1 Site Works
- Approximate Window Sample Borehole Locations - A2 Phase 1 Site Works
- Approximate Window Sample Borehole Locations - A2 Phase 2 Site Works
- Approximate Rotary Borehole Locations - A2 Phase 3 Site Works
- Approximate Superficial Water Sampling Locations

Notes:

Client: Property Alliance Group Ltd

Job No: 14-261

Date: 07.04.2021

Drawing No: 018

Scale: NTS

Phase	Issue	Date	Drawn	Checked
P1	REVA	07.04.2021	EB	NS

Job Title: Renaissance Deansgate

Drawing Title: Contamination Issues Plan - Human Health

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

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Appendix B: Historic Exploratory Hole Logs

Borehole Log

Borehole No. **RBH101**

Sheet 1 of 1

Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383744E - 398650N	Hole Type BH
Location: Deansgate, Manchester		Level:	Scale 1:50
Client: Property Alliance Group Ltd		Dates: 19/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25			MADE GROUND: Concrete.
					0.27			MADE GROUND: Rubber membrane.
					0.35			MADE GROUND: Concrete.
		0.80	BULK					Reddish brown medium SAND. (Weathered bedrock)
		1.00	SPT	50 (14,11/50 for 245mm)				
					1.50			Very weak medium bedded reddish brown fine SANDSTONE with occasional lenses of extremely weak sandstone (3.00-3.18m bgl) (3.78-3.86m bgl). Bedding 0-10 degrees, widely to medium spaced, planar rough.
		2.00	SPT	46 (21,4/46 for 84mm)				
		2.30	U					
		3.00	SPT	50 (25 for 50mm/50 for 70mm)				
		4.00	SPT	50 (25 for 45mm/50 for 55mm)				
		5.00	SPT	50 (25 for 40mm/50 for 50mm)				
		5.50	U		5.10			Medium strong (becoming very strong at 6.28m bgl) medium bedded reddish brown coarse SANDSTONE with occasional interbeds of weak sandstone (6.50-6.53m bgl) (7.24-7.35m bgl) (7.82-7.89m bgl). Bedding 0-10 degrees, medium spaced planar rough (becoming closely spaced undulating rough at 8.43m bgl).
		6.00	SPT	50 (25 for 25mm/50 for 70mm)				
		6.28	U					
		6.71	U					
		7.47	U					
		8.82	U					
		9.47	U					
		9.81	U					
					10.00			End of Borehole at 10.00m

Remarks

1. Install of 2m plain, 8m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

Borehole Log

Borehole No. **RBH102**

Sheet 1 of 1

Project Name:	Renaissance Hotel	Project No. 14261	Co-ords:	383741E - 398643N	Hole Type BH
Location:	Deansgate, Manchester		Level:		Scale 1:50
Client:	Property Alliance Group Ltd		Dates:	20/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.35			MADE GROUND: Concrete.
					0.46			MADE GROUND: Grey slightly sandy gravel. Gravel is fine to coarse angular to subangular of limestone. (MOT)
								MADE GROUND: Brick wall. (unknown underlying structure)
					1.50			Strong medium bedded reddish brown medium SANDSTONE. Bedding 0-10 degrees medium spaced planar rough.
		1.86	U					
		2.00	SPT	50 (25 for 45mm/50 for 50mm)	2.00			NO RECOVERY (Assumed SANDSTONE).
		3.00	SPT	50 (25 for 60mm/50 for 40mm)				
		4.00	SPT	50 (25 for 30mm/50 for 30mm)				
		5.00	SPT	50 (25 for 55mm/50 for 45mm)				
		6.00	SPT	50 (25 for 30mm/50 for 70mm)				
		7.00	SPT	50 (25 for 15mm/50 for 25mm)	7.00			Strong medium bedded reddish brown coarse SANDSTONE with occasional interbedded mudstone (8.44-8.47m bgl) (8.58-8.63m bgl). Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough. Jointing 40-45 degrees undulating rough.
		7.23	U					
		8.00	SPT	50 (25 for 20mm/50 for 20mm)				
		8.39	U					
		8.64	U					
		8.82	U					
		9.30	U					
		9.45	U					
		9.65	U					
					10.00			End of Borehole at 10.00m

Remarks

1. Install of 0.5m plain, 1.1m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

Borehole Log

Borehole No. **RBH103**

Sheet 1 of 1

Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383734E - 398636N	Hole Type BH
Location: Deansgate, Manchester		Level:	Scale 1:50
Client: Property Alliance Group Ltd		Dates: 20/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25			MADE GROUND: Concrete.
					0.27			MADE GROUND: Rubber membrane.
					0.33			MADE GROUND: Concrete.
		0.70	U		0.70			MADE GROUND: Grey slightly sandy gravel. Gravel is fine to coarse angular to subangular of limestone. (MOT)
		1.00	SPT	50 (6,7/50 for 105mm)				Strong medium bedded reddish brown coarse SANDSTONE. Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough. Jointing 40-45 degrees undulating rough.
		1.50	U					
		2.00	SPT	50 (25 for 85mm/50 for 60mm)				
		2.70	U					
		3.00	SPT	50 (25 for 60mm/50 for 55mm)				
		3.40	U					
		4.00	SPT	50 (25 for 50mm/50 for 45mm)				
		5.43	U					
		6.63	U					
		7.52	U					
		8.60	U					
					10.00			End of Borehole at 10.00m

1 2 3 4 5 6 7 8 9 10

Remarks

1. Install of 2m plain, 8m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

Borehole Log

Borehole No. **RBH104**

Sheet 1 of 1

Project Name:	Renaissance Hotel	Project No. 14261	Co-ords:	383729E - 398624N	Hole Type BH
Location:	Deansgate, Manchester		Level:		Scale 1:50
Client:	Property Alliance Group Ltd		Dates:	22/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.25			MADE GROUND: Concrete.
					0.27			MADE GROUND: Rubber membrane.
					0.35			MADE GROUND: Concrete.
					0.80			MADE GROUND: Brick wall. (unknown underlying structure)
		0.90	ES					
		1.00	SPT	50 (25 for 60mm/50 for 45mm)				Very weak medium bedded reddish brown fine SANDSTONE. Bedding 0-10 degrees, widely to medium spaced, planar rough.
		1.45	U					
		2.00	SPT	50 (25 for 45mm/50 for 40mm)				
		2.43	U					
		3.00	SPT	50 (25 for 30mm/50 for 20mm)	3.00			Strong medium bedded reddish brown coarse SANDSTONE. Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough. Jointing 40-45 degrees undulating rough.
		3.36	U					
		4.00	SPT	50 (25 for 25mm/50 for 30mm)				
		4.20	U					
		5.00	SPT	50 (25 for 2mm/50 for 10mm)				
		5.60	U					
		6.00	SPT	50 (25 for 70mm/50 for 75mm)				
		6.43	U					
		7.00	SPT	50 (25 for 60mm/50 for 55mm)				
		7.26	U					
		9.60	U					
					10.00			End of Borehole at 10.00m

Remarks

1. Install of 2m plain, 8m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

Borehole Log

Borehole No. **RBH105**

Sheet 1 of 1

Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383704E - 398599N	Hole Type BH
Location: Deansgate, Manchester		Level:	Scale 1:50
Client: Property Alliance Group Ltd		Dates: 26/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.35			MADE GROUND: Concrete.
		0.50	ES		0.45			MADE GROUND: Grey slightly sandy gravel. Gravel is fine to coarse angular to subangular of limestone. (MOT)
		0.78	U					Very weak medium bedded reddish brown fine SANDSTONE. Bedding 0-10 degrees, widely to medium spaced, planar rough.
		1.10	U					
		3.00	SPT	50 (25 for 70mm/50 for 45mm)				
		3.40	U					
		4.00	SPT	50 (25 for 45mm/50 for 55mm)				
					4.48			Strong medium bedded reddish brown coarse SANDSTONE. Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough.
		5.00	U					
		6.00	SPT	50 (25 for 60mm/50 for 40mm)				
		6.13	U					
		6.80	U					
		7.00	SPT	50 (25 for 30mm/50 for 35mm)				
		8.00	SPT	50 (25 for 50mm/50 for 40mm)				
		8.37	U					
		9.73	U					
					10.00			End of Borehole at 10.00m

Remarks

1. Install of 2m plain, 8m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

Borehole Log

Borehole No. **RBH106**

Sheet 1 of 1

Project Name: Renaissance Hotel	Project No. 14261	Co-ords: 383722E - 398602N	Hole Type BH
Location: Deansgate, Manchester		Level:	Scale 1:50
Client: Property Alliance Group Ltd		Dates: 24/02/2021	Logged By J Craig

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.35	ES		0.26			MADE GROUND: Concrete.
					0.28			MADE GROUND: Rubber membrane.
					0.40			MADE GROUND: Concrete.
								MADE GROUND: Concrete wall and sandstone.
		1.54	U		1.50			Strong medium bedded reddish brown coarse SANDSTONE. Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough.
		1.80	SPT	50 (25 for 70mm/50 for 45mm)				
		2.80	SPT	50 (21,4/50 for 70mm)				
		3.10	U					
		3.37	U					
		3.80	SPT	50 (25 for 45mm/50 for 75mm)				
		4.50	SPT	50 (25 for 60mm/50 for 55mm)				
		4.70	U					
		5.40	U					
		5.40	SPT	50 (25 for 50mm/50 for 45mm)				
		6.20	SPT	50 (25 for 6mm/50 for 70mm)				
		7.20	U					
		7.20	SPT	50 (25 for 60mm/50 for 45mm)				
		8.20	U		8.20			NO RECOVERY (Assumed SANDSTONE).
		8.20	SPT	50 (25 for 50mm/50 for 35mm)				
		9.00	SPT	50 (25 for 60mm/50 for 40mm)	9.20			Strong medium bedded reddish brown coarse SANDSTONE. Bedding 0-10 degrees medium spaced planar rough, becoming undulating rough.
		9.80	U					
					10.00			End of Borehole at 10.00m

Remarks

1. Install of 2m plain, 8m slotted 2. Borehole terminated at 10.00m bgl in sandstone at target depth

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS09A
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	22-03-22 / 22-03-22	25.16	E 383,716.1 N 398,621.1	4m
Client			SPT Energy Ratio	Sheet
BG&E			67%	1 of 1

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
				25.09		0.07	CONCRETE slab	
						(0.33)	Medium dense grey angular to subangular medium to coarse GRAVEL of concrete, type 1 material and tarmacadam. (MADE GROUND)	
				24.76		0.40		
0.50 0.50	ES1	VOC 0.0 ppm				(0.30)	Reinforced CONCRETE with 7mm diameter rebar mesh 40mm spaced.	
				24.46		0.70		
							Loose to medium dense red slightly gravelly fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of sandstone and brick. Cobbles are angular of brick and sandstone. (MADE GROUND)	
1.20	SPT (s)	(1, 1, 1, 1, 1, 1) N = 4						
1.50 1.50	ES2	VOC 0.0 ppm				(2.30)		
2.00	SPT (s)	(1, 2, 0, 1, 1, 0) N = 2						
2.50 2.50	ES3	VOC 0.0 ppm						
				22.16		3.00		
3.00	SPT (s)	(2, 1, 2, 1, 4, 4) N = 11					Medium dense reddish brown slightly gravelly fine to coarse SAND. Gravel is angular fine to coarse of sandstone. (Possible GLACIOFLUVIAL DEPOSITS)	
3.50 3.50	ES4	VOC 0.0 ppm				(1.00)		
				21.16		4.00		
4.00	SPT (s)	(1, 0, 1, 1, 1, 0) N = 3					----- *Borehole Terminated at 4m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Groundwater strike at 2.9m

All dimensions in metres Scale 1:31.25	Contractor A2 Site Investigation	Method/ Plant Used WS Rig	Logged By FA	Status FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS13
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	22-03-22 / 22-03-22	25.08	E 383,688.0 N 398,598.0	6m
Client			SPT Energy Ratio	Sheet
BG&E			67%	1 of 2

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
				25.01		0.07	CONCRETE slab	
						(0.43)	Medium dense grey slightly clayey sandy angular to subangular medium to coarse GRAVEL of type 1 material. Sand is fine to coarse. (MADE GROUND)	
				24.58		0.50		
0.50 0.50	ES1	VOC 0.0 ppm					Medium dense reddish brown slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick and sandstone. (MADE GROUND)	
1.00	SPT (s)	(1, 1, 1, 1, 2, 2) N = 6						
1.50 1.50	ES2	VOC 0.0 ppm				(2.50)		
2.00	SPT (s)	(2, 1, 3, 4, 3, 2) N = 12						
2.50 2.50	ES3	VOC 0.0 ppm						
				22.08		3.00		
3.00	SPT (s)	(2, 1, 1, 0, 0, 1) N = 2					Loose to medium dense brownish grey clayey slightly gravelly fine to medium SAND. Gravel is angular to subangular fine to medium of brick and sandstone. (MADE GROUND)	
3.50 3.50	ES4	VOC 0.0 ppm	1					
4.00 4.00 4.00	ES5 SPT (s)	(4, 6, 2, 2, 2, 3) N = 9 VOC 0.0 ppm				(2.80)		

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Groundwater strike at 3.5m
3.Hole colapsed to 4.0m before installation

All dimensions in metres Scale 1:31.25	Contractor A2 Site Investigation	Method/ Plant Used WS Rig	Logged By FA	Status FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

A2 Site Investigation

Borehole Log

Project				Borehole No
Renaissance Manchester				WS13
Job No	Start / Finish	Ground Level (mOD)	Co-Ordinates	Depth (m)
17321	22-03-22 / 22-03-22	25.08	E 383,688.0 N 398,598.0	6m
Client			SPT Energy Ratio	Sheet
BG&E			67%	2 of 2

SAMPLES & TESTS			Water	Reduced Level	Legend	Depth (Thickness)	STRATA Description	Instrument/ Backfill
Depth (m)	Type No	Test Result						
5.00 5.00 5.00	ES6 SPT (s)	(2, 0, 1, 0, 1, 0) N = 2 VOC 0.0 ppm					Loose to medium dense brownish grey clayey slightly gravelly fine to medium SAND. Gravel is angular to subangular fine to medium of brick and sandstone. (MADE GROUND) *(continued)*	
				19.28		5.80		
				19.08		6.00	Weak grey medium to coarse grained SANDSTONE (Possible CHESTER FORMATION)	
							----- *Borehole Terminated at 6m* -----	

Boring Progress and Water Observations

Date	Hole Depth (m)	Casing Depth	Casing Dia. mm	Water Depth (m)	Remarks

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

1.Borehole scanned with GPR, CAT & Genny
2.Groundwater strike at 3.5m
3.Hole colapsed to 4.0m before installation

All dimensions in metres Scale 1:31.25	Contractor A2 Site Investigation	Method/ Plant Used WS Rig	Logged By FA	Status FINAL

Report ID: A2SI AGS BH LOG FINAL || Project: 17321 RENAISSANCE MANCHESTER.GPJ || Library: A2SI AGS 4_0.GLB || Date: 8 April 2022
A2 Site Investigation,1 Westminster Bridge Road,SE1 7XW, Telephone: 020 7021 0396

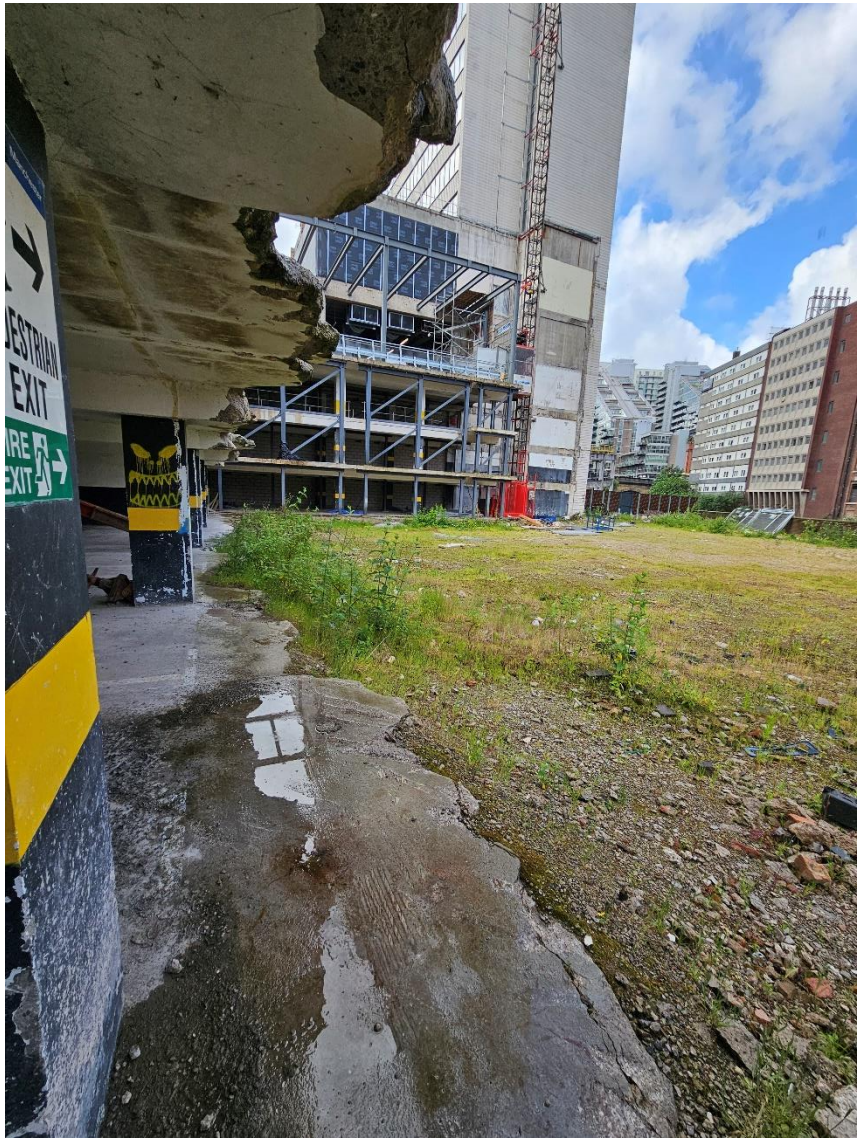
Appendix C: Photographic Record



A2 Site Investigation One Westminster Bridge Road, London SE1 7XW	Client	Project	Location	Created by	Approved by	Date
	Property Alliance Group Ltd	49224 Renaissance Water Sampling	North side of the site post demolition	FA	GC	05/07/24



A2 Site Investigation One Westminster Bridge Road, London SE1 7XW	Client	Project	Location	Created by	Approved by	Date
	Property Alliance Group Ltd	49224 Renaissance Water Sampling	North side of the site post demolition	FA	GC	05/07/24



A2 Site Investigation One Westminster Bridge Road, London SE1 7XW	Client	Project	Location	Created by	Approved by	Date
	Property Alliance Group Ltd	49224 Renaissance Water Sampling	North side of the site post demolition	FA	GC	05/07/24



A2 Site Investigation One Westminster Bridge Road, London SE1 7XW	Client	Project	Location	Created by	Approved by	Date
	Property Alliance Group Ltd	49224 Renaissance Water Sampling	North side of the site post demolition	FA	GC	05/07/24



A2 Site Investigation One Westminster Bridge Road, London SE1 7XW	Client	Project	Location	Created by	Approved by	Date
	Property Alliance Group Ltd	49224 Renaissance Water Sampling	North side of the site post demolition	FA	GC	05/07/24

Appendix D: Geoenvironmental Laboratory Testing Results

UKAS TESTING
4041

A2 Site Investigation Limited☐
One Westminster Bridge Road
South Bank
London
SE1 7XW

e: fernando.afonso@a2-si.com☐
labs@a2-si.com

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

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

Analytical Report Number : 24-023975

Project / Site name:	Renaissance Water Sampling	**Samples received on:**	07/06/2024
Your job number:	49224	**Samples instructed on/ Analysis started on:**	07/06/2024
Your order number:	PO3528-I2-01	**Analysis completed by:**	13/06/2024
Report Issue Number:	1	**Report issued on:**	14/06/2024
Samples Analysed:	7 water samples		

Signed:

Adam Fenwick
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 24-023975
Project / Site name: Renaissance Water Sampling

Your Order No: PO3528-I2-01

Lab Sample Number				221605	221606	221607	221608	221609
Sample Reference				RB104	RB105	RB106	WS09	WS13
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				5.00	4.00	5.00	3.60	4.00
Date Sampled				05/06/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH (L099)	pH Units	N/A	ISO 17025	7.4	8.3	7.9	8	7.5
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO_4	mg/l	0.045	ISO 17025	235	79.6	157	54.5	39.8
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	1.32	1.17	1.55	1.65	3.02
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	1.82	1.38	2.3	2.03	3.24
Total Suspended Solids (L004B)	mg/l	2	ISO 17025	310	33	2200	550	53
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Xylenols & Ethylphenols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol (2,3,5-)	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	< 3.5
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16

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Analytical Report Number: 24-023975
Project / Site name: Renaissance Water Sampling

Your Order No: PO3528-I2-01

Lab Sample Number				221605	221606	221607	221608	221609
Sample Reference				RB104	RB105	RB106	WS09	WS13
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				5.00	4.00	5.00	3.60	4.00
Date Sampled				05/06/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.77	0.22	0.45	2.38	2.05
Barium (dissolved)	µg/l	0.06	ISO 17025	80	66	26	38	60
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	0.1	< 0.02	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	7.9	1.1	5.3	3.2	0.3
Copper (dissolved)	µg/l	0.5	ISO 17025	1.3	2.4	3.9	5.4	2.3
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	0.2	0.4
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	2.8	0.26	0.3	11	4.4
Nickel (dissolved)	µg/l	0.5	ISO 17025	0.9	0.6	1.2	0.5	2.3
Selenium (dissolved)	µg/l	0.6	ISO 17025	5.2	1.6	2.8	4.8	< 0.6
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.5	< 0.2	0.4	1.5	< 0.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	4.7	1.9	4.2	2.3	5.7
Boron (dissolved)	µg/l	10	ISO 17025	100	49	22	92	78
Calcium (dissolved)	mg/l	0.012	ISO 17025	100	42	100	74	66
Chromium (hexavalent)	µg/l	5	ISO 17025	6.4	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Petroleum Hydrocarbons								
TPH - Aliphatic >C5 - C6 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C6 - C8 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C8 - C10 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >C10 - C12 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >C12 - C16 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >C16 - C21 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >C21 - C35 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >C5 - C35 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >C35 - C40 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >C5 - C40 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC10 - EC12 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC12 - EC16 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC16 - EC21 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC21 - EC35 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC35 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC35 - EC40 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC40 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH Total (>C5 - C40) $_{HS+EH\_1D\_TOTAL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10

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Analytical Report Number: 24-023975
Project / Site name: Renaissance Water Sampling

Your Order No: PO3528-I2-01

Lab Sample Number				221605	221606	221607	221608	221609
Sample Reference				RB104	RB105	RB106	WS09	WS13
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				5.00	4.00	5.00	3.60	4.00
Date Sampled				05/06/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
VOCs								
Chloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Bromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Vinyl Chloride	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trichlorofluoromethane	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trans 1,2-dichloroethylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
2,2-Dichloropropane	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chloroform	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,1-Trichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Cis-1,2-dichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Carbontetrachloride	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Dibromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Bromodichloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Cis-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trans-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2-Trichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,3-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Dibromochloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Tetrachloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dibromoethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,1,2-Tetrachloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Styrene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Bromoform	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Isopropylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2,2-Tetrachloroethane	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Bromobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
n-Propylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
2-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
4-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,3,5-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
tert-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2,4-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
sec-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,3-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
p-Isopropyltoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,4-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0

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Analytical Report Number: 24-023975
Project / Site name: Renaissance Water Sampling

Your Order No: PO3528-I2-01

Lab Sample Number				221605	221606	221607	221608	221609
Sample Reference				RB104	RB105	RB106	WS09	WS13
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				5.00	4.00	5.00	3.60	4.00
Date Sampled				05/06/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dibromo-3-chloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2,4-Trichlorobenzene	µg/l	3	NONE	< 3.0 #	< 3.0 #	< 3.0 #	< 3.0 #	< 3.0 #
Hexachlorobutadiene	µg/l	3	ISO 17025	< 3.0 ###	< 3.0 ###	< 3.0 ###	< 3.0 ###	< 3.0 ###
1,2,3-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Monoaromatics & Oxygenates								
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0

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Analytical Report Number: 24-023975
Project / Site name: Renaissance Water Sampling

Your Order No: PO3528-I2-01

Lab Sample Number				221605	221606	221607	221608	221609
Sample Reference				RB104	RB105	RB106	WS09	WS13
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				5.00	4.00	5.00	3.60	4.00
Date Sampled				05/06/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
SVOCs								
Aniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Carbazole	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
3+4-Methylphenol	µg/l	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

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

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Analytical Report Number: 24-023975
Project / Site name: Renaissance Water Sampling

Your Order No: PO3528-I2-01

Lab Sample Number				221610	221611
Sample Reference				Upstream	Downstream
Sample Number				Superficial	Superficial
Depth (m)				None Supplied	None Supplied
Date Sampled				05/06/2024	05/06/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
General Inorganics					
pH (L099)	pH Units	N/A	ISO 17025	7.8	7.8
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10
Sulphate as SO_4	mg/l	0.045	ISO 17025	50.9	49.5
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	6.97	6.81
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	7.28	7.16
Total Suspended Solids (L004B)	mg/l	2	ISO 17025	3	3
Phenols by HPLC					
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5
Total Xylenols & Ethylphenols	µg/l	0.5	NONE	< 0.5	< 0.5
Trimethylphenol (2,3,5-)	µg/l	0.5	NONE	< 0.5	< 0.5
Total Phenols					
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5
Speciated PAHs					
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Total PAH					
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16

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Analytical Report Number: 24-023975
Project / Site name: Renaissance Water Sampling

Your Order No: PO3528-I2-01

Lab Sample Number				221610	221611
Sample Reference				Upstream	Downstream
Sample Number				Superficial	Superficial
Depth (m)				None Supplied	None Supplied
Date Sampled				05/06/2024	05/06/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Heavy Metals / Metalloids					
Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.03	0.92
Barium (dissolved)	µg/l	0.06	ISO 17025	36	38
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	1.4	1.2
Copper (dissolved)	µg/l	0.5	ISO 17025	6.4	6.8
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	0.99	0.97
Nickel (dissolved)	µg/l	0.5	ISO 17025	2.9	3
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	< 0.6
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.8	0.8
Zinc (dissolved)	µg/l	0.5	ISO 17025	12	11
Boron (dissolved)	µg/l	10	ISO 17025	54	55
Calcium (dissolved)	mg/l	0.012	ISO 17025	44	43
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0
Petroleum Hydrocarbons					
TPH - Aliphatic >C5 - C6 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aliphatic >C6 - C8 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aliphatic >C8 - C10 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aliphatic >C10 - C12 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C12 - C16 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C16 - C21 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C21 - C35 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C5 - C35 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C35 - C40 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >C5 - C40 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aromatic >EC10 - EC12 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC12 - EC16 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC16 - EC21 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC21 - EC35 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC5 - EC35 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC35 - EC40 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC5 - EC40 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH Total (>C5 - C40) $_{HS+EH\_1D\_TOTAL\_MS}$	µg/l	10	NONE	< 10	< 10

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Analytical Report Number: 24-023975
Project / Site name: Renaissance Water Sampling

Your Order No: PO3528-I2-01

Lab Sample Number				221610	221611
Sample Reference				Upstream	Downstream
Sample Number				Superficial	Superficial
Depth (m)				None Supplied	None Supplied
Date Sampled				05/06/2024	05/06/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
VOCs					
Chloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Chloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Bromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Vinyl Chloride	µg/l	3	NONE	< 3.0	< 3.0
Trichlorofluoromethane	µg/l	3	NONE	< 3.0	< 3.0
1,1-Dichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Trans 1,2-dichloroethylene	µg/l	3	ISO 17025	< 3.0	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
2,2-Dichloropropane	µg/l	3	NONE	< 3.0	< 3.0
Chloroform	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1,1-Trichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1-Dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0
Cis-1,2-dichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0
Carbontetrachloride	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0
Trichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0
Dibromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Bromodichloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Cis-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0
Trans-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1,2-Trichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
1,3-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0
Dibromochloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Tetrachloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2-Dibromoethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Chlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1,1,2-Tetrachloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0
Styrene	µg/l	3	ISO 17025	< 3.0	< 3.0
Bromoform	µg/l	3	ISO 17025	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0
Isopropylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1,2,2-Tetrachloroethane	µg/l	3	NONE	< 3.0	< 3.0
Bromobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
n-Propylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
2-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0
4-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,3,5-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
tert-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2,4-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
sec-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,3-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
p-Isopropyltoluene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,4-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0

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Analytical Report Number: 24-023975
Project / Site name: Renaissance Water Sampling

Your Order No: PO3528-I2-01

Lab Sample Number				221610	221611
Sample Reference				Upstream	Downstream
Sample Number				Superficial	Superficial
Depth (m)				None Supplied	None Supplied
Date Sampled				05/06/2024	05/06/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2-Dibromo-3-chloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2,4-Trichlorobenzene	µg/l	3	NONE	< 3.0 #	< 3.0 #
Hexachlorobutadiene	µg/l	3	ISO 17025	< 3.0 ###	< 3.0 ###
1,2,3-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
Monoaromatics & Oxygenates					
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0

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Analytical Report Number: 24-023975
Project / Site name: Renaissance Water Sampling

Your Order No: PO3528-I2-01

Lab Sample Number				221610	221611
Sample Reference				Upstream	Downstream
Sample Number				Superficial	Superficial
Depth (m)				None Supplied	None Supplied
Date Sampled				05/06/2024	05/06/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
SVOCs					
Aniline	µg/l	0.05	NONE	< 0.05	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Carbazole	µg/l	0.05	NONE	< 0.05	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	41 $+	20 $+
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05
3+4-Methylphenol	µg/l	0.1	NONE	< 0.10	< 0.10

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

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Analytical Report Number : 24-023975
Project / Site name: Renaissance Water Sampling

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Suspended Solids in water	Determined gravimetrically with GFC filtration papers	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004B	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	ISO 17025
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC	In-house method based on Blue Book Method	L030	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	ISO 17025
Total organic carbon in water	Determination of total organic carbon in water by TOC/DOC NDIR analyser.Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices: SW, GW, PW, PrW (Al, Cu, Fe,Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Total petroleum hydrocarbons with carbon banding by GC-MS in water	Determination of total petroleum hydrocarbons in water by GC-MS/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L070B	W	NONE
BTEX and/or Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA 8260	L073B	W	ISO 17025
Chromium III in water	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW	L080	W	ISO 17025
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Total petroleum hydrocarbons by GC-MS HS in water	Determination of total petroleum hydrocarbons in water by GC-MS HS	In-house method	L088B	W	ISO 17025
pH at 20°C in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method	L099	W	ISO 17025
Speciated PAHs and/or Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds (including PAH) in leachate by extraction in dichloromethane followed by GC-MS	In-house method based on USEPA 8270	L102B	W	ISO 17025
Phenols in water by GC-MS	Determination of phenols in water by GC-MS	In-house method	L102B	W	NONE

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Analytical Report Number : 24-023975
Project / Site name: Renaissance Water Sampling

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW, LL	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals. The result for sum should be interpreted with caution

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

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

- Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.
- Quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.

$+ - Result over calibration range, concentration determined by extrapolated calibration. The result should be interpreted with caution.

UKAS TESTING
4041

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Analytical Report Number : 24-025371

Project / Site name:	Renaissance Water Sampling	**Samples received on:**	14/06/2024
Your job number:	49224	**Samples instructed on/ Analysis started on:**	14/06/2024
Your order number:	PO3569-I2-02	**Analysis completed by:**	21/06/2024
Report Issue Number:	1	**Report issued on:**	25/06/2024
Samples Analysed:	7 water samples		



Signed:

Adam Fenwick
Key Account Executive
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 24-025371
Project / Site name: Renaissance Water Sampling

Your Order No: PO3569-I2-02

Lab Sample Number				229308	229309	229310	229311	229312
Sample Reference				RB104	RB105	RB106	WS09A	WS13
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				5.00	4.00	5.00	3.60	4.00
Date Sampled				13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH (L099)	pH Units	N/A	ISO 17025	7.4	8.3	7.9	7.8	7.3
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO_4	mg/l	0.045	ISO 17025	230	81.1	224	46.1	44.3
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	1.86	1.86	2.5	1.86	3.23
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	2	1.87	2.55	1.94	3.33
Total Suspended Solids (L004B)	mg/l	2	ISO 17025	120	73	2200	840	470
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Xylenols & Ethylphenols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol (2,3,5-)	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	< 3.5
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.07
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.06
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.05
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.51
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.13
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.3
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	1.5
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.68
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.79
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.94
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.38
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.87
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.4
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.13
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	0.52
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16	8.33
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.53	0.16	0.37	1.91	2.52
Barium (dissolved)	µg/l	0.06	ISO 17025	71	63	17	26	59
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	6	0.9	4.6	3.9	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	1.5	3.7	1.8	3.1	1

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Analytical Report Number: 24-025371
Project / Site name: Renaissance Water Sampling

Your Order No: PO3569-I2-02

Lab Sample Number				229308	229309	229310	229311	229312
Sample Reference				RB104	RB105	RB106	WS09A	WS13
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				5.00	4.00	5.00	3.60	4.00
Date Sampled				13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Lead (dissolved)	µg/l	0.2	ISO 17025	0.4	< 0.2	< 0.2	1	1.9
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	2.3	0.18	0.52	8.9	3.9
Nickel (dissolved)	µg/l	0.5	ISO 17025	0.7	< 0.5	0.9	< 0.5	1.5
Selenium (dissolved)	µg/l	0.6	ISO 17025	4	1.9	2.3	3.9	< 0.6
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.6	< 0.2	0.7	1.5	1
Zinc (dissolved)	µg/l	0.5	ISO 17025	4.6	1.7	1.9	1.6	3.2
Boron (dissolved)	µg/l	10	ISO 17025	87	41	25	82	78
Calcium (dissolved)	mg/l	0.012	ISO 17025	100	41	140	64	61
Chromium (hexavalent)	µg/l	5	ISO 17025	U/S *U/S j	< 5.0	< 5.0 *h	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	U/S *U/S j	< 5.0	< 5.0 *h	< 5.0	< 5.0
Petroleum Hydrocarbons								
TPH - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC10 - EC12 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC12 - EC16 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC16 - EC21 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC21 - EC35 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC5 - EC35 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC35 - EC40 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC5 - EC40 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC10 - EC12 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC12 - EC16 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	15
TPH - Aromatic >EC16 - EC21 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	20
TPH - Aromatic >EC21 - EC35 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	55
TPH - Aromatic >EC5 - EC35 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	90
TPH - Aromatic >EC35 - EC40 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC40 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	90
TPH Total (>EC5 - EC40) $_{HS+EH\_1D\_TOTAL\_MS}$	µg/l	10	NONE	< 10	< 10	< 10	< 10	90
VOCs								
Chloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Bromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Vinyl Chloride	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trichlorofluoromethane	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trans 1,2-dichloroethylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
2,2-Dichloropropane	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chloroform	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,1-Trichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0

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Analytical Report Number: 24-025371
Project / Site name: Renaissance Water Sampling

Your Order No: PO3569-I2-02

Lab Sample Number				229308	229309	229310	229311	229312
Sample Reference				RB104	RB105	RB106	WS09A	WS13
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				5.00	4.00	5.00	3.60	4.00
Date Sampled				13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
1,2-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Cis-1,2-dichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Carbontetrachloride	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Dibromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Bromodichloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Cis-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trans-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2-Trichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,3-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Dibromochloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Tetrachloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dibromoethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,1,2-Tetrachloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Styrene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Bromoform	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Isopropylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2,2-Tetrachloroethane	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Bromobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
n-Propylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
2-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
4-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,3,5-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
tert-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2,4-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
sec-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,3-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
p-Isopropyltoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,4-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dibromo-3-chloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2,4-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Hexachlorobutadiene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2,3-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

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Date Sampled				13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Carbazole	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
3+4-Methylphenol	µg/l	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

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

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Analytical Report Number: 24-025371
Project / Site name: Renaissance Water Sampling

Your Order No: PO3569-I2-02

Lab Sample Number				229313	229314
Sample Reference				Upstream	Downstream
Sample Number				Superficial	Superficial
Depth (m)				None Supplied	None Supplied
Date Sampled				13/06/2024	13/06/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
General Inorganics					
pH (L099)	pH Units	N/A	ISO 17025	7.8	7.7
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10
Sulphate as SO_4	mg/l	0.045	ISO 17025	53.9	53.7
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	7.38	7.43
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	7.48	7.46
Total Suspended Solids (L004B)	mg/l	2	ISO 17025	42	19
Phenols by HPLC					
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5
Total Xylenols & Ethylphenols	µg/l	0.5	NONE	< 0.5	< 0.5
Trimethylphenol (2,3,5-)	µg/l	0.5	NONE	< 0.5	< 0.5
Total Phenols					
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5
Speciated PAHs					
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Total PAH					
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16
Heavy Metals / Metalloids					
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.74	0.74
Barium (dissolved)	µg/l	0.06	ISO 17025	31	31
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.8	0.7
Copper (dissolved)	µg/l	0.5	ISO 17025	3.5	2.8

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Analytical Report Number: 24-025371
Project / Site name: Renaissance Water Sampling

Your Order No: PO3569-I2-02

Lab Sample Number				229313	229314
Sample Reference				Upstream	Downstream
Sample Number				Superficial	Superficial
Depth (m)				None Supplied	None Supplied
Date Sampled				13/06/2024	13/06/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	0.88	0.83
Nickel (dissolved)	µg/l	0.5	ISO 17025	2	2
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	< 0.6
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.4	0.4
Zinc (dissolved)	µg/l	0.5	ISO 17025	5.9	5.6
Boron (dissolved)	µg/l	10	ISO 17025	46	45
Calcium (dissolved)	mg/l	0.012	ISO 17025	41	39
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0 *h	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0 *h	< 5.0

Petroleum Hydrocarbons

TPH - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aliphatic >EC10 - EC12 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >EC12 - EC16 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >EC16 - EC21 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >EC21 - EC35 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >EC5 - EC35 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >EC35 - EC40 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aliphatic >EC5 - EC40 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH - Aromatic >EC10 - EC12 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC12 - EC16 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC16 - EC21 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC21 - EC35 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC5 - EC35 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC35 - EC40 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH - Aromatic >EC5 - EC40 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10	< 10
TPH Total (>EC5 - EC40) $_{HS+EH\_1D\_TOTAL\_MS}$	µg/l	10	NONE	< 10	< 10

VOCs

Chloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Chloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Bromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Vinyl Chloride	µg/l	3	NONE	< 3.0	< 3.0
Trichlorofluoromethane	µg/l	3	NONE	< 3.0	< 3.0
1,1-Dichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Trans 1,2-dichloroethylene	µg/l	3	ISO 17025	< 3.0	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
2,2-Dichloropropane	µg/l	3	NONE	< 3.0	< 3.0
Chloroform	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1,1-Trichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0

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Analytical Report Number: 24-025371
Project / Site name: Renaissance Water Sampling

Your Order No: PO3569-I2-02

Lab Sample Number				229313	229314
Sample Reference				Upstream	Downstream
Sample Number				Superficial	Superficial
Depth (m)				None Supplied	None Supplied
Date Sampled				13/06/2024	13/06/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
1,2-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1-Dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0
Cis-1,2-dichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0
Carbontetrachloride	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0
Trichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0
Dibromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Bromodichloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Cis-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0
Trans-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1,2-Trichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
1,3-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0
Dibromochloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Tetrachloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2-Dibromoethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Chlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1,1,2-Tetrachloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0
Styrene	µg/l	3	ISO 17025	< 3.0	< 3.0
Bromoform	µg/l	3	ISO 17025	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0
Isopropylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,1,2,2-Tetrachloroethane	µg/l	3	NONE	< 3.0	< 3.0
Bromobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
n-Propylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
2-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0
4-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,3,5-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
tert-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2,4-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
sec-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,3-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
p-Isopropyltoluene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,4-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2-Dibromo-3-chloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2,4-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0
Hexachlorobutadiene	µg/l	3	ISO 17025	< 3.0	< 3.0
1,2,3-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05

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Analytical Report Number: 24-025371
Project / Site name: Renaissance Water Sampling

Your Order No: PO3569-I2-02

Lab Sample Number				229313	229314
Sample Reference				Upstream	Downstream
Sample Number				Superficial	Superficial
Depth (m)				None Supplied	None Supplied
Date Sampled				13/06/2024	13/06/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Carbazole	µg/l	0.05	NONE	< 0.05	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	13	37
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05
3+4-Methylphenol	µg/l	0.1	NONE	< 0.10	< 0.10

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

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Analytical Report Number : 24-025371
Project / Site name: Renaissance Water Sampling

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Suspended Solids in water	Determined gravimetrically with GFC filtration papers	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004B	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	ISO 17025
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC	In-house method based on Blue Book Method	L030	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	ISO 17025
Total organic carbon in water	Determination of total organic carbon in water by TOC/DOC NDIR analyser.Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices: SW, GW, PW, PrW (Al, Cu, Fe,Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Total petroleum hydrocarbons with carbon banding by GC-MS in water	Determination of total petroleum hydrocarbons in water by GC-MS/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L070B	W	NONE
BTEX and/or Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA 8260	L073B	W	ISO 17025
Chromium III in water	In-house method by calculation from total Cr and Cr VI	In-house method by calculation	L080	W	NONE
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW	L080	W	ISO 17025
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080	W	ISO 17025
Total petroleum hydrocarbons by GC-MS HS in water	Determination of total petroleum hydrocarbons in water by GC-MS HS	In-house method	L088B	W	ISO 17025
pH at 20°C in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method	L099	W	ISO 17025
Speciated PAHs and/or Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds (including PAH) in leachate by extraction in dichloromethane followed by GC-MS	In-house method based on USEPA 8270	L102B	W	ISO 17025
Phenols in water by GC-MS	Determination of phenols in water by GC-MS	In-house method	L102B	W	NONE

Analytical Report Number : 24-025371
Project / Site name: Renaissance Water Sampling

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW, LL	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

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

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

*U/S j - Unsuitable for analysis due to high discrepancy between Hexavalent Chromium and dissolved Chromium results caused by methods difference.

*h - Due to methods difference, results for Hexavalent Chromium and Total Chromium do not agree, results should be interpreted with caution.

Appendix E: Groundwater Sampling Results

Project Name:	**Ranaissance Water Sampling**
Project Number:	**49224**
Date of Sampling:	**05/06/2024**
Engineer Name:	**FA**
Weather:	**Sunny/Rainy**
Atmospheric Pressure:	

A2 Site Investigation

Instrument	Model	S/N	Calibration date
Easy Load II Peristaltic Pump	GT-EL2cb	6365	NA
YSI Professional Plus Quattro	Plus Quattro	22H102053	44980

RB104							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**10:27**	**Comments**
2.41	5.65	3.24	No	**5**	**End sampling**	**10:39**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	11.5	760	2.42	635	351.2	7.31	**Clear**
02:00	11.7	760	2.42	629	352.6	7.3	
03:00	11.7	759.9	2.41	626	353.3	7.29	
04:00	11.7	760	2.37	625	354.3	7.28	
05:00	11.7	759.9	2.35	624	355.4	7.27	
06:00	11.7	759.9	2.31	624	355.9	7.27	
07:00	11.7	760	2.28	623	356.4	7.26	
08:00							
09:00							

RB106							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**11:18**	**Comments**
2.86	4.61	1.75	No	**4**	**End sampling**	**11:31**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	12.1	760	4.25	869	338.4	7.45	**Colour: Redish brown**
02:00	12	759.9	4.07	87.2	339.7	7.45	
03:00	12.1	759.9	3.94	874	341.3	7.45	
04:00	12.1	759.9	3.88	876	342	7.46	
05:00	12.1	759.9	3.86	877	342.5	7.46	
06:00	12.1	759.9	3.83	878	343.2	7.46	
07:00							
08:00							
09:00							

RB105							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**11:35**	**Comments**
3.01	5.6	2.59	No	**5**	**End sampling**	**11:56**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	11.8	759.7	3.46	360.2	298.1	8.26	**Clear**
02:00	11.8	759.8	2.44	359.5	302.1	8.4	
03:00	11.8	759.7	2.25	359.5	304.3	8.45	
04:00	11.8	759.8	2.19	359.1	305.7	8.48	
05:00	11.8	759.8	2.17	359.2	305.9	8.49	
06:00	11.8	759.8	2.16	359	306.2	8.49	
07:00							
08:00							
09:00							

WS09A							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**12:00**	**Comments**
3.43	3.7	0.27	No	**3.6**	**End sampling**	**12:23**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	11.5	759.8	3.93	414.9	338.3	7.86	**Clear**
02:00	11.5	759.9	3.75	415.1	338.9	7.84	
03:00	11.5	759.9	3.53	414.6	339.6	7.83	
04:00	11.5	759.9	3.51	414.3	339.9	7.82	
05:00	11.5	759.9	3.54	414.5	339.9	7.82	
06:00							
07:00							
08:00							
09:00							

WS13							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**12:26**	**Comments**
3.41	4.09	0.68	No	**4**	**End sampling**	**12:51**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	11.9	760	4	410	27.1	7.42	**Colour: grey**
02:00	11.8	760	2.33	405.9	-34	7.33	
03:00	11.8	760	1.34	402.1	-59.5	7.31	
04:00	11.8	760	0.09	399.9	-67.2	7.31	
05:00	11.8	760	1.03	398.2	-68.8	7.31	
06:00	11.8	760	0.99	398.5	-70.7	7.31	
07:00	11.8	760	0.95	398.2	-72.1	7.31	
08:00							
09:00							

Upstream							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**13:15**	**Comments**
			No	**Superficial**	**End sampling**	**13:25**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	13.1	759.8	4.97	334.1	252.4	7.7	**Clear**
02:00							
03:00							
04:00							
05:00							
06:00							
07:00							
08:00							
09:00							

Downstream							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**14:45**	**Comments**
			No	**Superficial**	**End sampling**	**14:55**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	14	760.1	3.84	333.1	293.9	7.93	**Clear**
02:00							
03:00							
04:00							
05:00							
06:00							
07:00							
08:00							
09:00							

Project Name:	**Ranaissance Water Sampling**
Project Number:	**49224**
Date of Sampling:	**13/06/2024**
Engineer Name:	**FA**
Weather:	**Sunny/Rainy**
Atmospheric Pressure:	

A2 Site Investigation

Instrument	Model	S/N	Calibration date
Easy Load II Peristaltic Pump	GT-EL2cb	6365	NA
YSI Professional Plus Quattro	Plus Quattro	22H102053	44980

RB104							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**09:35**	**Comments**
2.43	5.65	3.22	No	**5**	**End sampling**	**09:48**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	11.4	758.9	2.13	626	331.2	7.26	**Clear**
02:00	11.4	758.9	2.11	622	316.5	7.28	
03:00	11.4	758.9	2.07	619	310.2	7.29	
04:00	11.4	758.9	2.06	618	305.1	7.29	
05:00	11.4	758.9	2.06	618	304.2	7.29	
06:00	11.4	758.9	2.05	617	303.1	7.29	
07:00							
08:00							
09:00							

RB106							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**09:55**	**Comments**
2.83	4.61	1.78	No	**4**	**End sampling**	**10:25**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	12.5	758.9	5.12	921	412.3	7.51	**Colour: Redish brown**
02:00	12.5	758.9	4.98	892	378.5	7.5	
03:00	12.4	758.9	4.71	875	345.2	7.49	
04:00	12.3	758.9	7.55	864	321.2	7.49	
05:00	12.3	758.9	7.35	862	317.2	7.49	
06:00	12.3	758.9	7.33	859	311.5	7.49	
07:00	12.3	758.9	7.26	856	309.2	7.49	
08:00							
09:00							

RB105							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**10:51**	**Comments**
3.01	5.6	2.59	No	**5**	**End sampling**	**11:19**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	12.1	758.9	2.78	296.5	257.6	8.32	**Clear**
02:00	12.1	758.9	2.55	289.5	268.3	8.31	
03:00	12.1	758.9	2.42	288.1	259.3	8.31	
04:00	12.1	758.9	2.4	287.8	256.1	8.31	
05:00	12.1	758.9	2.39	287.6	255.3	8.3	
06:00							
07:00							
08:00							
09:00							

WS09A							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**11:32**	**Comments**
3.49	3.7	0.21	No	**3.6**	**End sampling**	**11:49**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	11.2	758.8	4.21	402.6	315.2	7.95	**Clear**
02:00	11.2	758.8	4.11	403.5	319.4	7.96	
03:00	11.2	758.8	4.05	404.1	326.5	7.95	
04:00	11.2	758.8	4.03	404.5	331.2	7.95	
05:00	11.2	758.8	4.03	404.6	334.3	7.94	
06:00							
07:00							
08:00							
09:00							

WS13							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**11:52**	**Comments**
3.47	4.09	0.62	No	**4**	**End sampling**	**12:15**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	12.2	759	5.21	401.2	-31.2	7.32	**Colour: grey**
02:00	12.0	759	3.35	399.8	-45.2	7.31	
03:00	12.0	759	3.33	398.2	-43.2	7.31	
04:00	12.0	759	3.32	397.5	-42.5	7.31	
05:00							
06:00							
07:00							
08:00							
09:00							

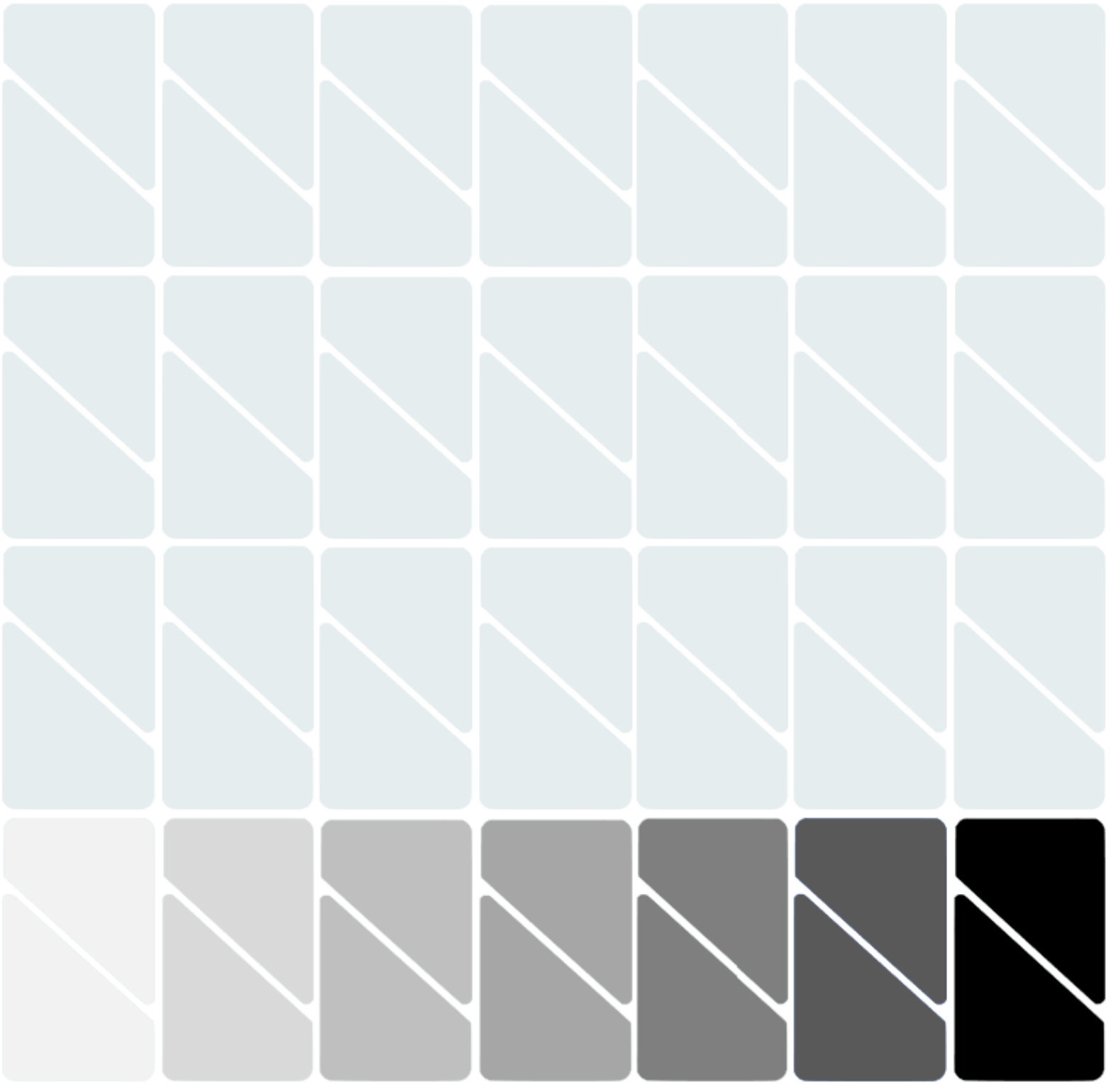
Upstream							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**13:25**	**Comments**
			No	**Superficial**	**End sampling**	**13:32**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	13	759	5.32	352.1	231.2	7.82	**Clear**
02:00							
03:00							
04:00							
05:00							
06:00							
07:00							
08:00							
09:00							

Downstream							
Water Level (m)	**Well Depth (m)**	**Water Collum (m)**	**Free Phase**	**Sampling Depth (m)**	**Start sampling**	**13:51**	**Comments**
			No	**Superficial**	**End sampling**	**13:59**	
Purging time	**Temp (°C)**	**Pressure (mmHg)**	**Dissolved Oxygen (mg/L)**	**Conductivity (µs/cm)**	**ORP (mV)**	**pH (pH Units)**	
01:00	13.8	759.1	4.13	365.8	301.2	7.75	**Clear**
02:00							
03:00							
04:00							
05:00							
06:00							
07:00							
08:00							
09:00							

A2 Site Investigation

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Appendix D: GQRA Screening Tables (Excluding Deansgate Level)

Human Health Generic Quantitative Assessment for Soil

3199 - Renaissance Manchester Supplamentary

Key:

Exceedance of the GAC

GAC - Generic Assessment Criteria

					A2SI									E3P												
Laboratory Report Ref.		**Residential without home grown produce**	**Commercial**		269593	269596	269600	269601	269608	269609	269606	269607	269614	1786020	1786021	1786022	1786023	1760718	1760719	1760720	1760721	1760722	1760743	1760744	1760745	1760746
Exploratory Location Ref.					WS08	WS09A	WS13	WS13	WS10	WS10	WS11	WS12	WS07	RH101	RH102	RH103	RH103	RBH104	RBH104	RBH105	RBH105	RBH106	TP01	TP02	TP03	TP04
Sample Depth (m)	**Units**				0.50	0.50	0.50	1.50	0.50	1.50	0.5	0.5	0.5	0.8	0.6	0.8	0.4	0.30	0.90	0.30	0.50	0.35	0.40	0.40	0.45	0.45
Sample Date					23/02/2022	23/02/2022	22/02/2022	22/02/2022	23/02/2022	23/02/2022				44250	44250	44250	44250	02/03/2021	02/03/2021	02/03/2021	02/03/2021	02/03/2021	26/02/2021	26/02/2021	26/02/2021	26/02/2021
Made Ground / Natural ?					MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	**MG**
		GAC	**1% SOM**	**GAC Ref.**																						

Anions and Other

Stone Content	%		-		-	-	-	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	51	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%		-		-	-	-	-	-	-	-	-	-	19	13	18	14	11	11	2.2	12	3.4	4.8	14	5.9	4.8	
Total mass of sample received	kg		-		-	-	-	-	-	-	-	-	-	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	1	0.5	0.5	0.5
pH - Automated	pH Units		-		-	-	-	-	-	-	-	-	-	9.2	12.4	9.2	12.3	7.8	9.1	11.5	9.5	11.7	11.5	12.3	11.2	11.3
Total Cyanide	mg/kg	34	34	Atkins AtRisk	-	-	-	-	-	-	-	-	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg		-		-	-	-	-	-	-	-	-	-	94	5000	270	5100	1300	100	980	140	2800	1200	1800	640	390
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l		-		-	-	-	-	-	-	-	-	-	0.014	0.015	0.083	0.011	0.42	0.0095	0.02	0.014	0.017	0.031	0.0047	0.077	0.027
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg		-		-	-	-	-	-	-	-	-	-	28	31	170	21	830	19	40	29	34	62	9.3	150	53
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l		-		-	-	-	-	-	-	-	-	-	13.8	15.4	83.3	10.5	416	9.5	19.8	14.3	16.9	31.2	4.7	76.7	26.6
Sulphide	mg/kg		-		-	-	-	-	-	-	-	-	-	< 1.0	4.6	< 1.0	5.8	2.8	1	8.5	< 1.0	4.2	2.7	5.6	13	8
Total Sulphur	mg/kg		-		-	-	-	-	-	-	-	-	-	< 50	2000	390	1900	370	< 50	459	< 50	1150	480	630	620	290

Asbestos

Asbestos in Soil	Type	Present		A-squared GAC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Chrysotile
Asbestos in Soil	%	Detectable			Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Detected
Asbestos Quantification (Stage 2)	%	0.001			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.001
Asbestos Quantification Total	%	0.001			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.001

Heavy Metals and Metalloids

Arsenic (aqua regia extractable)	mg/kg	40	640	DEFRA C4SLs	-	-	-	-	-	-	-	-	-	1.7	3.2	2.2	3.9	3.6	3.2	2.6	3.2	3.2	3.5	1.6	1.9	1.9
Cadmium (aqua regia extractable)	mg/kg	150	410	LQM S4ULs	-	-	-	-	-	-	-	-	-	< 0.2	0.3	< 0.2	0.3	< 0.2	< 0.2	0.6	< 0.2	< 0.2	0.4	< 0.2	0.4	0.3
Chromium (hexavalent)	mg/kg	21	8600	DEFRA C4SLs	-	-	-	-	-	-	-	-	-	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	910	49	LQM S4ULs	-	-	-	-	-	-	-	-	-	4.2	14	5.7	14	7.5	5.6	9.2	6.5	13	8.5	8.2	6.1	5.6
Copper (aqua regia extractable)	mg/kg	7100	68000	LQM S4ULs	-	-	-	-	-	-	-	-	-	15	29	14	30	20	11	12	13	22	27	18	13	12
Lead (aqua regia extractable)	mg/kg	310	2300	DEFRA C4SLs	-	-	-	-	-	-	-	-	-	3.6	9.8	14	11	16	2.9	13	2.8	16	16	4.1	7.1	6.4
Mercury (aqua regia extractable)	mg/kg	15	320	LQM S4ULs	-	-	-	-	-	-	-	-	-	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	180	980	LQM S4ULs	-	-	-	-	-	-	-	-	-	5.9	8.5	7.4	11	7.7	7.8	8.5	8.6	9	9.2	8.6	5.5	
Selenium (aqua regia extractable)	mg/kg	430	12000	LQM S4ULs	-	-	-	-	-	-	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	40000	730000	LQM S4ULs	-	-	-	-	-	-	-	-	-	21	64	38	65	31	18	45	18	54	54	24	23	21

PAHs

Naphthalene	mg/kg	2.3	190	LQM S4ULs	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	2900	83000	LQM S4ULs	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	3000	84000	LQM S4ULs	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	2800	63000	LQM S4ULs	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	1300	22000	LQM S4ULs	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	0.4	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	31000	520000	LQM S4ULs	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	1500	23000	LQM S4ULs	< 0.1	< 0.1	0.3	0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	0.44	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	3700	54000	LQM S4ULs	< 0.1	< 0.1	0.3	0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	0.42	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	11	170	LQM S4ULs	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	0.33	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	30	350	LQM S4ULs	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	0.23	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	3.9	44	LQM S4ULs	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	110	1200	DEFRA C4SLs	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	5.3	77	LQM S4ULs	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	45	500	LQM S4ULs	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.31	3.5	LQM S4ULs	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(g,h,i)perylene	mg/kg	360	3900	LQM S4ULs	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH16	mg/kg		-		< 0.4	< 0.4	1.9	< 0.4	< 0.4	< 0.4	-	-	-	< 0.80	< 0.80	1.82	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80

TPH

>C5-C6 Aliphatic	mg/kg	42	3200	LQM S4ULs	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C6-C8 Aliphatic	mg/kg	100	7800	LQM S4ULs	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C8-C10 Aliphatic	mg/kg	27	2000	LQM S4ULs	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C10-C12 Aliphatic	mg/kg	130	9700	LQM S4ULs	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C12-C16 Aliphatic	mg/kg	1100	59000	LQM S4ULs	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C16-C21 Aliphatic	mg/kg	65000	1600000	LQM S4ULs	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C21-C35 Aliphatic	mg/kg			LQM S4ULs	2.3	< 1.0	< 1.0	< 1.0	< 1.0	3.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C35-C40 Aliphatic	mg/kg	65000	1600000	LQM S4ULs	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total aliphatic hydrocarbons (>C5 - C40)	mg/kg		-		3.7	< 1.0	< 1.0	< 1.0	< 1.0	5.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C5-C7 Aromatic	mg/kg	370	26000	LQM S4ULs	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C7-C8 Aromatic	mg/kg	860	56000	LQM S4ULs	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C8-C10 Aromatic	mg/kg	47	3500	LQM S4ULs	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C10-C12 Aromatic	mg/kg	250	16000	LQM S4ULs	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C12-C16 Aromatic	mg/kg	1800	36000	LQM S4ULs	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C16-C21 Aromatic	mg/kg	1900	28000	LQM S4ULs	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C21-C35 Aromatic	mg/kg	1900	28000	LQM S4ULs	1.8	< 1.0	< 1.0	< 1.0	< 1.0	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C35-C40 Aromatic	mg/kg	1900	28000	LQM S4ULs	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total aromatic hydrocarbons (>C5 - C40)	mg/kg		-		3.2	< 1.0	< 1.0	< 1.0	< 1.0	10.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total petroleum hydrocarbons (>C5 - C40)	mg/kg		-		6.9	< 1.0	< 1.0	< 1.0	< 1.0	15.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TPH (C5 - C8)	mg/kg	42	3200	LQM S4ULs	-	-	-	-	-	-	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C8 - C8)	mg/kg	100	7800	LQM S4ULs	-	-	-	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	27	2000	LQM S4ULs	-	-	-	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	130	9700	LQM S4ULs	-	-	-	-	-	-	-	-	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	1,100	59000	LQM S4ULs	-	-	-	-	-	-	-	-	-	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1,900	1,600,000	LQM S4ULs	-	-	-	-	-	-	-	-	-	< 1.0	7.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	16	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1,900	1,600,000	LQM S4ULs	-	-	-	-	-	-	-	-	-	< 1.0	51	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	42	< 1.0
TPH (C35 - C40)	mg/kg	1,900	1,600,000	LQM S4ULs	-	-	-	-	-	-	-	-	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	14	< 10
TPH Total C5 - C40	mg/kg		-		-	-	-	-	-	-	-	-	-	< 10	60	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	74	< 10

BTEX and MTBE

Benzene	ug/kg	890	27000	DEFRA C4SLs	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	ug/kg	880000	56000000	LQM S4ULs	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	ug/kg	83000	5700000	LQM S4ULs	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes	ug/kg	79000	18700000	LQM S4ULs	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MTBE	ug/kg	73000	7900000	CL AIRE GAC	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Human Health Generic Quantitative Assessment for Soil

3199 - Renaissance Manchester Supplamentary

Key:

Exceedance of the GAC

GAC - Generic Assessment Criteria

					A2SI									E3P													
Laboratory Report Ref.					269593	269596	269600	269601	269608	269609	269606	269607	269614	1786020	1786021	1786022	1786023	1790718	1790719	1790720	1790721	1790722	1787643	1787644	1787645	1787646
Exploratory Location Ref.					WS08	WS09A	WS13	WS13	WS10	WS10	WS11	WS12	WS07	RH101	RH102	RH103	RH103	RBH104	RBH104	RBH105	RBH105	RBH106	TP01	TP02	TP03	TP04
Sample Depth (m)					0.50	0.50	0.50	1.50	0.50	1.50	0.5	0.5	0.5	0.8	0.6	0.8	0.4	0.30	0.90	0.30	0.50	0.35	0.40	0.40	0.45	0.45
Sample Date					23/02/2022	23/02/2022	22/02/2022	22/02/2022	23/02/2022	23/02/2022				44250	44250	44250	44250	02/03/2021	02/03/2021	02/03/2021	02/03/2021	02/03/2021	26/02/2021	26/02/2021	26/02/2021	26/02/2021
Made Ground / Natural ?					MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	**MG**
	Units	**Residential without home grown produce**	**Commercial**																								
		GAC	**1%SOM**	**GAC Ref.**																							
VOC																											
Heptane	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Octane	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nonane	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	ug/kg	890	27000	DEFRA C4SLs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	ug/kg	880000	56000000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	ug/kg	83000	5700000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
m+p-xylene	ug/kg	79000	12100000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
o-xylene	ug/kg	88000	6800000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-dichloroethene	ug/kg	120	14000	CL:AIRE GAC	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	ug/kg	2500	280000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	ug/kg	1200	99000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloromethane	ug/kg	26	2900	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	ug/kg	880	660000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethylene	ug/kg	17	1200	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethylene	ug/kg	180	19000	LQM S4ULs	-	-	< 10.0	-	66.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1,2-Tetrachloroethane	ug/kg	1500	110000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroetha	ug/kg	3900	270000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	ug/kg	460	56000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromobenzene	ug/kg	910	97000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	ug/kg	19	2000	CL:AIRE GAC	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methylethylbenzene	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloro-1-propene	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trans - 1-2 -dichloroethylene	ug/kg	190	22000	CL:AIRE GAC	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2-Dichloropropane	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	ug/kg	9.2	670	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromomethane	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	ug/kg	240	3000	CL:AIRE GAC	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloro-1-propene	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloro-1-propene	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	ug/kg	880	94000	CL:AIRE GAC	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichloropropane	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-dibromoethane	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	ug/kg	35000	3300000	CL:AIRE GAC	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Propylbenzene	ug/kg	40000	41000	CL:AIRE GAC	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	ug/kg	410	42000	CL:AIRE GAC	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorotoluene	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
t-butylbenzene	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-methylpropylbenzene	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
p-cymene	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	ug/kg	440	130000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Butylbenzene	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	ug/kg		-		-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	ug/kg	320	110000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-2-3 - Trichlorobenzene	ug/kg	1,500	102000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	ug/kg	2,300	190	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1-2-4 - Trichlorobenzene	ug/kg	2,600	220000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	ug/kg	61,000	4400000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	ug/kg	24,000	2000000	LQM S4ULs	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	ug/kg	5,200	760000	CL:AIRE GAC	-	-	< 10.0	-	< 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenolics																											

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

Key:

Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

				Inside Footprint									outside site fo				
				RB 103	RB 104				RB 105				RB 106			WS09A	
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	272020	1835881	272021	221605	229308	1835882	272022	221606	229309	272023	221607	229310	272024	221608
Exploratory Location Ref.				RB103	RB 104	RB104	RB104	RB104	RB 105	RB105	RB105	RB105	RB106	RB106	RB106	WS09A	WS09A
Sample Date				15/03/2022	13/04/2021	15/03/2022	05/06/2024	13/06/2024	13/04/2021	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA														
Miscellaneous																	
Dissolved organic carbon	mg/l	-		3.3	6.01	11	1.32	1.86	0.97	2.2	1.2	1.86	2.7	1.6	2.5	3.0	1.7
pH	pH units	-		6.7	10.2	7.3	7.4	7.4	10.0	8.3	8.3	8.3	7.4	7.9	7.9	7.4	8.0
Suspended Solids	mg/l	-		26	-	120	310	120	-	8.0	33.0	73	24	2200	2200	12	550
Total Organic Carbon	mg/l	-		3	-	18	1.82	2	-	2	1	1.87	3	2	2.55	3	2
Anions and Other																	
Sulphate	mg/l	250	400	416	-	175	235	230	-	23.1	76.9	81.1	146	157	224	69.1	54.5
Free Cyanide	ug/l	-	1	< 5	-	< 5	< 10	< 10	-	< 5	< 10	< 10	< 5	< 10	< 10	< 5	< 10
Hexavalent Chromium (Dissolved)	ug/l	-	3.4	<0.5	< 5.0	≤ 1.0	6.4	U/S [u/s]	< 5.0	≤ 1.2	< 5.0	< 5.0	≤ 0.6	< 5.0	< 5.0 [h]	≤ 2.4	< 5.0
Total Cyanide	ug/l	50	-	6	< 1.0	< 5	< 10	< 10	< 1.0	< 5	< 10	< 10	< 5	< 10	< 10	< 5	< 10
Heavy Metals and Metalloids																	
Arsenic	ug/l	10	50	< 0.5	2.93	3.0	0.77	0.53	1.18	0.6	0.2	0.16	< 0.5	0.45	0.37	2.3	2.4
Boron	ug/l	1000	2000	206	-	111	100	87	-	45	49	41	13	22	25	83	92
Barium	ug/l	700	-	38	-	90	80	71	-	41	66	63	191	26	17	38	38
Beryllium	ug/l	12	-	< 1	-	< 1	< 0.1	< 0.1	-	< 1	< 0.1	< 0.1	< 1	< 0.1	< 0.1	< 1	< 0.1
Cadmium	ug/l	5	0.08	< 0.5	0.03	< 0.5	< 0.02	< 0.02	< 0.02	< 0.5	0.1	< 0.02	< 0.5	< 0.02	< 0.02	< 0.5	< 0.02
Chromium	ug/l	50	4.7	< 0.5	3.8	1.0	7.9	6	1.6	1.2	1.1	0.9	0.6	5.3	4.6	2.4	3.2
Chromium (III)	ug/l	50	4.7	<0.5	3.8	≤ 1.0	7.9	U/S [u/s]	1.6	≤ 1.2	< 5.0	< 5.0	≤ 0.6	< 5.0	< 5.0 [h]	≤ 2.4	< 5.0
Copper	ug/l	2000	1	0.6	8.4	7.4	1.3	1.5	2.9	< 0.5	2.4	3.7	0.5	3.9	1.8	3.4	5.4
Mercury	ug/l	1	-	< 0.05	1.22	< 0.05	< 0.2	0.4	0.07	< 0.05	< 0.2	< 0.2	< 0.05	< 0.2	< 0.2	< 0.05	0.2
Molybdenum	ug/l	-		< 1	-	6	< 0.05	< 0.05	-	< 1	< 0.05	< 0.05	< 1	< 0.05	< 0.05	7	< 0.05
Nickel	ug/l	20	4	2.1	2.1	8.3	2.8	2.3	0.5	< 0.5	0.26	0.18	1.8	0.3	0.52	1.2	11
Lead	ug/l	10	1.2	< 0.5	< 0.2	< 0.5	0.9	0.7	< 0.2	< 0.5	0.6	< 0.5	< 0.5	1.2	0.9	< 0.5	0.5
Selenium	ug/l	10	-	< 1	2.8	4	5.2	4	2.2	< 1	1.6	1.9	2	2.8	2.3	2	4.8
Vanadium	ug/l	-	20	< 0.5	-	7.0	0.5	0.6	-	< 0.5	< 0.2	< 0.2	< 0.5	0.4	0.7	1.6	1.5
Zinc	ug/l	3,000	10.9	10.9	2.7	23.3	4.7	4.6	2.2	< 1.2	1.9	1.7	16.8	4.2	1.9	3.0	2.3
PAHs																	
Naphthalene	ug/l	-	2	0.01	-	0.02	< 0.01	< 0.01	-	0.02	< 0.01	< 0.01	0.01	< 0.01	< 0.01	0.02	< 0.01
Acenaphthylene	ug/l	-		< 0.01	-	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	ug/l	-		< 0.01	-	0.02	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	ug/l	-		< 0.01	-	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	ug/l	-		0.02	-	0.06	< 0.01	< 0.01	-	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01
Anthracene	ug/l	-	0.1	< 0.01	-	0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	ug/l	-	0.0063	0.02	-	0.06	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01
Pyrene	ug/l	-		0.02	-	0.06	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

Key:

Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

				Inside Footprint									outside site fo				
				RB 103	RB 104				RB 105				RB 106			WS09A	
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	272020	1835881	272021	221605	229308	1835882	272022	221606	229309	272023	221607	229310	272024	221608
Exploratory Location Ref.				RB103	RB 104	RB104	RB104	RB104	RB 105	RB105	RB105	RB105	RB106	RB106	RB106	WS09A	WS09A
Sample Date				15/03/2022	13/04/2021	15/03/2022	05/06/2024	13/06/2024	13/04/2021	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA														
Benzo (a) anthracene	ug/l	-		0.02	-	0.03	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	ug/l	-		0.02	-	0.04	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01
Benzo (b) fluoranthene	ug/l	0.1 (sum)	-	0.04	-	0.33	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo (k) fluoranthene	ug/l		-	0.03	-	0.26	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	ug/l		-	0.08	-	0.03	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno (1,2,3-cd) pyrene	ug/l		-	0.08	-	0.02	< 0.01	< 0.01	-	0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	ug/l	-		0.08	-	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo (a) pyrene	ug/l	0.01	0.0002	0.04	-	0.03	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01
Total PAH(16)	ug/l	-		0.48	-	0.98	< 0.16	< 0.16	-	0.13	< 0.16	< 0.16	0.09	< 0.16	< 0.16	0.15	< 0.16
TPH																	
>C5-C6 Aliphatic	ug/l	300	20	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C6-C8 Aliphatic	ug/l	300	20	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aliphatic	ug/l	300	20	7.8	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 5.0	< 1.0
>C10-C12 Aliphatic	ug/l	300	20	< 5.0	< 1.0	< 5.0	< 10	< 10	< 1.0	< 5.0	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10
>C12-C16 Aliphatic	ug/l	300	20	< 5.0	< 10	< 5.0	< 10	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10
>C16-C21 Aliphatic	ug/l	Insoluble	Insoluble	< 5.0	< 10	< 5.0	< 10	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10
>C21-C35 Aliphatic	ug/l			5.5	< 10	76.4	< 10	< 10	< 10	< 5.0	< 10	< 10	17.6	< 10	< 10	< 5.0	< 10
>C35-C40 Aliphatic	ug/l	Insoluble	Insoluble	< 5.0	-	< 5.0	< 10	< 10	-	< 5.0	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10
Total (>C5-C35) Aliphatic	ug/l	-		-	< 10	-	< 10	< 10	< 10	-	< 10	< 10	-	< 10	< 10	-	< 10
Total (>C5-C40) Aliphatic	ug/l	-		13.2	-	76.4	< 10	< 10	-	< 5.0	< 10	< 10	17.6	< 10	< 10	< 5.0	< 10
>C5-C7 Aromatic	ug/l	1	10	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C7-C8 Aromatic	ug/l	700	74	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aromatic	ug/l	300	20	< 5.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 5.0	< 1.0
>C10-C12 Aromatic	ug/l	90	20	< 5.0	< 1.0	< 5.0	< 10	< 10	< 1.0	< 5.0	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10
>C12-C16 Aromatic	ug/l	90	20	< 5.0	< 10	< 5.0	< 10	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10
>C16-C21 Aromatic	ug/l	90	20	< 5.0	< 10	5.6	< 10	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10
>C21-C35 Aromatic	ug/l	90	20	< 5.0	< 10	69.8	< 10	< 10	< 10	< 5.0	< 10	< 10	8.3	< 10	< 10	< 5.0	< 10
>C35-C40 Aromatic	ug/l	-	20	< 5.0	-	< 5.0	< 10	< 10	-	< 5.0	< 10	< 10	< 5.0	< 10	< 10	< 5.0	< 10
Total (>C5-C35) Aromatic	ug/l	-		-	< 10	-	< 10	< 10	< 10	-	< 10	< 10	-	< 10	< 10	-	< 10
Total (>C5-C40) Aromatic	ug/l	-		< 5.0	-	75.4	< 10	< 10	-	< 5.0	< 10	< 10	8.3	< 10	< 10	< 5.0	< 10
Total (>C5-C40) Ali/Aro	ug/l	-		13.2	-	152	< 10	< 10	-	< 5.0	< 10	< 10	25.9	< 10	< 10	< 5.0	< 10

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Sample Date				15/03/2022	13/04/2021	15/03/2022	05/06/2024	13/06/2024	13/04/2021	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024
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GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA														
BTEX and MTBE																	
Benzene	ug/l	1	10	< 1.00	< 1.0	< 1.00	< 3.0	< 3.0	< 1.0	< 1.00	< 3.0	< 3.0	< 1.00	< 3.0	< 3.0	< 1.00	< 3.0
Toluene	ug/l	700	74	< 1.00	< 1.0	< 1.00	< 3.0	< 3.0	< 1.0	< 1.00	< 3.0	< 3.0	< 1.00	< 3.0	< 3.0	< 1.00	< 3.0
Ethylbenzene	ug/l	300	20	< 1.00	< 1.0	< 1.00	< 3.0	< 3.0	< 1.0	< 1.00	< 3.0	< 3.0	< 1.00	< 3.0	< 3.0	< 1.00	< 3.0
Xylenes	ug/l	500	30	< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
p & m-xylene	µg/l	500	30	-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
o-xylene	µg/l	500	30	-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
MTBE	ug/l	15	-	< 1.00	< 1.0	< 1.00	< 3.0	< 3.0	< 1.0	< 1.00	< 3.0	< 3.0	< 1.00	< 3.0	< 3.0	< 1.00	< 3.0
VOC																	
MTBE	ug/l	15	-	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Heptane	ug/l	-		< 1	-	< 1	-	-	-	< 1	-	-	< 1	-	-	< 1	-
Octane	ug/l	-		< 1	-	< 1	-	-	-	< 1	-	-	< 1	-	-	< 1	-
Nonane	ug/l	-		< 1	-	< 1	-	-	-	< 1	-	-	< 1	-	-	< 1	-
Benzene	ug/l	1	10	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Toluene	ug/l	700	74	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Ethylbenzene	ug/l	300	20	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
m+p-xylene	ug/l	500	30	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
o-xylene	ug/l	500	30	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
cis-1,2-dichloroethene	ug/l	-		8	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	2	< 3.0
1,1-Dichloroethane	ug/l	0.007	-	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Chloroform	ug/l	100	2.5	< 1	8.6	< 1	< 3.0	< 3.0	7.9	8	< 3.0	< 3.0	2	< 3.0	< 3.0	< 1	< 3.0
Bromoform	ug/l		-	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Dibromochloromethane	ug/l		-	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Bromodichloromethane	ug/l		-	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Tetrachloromethane	ug/l	3	12	< 1	< 1.0	< 1	-	-	< 1.0	< 1	-	-	< 1	-	-	< 1	-
1,1,1-Trichloroethane	ug/l	200	100	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Trichloroethylene	ug/l	10 (sum)	10	27	< 1.0	< 1	< 3.0	< 3.0	< 1	< 1	< 3.0	< 3.0	<1	< 3.0	< 3.0	< 1	< 3.0
Tetrachloroethylene	ug/l		10	79	< 1.0	< 1	< 3.0	< 3.0	< 1	< 1	< 3.0	< 3.0	<1	< 3.0	< 3.0	13	< 3.0
1,1,1,2-Tetrachloroethane	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
1,1,2,2-Tetrachloroetha	ug/l	-		< 1	< 1.0	< 1	-	-	< 1.0	< 1	-	-	< 1	-	-	< 1	-
Chlorobenzene	ug/l	100	-	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Bromobenzene	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Methylethylbenzene	ug/l	-		< 1	-	< 1	-	-	-	< 1	-	-	< 1	-	-	< 1	-
1,1-Dichloro-1-propene	ug/l	-		< 1	< 1.0	< 1	-	-	< 1.0	< 1	-	-	< 1	-	-	< 1	-
Trans - 1-2 - dichloroethylene	ug/l	-		< 1	< 1.0	< 1	-	-	< 1.0	< 1	-	-	< 1	-	-	< 1	-
2,2-Dichloropropane	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Bromochloromethane	ug/l	-		< 1	-	< 1	-	-	-	< 1	-	-	< 1	-	-	< 1	-
1,2-Dichloroethane	ug/l	3	10	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

Key:

Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

				Inside Footprint									outside site fo				
				RB 103	RB 104				RB 105				RB 106			WS09A	
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	272020	1835881	272021	221605	229308	1835882	272022	221606	229309	272023	221607	229310	272024	221608
Exploratory Location Ref.				RB103	RB 104	RB104	RB104	RB104	RB 105	RB105	RB105	RB105	RB106	RB106	RB106	WS09A	WS09A
Sample Date				15/03/2022	13/04/2021	15/03/2022	05/06/2024	13/06/2024	13/04/2021	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA														
Dibromomethane	ug/l	-		< 1	-	< 1	< 3.0	< 3.0	-	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
1,2-Dichloropropane	ug/l	22	-	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
cis-1,3-Dichloro-1-propene	ug/l	-		< 1	< 1.0	< 1	-	-	< 1.0	< 1	-	-	< 1	-	-	< 1	-
trans-1,3-Dichloro-1-propene	ug/l	-		< 1	< 1.0	< 1	-	-	< 1.0	< 1	-	-	< 1	-	-	< 1	-
1,1,2-Trichloroethane	ug/l	5	400	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
1,3-Dichloropropane	ug/l	20	-	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Dibromoethane	ug/l	-		< 1	< 1.0	< 1	-	-	< 1.0	< 1	-	-	< 1	-	-	< 1	-
Styrene	ug/l	20	50	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Propylbenzene	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
2-Chlorotoluene	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
1,2,4-Trimethylbenzene	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
4-Chlorotoluene	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
t-butylbenzene	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
1,3,5-Trimethylbenzene	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
1-methylpropylbenzene	ug/l	-		< 1	-	< 1	-	-	-	< 1	-	-	< 1	-	-	< 1	-
p-cymene	ug/l	-		< 1	-	< 1	-	-	-	< 1	-	-	< 1	-	-	< 1	-
1,3-Dichlorobenzene	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Butylbenzene	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
1,2-Dibromo-3-chloropropane	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Hexachlorobutadiene	ug/l	0.6	0.6	< 1	< 1.0	< 1	< 3.0 ###	< 3.0 ###	< 1.0	< 1	< 3.0 ###	< 3.0 ###	< 1	< 3.0 ###	< 3.0 ###	< 1	< 3.0 ###
1-2-3 - Trichlorobenzene	ug/l	-		< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Naphthalene	ug/l	-	2	< 1	-	< 1	-	-	-	< 1	-	-	< 1	-	-	< 1	-
1-2-4 - Trichlorobenzene	ug/l	-		< 1	< 1.0	< 1	< 3.0 #	< 3.0 #	< 1.0	< 1	< 3.0 #	< 3.0 #	< 1	< 3.0 #	< 3.0 #	< 1	< 3.0 #
1,4-Dichlorobenzene	ug/l	300	-	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
1,2-Dichlorobenzene	ug/l	1000	-	< 1	< 1.0	< 1	< 3.0	< 3.0	< 1.0	< 1	< 3.0	< 3.0	< 1	< 3.0	< 3.0	< 1	< 3.0
Chloromethane	ug/l	-		-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
Chloroethane	ug/l	0.5	-	-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
Bromomethane	ug/l	-		-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
Vinyl Chloride	ug/l	0.5	-	-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
Trichlorofluoromethane	ug/l	-		-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
1,1-Dichloroethene	ug/l	-		-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l	-		-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
1,2-Dibromoethane	ug/l	0.4	-	-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
sec-Butylbenzene	ug/l	-		-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
Isopropylbenzene	ug/l	-		-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
p-Isopropyltoluene	ug/l	-		-	< 1.0	-	< 3.0	< 3.0	< 1.0	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
Trans 1,2-dichloroethylene	ug/l	-		-	-	-	< 3.0	< 3.0	-	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

Key:

Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

				Inside Footprint										outside site fo				
				RB 103	RB 104				RB 105				RB 106			WS09A	
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	272020	1835881	272021	221605	229308	1835882	272022	221606	229309	272023	221607	229310	272024	221608
Exploratory Location Ref.				RB103	RB 104	RB104	RB104	RB104	RB 105	RB105	RB105	RB105	RB106	RB106	RB106	WS09A	WS09A
Sample Date				15/03/2022	13/04/2021	15/03/2022	05/06/2024	13/06/2024	13/04/2021	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA														
1,1-Dichloropropene	ug/l	-		-	-	-	< 3.0	< 3.0	-	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
Carbontetrachloride	ug/l	3	12	-	-	-	< 3.0	< 3.0	-	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
Cis-1,3-dichloropropene	ug/l	-		-	-	-	< 3.0	< 3.0	-	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
Trans-1,3-dichloropropene	ug/l	-		-	-	-	< 3.0	< 3.0	-	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0
1,1,2,2-Tetrachloroethane	ug/l	-	140	-	-	-	< 3.0	< 3.0	-	-	< 3.0	< 3.0	-	< 3.0	< 3.0	-	< 3.0

Controlled Waters Generic Quantitative Assessment for Groundwater

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				Inside Footprint									outside site fo				
				RB 103	RB 104				RB 105				RB 106			WS09A	
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	272020	1835881	272021	221605	229308	1835882	272022	221606	229309	272023	221607	229310	272024	221608
Exploratory Location Ref.				RB103	RB 104	RB104	RB104	RB104	RB 105	RB105	RB105	RB105	RB106	RB106	RB106	WS09A	WS09A
Sample Date				15/03/2022	13/04/2021	15/03/2022	05/06/2024	13/06/2024	13/04/2021	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA														
SVOC																	
Phenol	ug/l	-	7.7	< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Aniline	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Bis(2-chloroethyl)ether	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
2-Chlorophenol	ug/l	-	50	< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
1,3-Dichlorobenzene	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
1,4-Dichlorobenzene	ug/l	300	-	< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Benzyl Alcohol	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
1,2-Dichlorobenzene	ug/l	1000	-	< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
2-Methylphenol	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Bis(2-chloroisopropyl)ether	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
3 and 4-methylphenol	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
N-Nitrosodi-n-propylamine	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Hexachloroethane	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Nitrobenzene	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Isophorone	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
2-Nitrophenol	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
2,4-Dimethylphenol	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Bis(2-chloroethoxy)methane	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
2,4-Dichlorophenol	ug/l	-	4.2	< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
1,3,5-Trichlorobenzene	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Naphthalene	ug/l	-	2	0.01	< 0.01	0.02	-	-	< 0.01	0.02	-	-	0.01	-	-	0.02	-
3-Chloroaniline	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Hexachloro-1,3-butadiene	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
4-Chloro-3-methylphenol	ug/l	-	40	< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
2-Methynaphthalene	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
1-Methylnaphthalene	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Hexachlorocyclopentadiene	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
2,4,6-Trichlorophenol	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
2,4,5-Trichlorophenol	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
1-Chloronaphthalene	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
2-Nitroaniline	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
1,4-Dinitrobenzene	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Dimethyl phthalate	ug/l	-	800	< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
1-3-dinitrobenzene	ug/l	-		< 1.00	< 0.05	< 1.00	-	-	< 0.05	< 1.00	-	-	< 1.00	-	-	< 1.00	-
2-6-dinitrotoluene	ug/l	-		< 1.00	< 0.05	< 1.00	-	-	< 0.05	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Acenaphthylene	ug/l	-		< 0.01	< 0.01	< 0.01	-	-	< 0.01	< 0.01	-	-	< 0.01	-	-	< 0.01	-
1,2-Dinitrobenzene	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
3-Nitroaniline	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Acenaphthene	ug/l	-		< 0.01	-	0.02	-	-	-	< 0.01	-	-	< 0.01	-	-	< 0.01	-

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

Key:

Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

				Inside Footprint									outside site fo				
				RB 103	RB 104				RB 105				RB 106			WS09A	
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	272020	1835881	272021	221605	229308	1835882	272022	221606	229309	272023	221607	229310	272024	221608
Exploratory Location Ref.				RB103	RB 104	RB104	RB104	RB104	RB 105	RB105	RB105	RB105	RB106	RB106	RB106	WS09A	WS09A
Sample Date				15/03/2022	13/04/2021	15/03/2022	05/06/2024	13/06/2024	13/04/2021	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA														
4-nitrophenol	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Dibenzofuran	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
2,3,5,6-Tetrachlorophenol	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
2,3,4,6-Tetrachlorophenol	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Diethyl phthalate	ug/l	-	200	< 1.00	< 0.05	< 1.00	-	-	< 0.05	< 1.00	-	-	< 1.00	-	-	< 1.00	-
1-chloro-4-phenoxybenzene	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Fluorene	ug/l	-		< 0.01	< 0.01	0.01	-	-	< 0.01	< 0.01	-	-	< 0.01	-	-	< 0.01	-
4-Nitroaniline	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Dinitro-o-cresol	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Diphenylamine	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Azobenzene	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
1-bromo-4-phenoxybenzene	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Hexachlorobenzene	ug/l	0.05	-	< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Pentachlorophenol	ug/l	9	0.4	< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Phenanthrene	ug/l	-		0.02	< 0.01	0.06	-	-	< 0.01	0.01	-	-	< 0.01	-	-	0.02	-
Anthracene	ug/l	-	0.1	< 0.01	< 0.01	0.02	-	-	< 0.01	< 0.01	-	-	< 0.01	-	-	< 0.01	-
Carbazole	ug/l	-		< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Dibutyl phthalate	ug/l	-	8	< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Fluoranthene	ug/l	-	0.0063	0.02	< 0.01	0.06			< 0.01	< 0.01			< 0.01			0.02	
Pyrene	ug/l	-		0.03	< 0.01	0.06			< 0.01	< 0.01			< 0.01			0.02	
Butyl benzyl phthalate	ug/l	-	7.5	< 1.00	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05	< 0.05	< 1.00	< 0.05
Bis-2-ethylhexyladipate	ug/l	8	1.3	< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Diisooctyl phthalate	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Benzo(a)anthracene	ug/l	-		0.03	< 0.01	0.04	-	-	< 0.01	< 0.01	-	-	< 0.01	-	-	< 0.01	-
Chrysene	ug/l	-		0.03	< 0.01	0.04	-	-	< 0.01	< 0.01	-	-	< 0.01	-	-	0.01	-
Bis(2-ethylhexyl)phthalate	ug/l	-		< 1.00	-	< 1.00	-	-	-	< 1.00	-	-	< 1.00	-	-	< 1.00	-
Benzo(b)fluoranthene	ug/l	0.1 (sum)	-	0.05	< 0.01	0.03	-	-	< 0.01	0.01	-	-	< 0.01	-	-	< 0.01	-
Benzo(k)fluoranthene	ug/l		-	0.05	< 0.01	0.03	-	-	< 0.01	0.01	-	-	< 0.01	-	-	0.01	-
Benzo(ghi)perylene	ug/l		-	0.09	< 0.01	0.03	-	-	< 0.01	0.01	-	-	0.01	-	-	0.01	-
Indeno(1,2,3-CD)pyrene	ug/l		-	0.08	< 0.01	0.02	-	-	< 0.01	< 0.01	-	-	0.02	-	-	< 0.01	-
Dibenzo(a,h)anthracene	ug/l	-		0.09	< 0.01	< 0.01	-	-	< 0.01	< 0.01	-	-	0.01	-	-	< 0.01	-
Benzo(a)pyrene	ug/l	0.01	0.0002	0.04	< 0.01	0.03	-	-	< 0.01	< 0.01	-	-	< 0.01	-	-	< 0.01	-
4-Methylphenol	ug/l	-		-	< 0.05	-	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05
1,2,4-Trichlorobenzene	ug/l	-		-	< 0.05	-	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05
4-Chloroaniline	ug/l	-		-	< 0.05	-	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05
Hexachlorobutadiene	ug/l	0.6	0.6	-	< 0.05	-	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05
2-Chloronaphthalene	ug/l	-		-	< 0.05	-	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05
2,4-Dinitrotoluene	ug/l	-		-	< 0.05	-	-	-	< 0.05	-	-	-	-	-	-	-	-
3&4-Methylphenol	ug/l	-		-	< 0.10	-	<0.1	<0.1	< 0.10	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1
Anthraquinone	ug/l	-		-	< 0.05	-	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

Key:

Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

				Inside Footprint													outside site fo	
				RB 103	RB 104				RB 105				RB 106			WS09A		
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	272020	1835881	272021	221605	229308	1835882	272022	221606	229309	272023	221607	229310	272024	221608
Exploratory Location Ref.				RB103	RB 104	RB104	RB104	RB104	RB 105	RB105	RB105	RB105	RB106	RB106	RB106	WS09A	WS09A
Sample Date				15/03/2022	13/04/2021	15/03/2022	05/06/2024	13/06/2024	13/04/2021	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024	13/06/2024	15/03/2022	05/06/2024
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA															
Bromophenyl phenyl ether	ug/l	-		-	< 0.05	-	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05
2,6-Dinitrotoluene	ug/l	-		-	-	-	< 0.05	< 0.05	-	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05
2,4-Dinitrotoluene	ug/l	-		-	-	-	< 0.05	< 0.05	-	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05
Dimethylphthalate	ug/l	0	800	-	-	-	< 0.05	< 0.05	-	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05
4-Chlorophenyl phenyl ether	ug/l	-		-	-	-	< 0.05	< 0.05	-	-	< 0.05	< 0.05	-	< 0.05	< 0.05	-	< 0.05
Phenolics																	
Total Phenol	ug/l	-	7.7	1	-	< 1	<3.5	<3.5	-	< 1	<3.5	<3.5	< 1	<3.5	<3.5	< 1	<3.5
M,P-Cresol	ug/l	-		1	-	< 1	-	-	-	-	-	-	-	-	-	-	-
O-Cresol	ug/l	-		1	-	< 1	-	-	-	-	-	-	-	-	-	-	-
3,4-Dimethylphenol	ug/l	-		1	-	< 1	-	-	-	-	-	-	-	-	-	-	-
2,3-Dimethylphenol	ug/l	-		1	-	< 1	-	-	-	-	-	-	-	-	-	-	-
2,3,5-trimethylphenol	ug/l	-		1	-	< 1	-	-	-	-	-	-	-	-	-	-	-
Total Monohydric Phenols	ug/l	-	7.7	1	4.8	< 1	-	-	-	-	-	-	-	-	-	-	-
Catechol	ug/l	-		-	-	-	< 0.5	< 0.5	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5
Resorcinol	ug/l	-		-	-	-	< 0.5	< 0.5	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5
Cresols	ug/l	-		-	-	-	< 0.5	< 0.5	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5
Naphthols	ug/l	-		-	-	-	< 0.5	< 0.5	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5
Isopropylphenol	ug/l	-		-	-	-	< 0.5	< 0.5	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5
Phenol	ug/l	-		-	-	-	< 0.5	< 0.5	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5
Total Xylenols & Ethylphenols	ug/l	-		-	-	-	< 0.5	< 0.5	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5
Trimethylphenol (2,3,5-)	ug/l	-		-	-	-	< 0.5	< 0.5	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplementary

Key:

Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

otprint

					WS13			RB 101
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	229311	272025	221609	229312	1835880
Exploratory Location Ref.				WS09A	WS13	WS13	WS13	RB 101
Sample Date				13/06/2024	15/03/2022	05/06/2024	13/06/2024	13/04/2021
Aquifer Unit				MG	MG	MG	MG	Chester Formation
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA					
Miscellaneous								
Dissolved organic carbon	mg/l	-		1.86	3.5	3.0	3.23	0.80
pH	pH units	-		7.8	7.0	7.5	7.3	7.3
Suspended Solids	mg/l	-		840	74	53	470	-
Total Organic Carbon	mg/l	-		1.94	4	3	3.33	-
Anions and Other								
Sulphate	mg/l	250	400	46.1	63.2	39.8	44.3	-
Free Cyanide	ug/l	-	1	< 10	< 5	< 10	< 10	-
Hexavalent Chromium (Dissolved)	ug/l	-	3.4	< 5.0	<0.5	< 5.0	< 5.0	< 5.0
Total Cyanide	ug/l	50	-	< 10	< 5	< 10	< 10	< 1.0
Heavy Metals and Metalloids								
Arsenic	ug/l	10	50	1.91	1.8	2.1	2.52	0.39
Boron	ug/l	1000	2000	82	87	78	78	-
Barium	ug/l	700	-	26	80	60	59	-
Beryllium	ug/l	12	-	< 0.1	< 1	< 0.1	< 0.1	-
Cadmium	ug/l	5	0.08	< 0.02	< 0.5	< 0.02	< 0.02	< 0.02
Chromium	ug/l	50	4.7	3.9	< 0.5	0.3	< 0.2	1.2
Chromium (III)	ug/l	50	4.7	< 5.0	<0.5	< 5.0	< 5.0	1.2
Copper	ug/l	2000	1	3.1	2.9	2.3	1	3.1
Mercury	ug/l	1	-	1	< 0.05	0.4	1.9	< 0.05
Molybdenum	ug/l	-		< 0.05	4	< 0.05	< 0.05	-
Nickel	ug/l	20	4	8.9	2.3	4.4	3.9	1.2
Lead	ug/l	10	1.2	< 0.5	2.1	2.3	1.5	0.2
Selenium	ug/l	10	-	3.9	< 1	< 0.6	< 0.6	< 0.6
Vanadium	ug/l	-	20	1.5	< 0.5	< 0.2	1	-
Zinc	ug/l	3,000	10.9	1.6	13.8	5.7	3.2	7.8
PAHs								
Naphthalene	ug/l	-	2	< 0.01	0.01	< 0.01	< 0.01	-
Acenaphthylene	ug/l	-		< 0.01	< 0.01	< 0.01	0.07	-
Acenaphthene	ug/l	-		< 0.01	< 0.01	< 0.01	0.06	-
Fluorene	ug/l	-		< 0.01	< 0.01	< 0.01	0.05	-
Phenanthrene	ug/l	-		< 0.01	0.05	< 0.01	0.51	-
Anthracene	ug/l	-	0.1	< 0.01	0.01	< 0.01	0.13	-
Fluoranthene	ug/l	-	0.0063	< 0.01	0.12	< 0.01	1.3	-
Pyrene	ug/l	-		< 0.01	0.13	< 0.01	1.5	-

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplementary

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otprint

					WS13			RB 101
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	229311	272025	221609	229312	1835880
Exploratory Location Ref.				WS09A	WS13	WS13	WS13	RB 101
Sample Date				13/06/2024	15/03/2022	05/06/2024	13/06/2024	13/04/2021
Aquifer Unit				MG	MG	MG	MG	Chester Formation
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA					
Benzo (a) anthracene	ug/l	-		< 0.01	0.06	< 0.01	0.68	-
Chrysene	ug/l	-		< 0.01	0.07	< 0.01	0.79	-
Benzo (b) fluoranthene	ug/l	0.1 (sum)	-	< 0.01	0.16	< 0.01	0.94	-
Benzo (k) fluoranthene	ug/l		-	< 0.01	0.42	< 0.01	0.38	-
Benzo(ghi)perylene	ug/l		-	< 0.01	0.06	< 0.01	0.87	-
Indeno (1,2,3-cd) pyrene	ug/l		-	< 0.01	0.05	< 0.01	0.4	-
Dibenzo(a,h)anthracene	ug/l	-		< 0.01	0.02	< 0.01	0.13	-
Benzo (a) pyrene	ug/l	0.01	0.0002	< 0.01	0.09	< 0.01	0.52	-
Total PAH(16)	ug/l	-		< 0.16	1.26	< 0.16	8.33	-
TPH								
>C5-C6 Aliphatic	ug/l	300	20	< 1.0	< 1.0	< 1.0	< 1.0	< 10
>C6-C8 Aliphatic	ug/l	300	20	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aliphatic	ug/l	300	20	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	ug/l	300	20	< 10	< 5.0	< 10	< 10	< 1.0
>C12-C16 Aliphatic	ug/l	300	20	< 10	< 5.0	< 10	< 10	< 10
>C16-C21 Aliphatic	ug/l	Insoluble	Insoluble	< 10	< 5.0	< 10	< 10	< 10
>C21-C35 Aliphatic	ug/l			< 10	6.2	< 10	< 10	< 10
>C35-C40 Aliphatic	ug/l	Insoluble	Insoluble	< 10	< 5.0	< 10	< 10	-
Total (>C5-C35) Aliphatic	ug/l	-		< 10	-	< 10	< 10	< 10
Total (>C5-C40) Aliphatic	ug/l	-		< 10	6.2	< 10	< 10	-
>C5-C7 Aromatic	ug/l	1	10	< 1.0	< 1.0	< 1.0	< 1.0	< 10
>C7-C8 Aromatic	ug/l	700	74	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aromatic	ug/l	300	20	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	ug/l	90	20	< 10	< 5.0	< 10	< 10	< 1.0
>C12-C16 Aromatic	ug/l	90	20	< 10	< 5.0	< 10	15	< 10
>C16-C21 Aromatic	ug/l	90	20	< 10	< 5.0	< 10	20	< 10
>C21-C35 Aromatic	ug/l	90	20	< 10	< 5.0	< 10	55	< 10
>C35-C40 Aromatic	ug/l	-	20	< 10	< 5.0	< 10	<10	-
Total (>C5-C35) Aromatic	ug/l	-		< 10	-	< 10	90	< 10
Total (>C5-C40) Aromatic	ug/l	-		< 10	< 5.0	< 10	90	-
Total (>C5-C40) Ali/Aro	ug/l	-		< 10	6.2	< 10	90	-

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplementary

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Exceedance of both GAC

GAC - Generic Assessment Criteria

otprint

					WS13			RB 101
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	229311	272025	221609	229312	1835880
Exploratory Location Ref.				WS09A	WS13	WS13	WS13	RB 101
Sample Date				13/06/2024	15/03/2022	05/06/2024	13/06/2024	13/04/2021
Aquifer Unit				MG	MG	MG	MG	Chester Formation
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA					
BTEX and MTBE								
Benzene	ug/l	1	10	< 3.0	< 1.00	< 3.0	< 3.0	< 1.0
Toluene	ug/l	700	74	< 3.0	< 1.00	< 3.0	< 3.0	< 1.0
Ethylbenzene	ug/l	300	20	< 3.0	< 1.00	< 3.0	< 3.0	< 1.0
Xylenes	ug/l	500	30	-	< 1.00	-	-	-
p & m-xylene	µg/l	500	30	< 3.0	-	< 3.0	< 3.0	< 1.0
o-xylene	µg/l	500	30	< 3.0	-	< 3.0	< 3.0	< 1.0
MTBE	ug/l	15	-	< 3.0	< 1.00	< 3.0	< 3.0	< 1.0
VOC								
MTBE	ug/l	15	-	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Heptane	ug/l	-		-	< 1	-	-	-
Octane	ug/l	-		-	< 1	-	-	-
Nonane	ug/l	-		-	< 1	-	-	-
Benzene	ug/l	1	10	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Toluene	ug/l	700	74	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Ethylbenzene	ug/l	300	20	< 3.0	< 1	< 3.0	< 3.0	< 1.0
m+p-xylene	ug/l	500	30	< 3.0	< 1	< 3.0	< 3.0	< 1.0
o-xylene	ug/l	500	30	< 3.0	< 1	< 3.0	< 3.0	< 1.0
cis-1,2-dichloroethene	ug/l	-		< 3.0	1	< 3.0	< 3.0	< 1.0
1,1-Dichloroethane	ug/l	0.007	-	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Chloroform	ug/l	100	2.5	< 3.0	< 1	< 3.0	< 3.0	18.8
Bromoform	ug/l		-	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Dibromochloromethane	ug/l		-	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Bromodichloromethane	ug/l		-	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Tetrachloromethane	ug/l	3	12	-	< 1	-	-	< 1.0
1,1,1-Trichloroethane	ug/l	200	100	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Trichloroethylene	ug/l	10 (sum)	10	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Tetrachloroethylene	ug/l		10	< 3.0	< 1	< 3.0	< 3.0	< 1.0
1,1,1,2-Tetrachloroethane	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
1,1,2,2-Tetrachloroetha	ug/l	-		-	< 1	-	-	< 1.0
Chlorobenzene	ug/l	100	-	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Bromobenzene	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
Methylethylbenzene	ug/l	-		-	< 1	-	-	-
1,1-Dichloro-1-propene	ug/l	-		-	< 1	-	-	< 1.0
Trans - 1-2 - dichloroethylene	ug/l	-		-	< 1	-	-	< 1.0
2,2-Dichloropropane	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
Bromochloromethane	ug/l	-		-	< 1	-	-	-
1,2-Dichloroethane	ug/l	3	10	< 3.0	< 1	< 3.0	< 3.0	< 1.0

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplementary

Key:

Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

otprint

					WS13			RB 101
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	229311	272025	221609	229312	1835880
Exploratory Location Ref.				WS09A	WS13	WS13	WS13	RB 101
Sample Date				13/06/2024	15/03/2022	05/06/2024	13/06/2024	13/04/2021
Aquifer Unit				MG	MG	MG	MG	Chester Formation
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA					
Dibromomethane	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	-
1,2-Dichloropropane	ug/l	22	-	< 3.0	< 1	< 3.0	< 3.0	< 1.0
cis-1,3-Dichloro-1-propene	ug/l	-		-	< 1	-	-	< 1.0
trans-1,3-Dichloro-1-propene	ug/l	-		-	< 1	-	-	< 1.0
1,1,2-Trichloroethane	ug/l	5	400	< 3.0	< 1	< 3.0	< 3.0	< 1.0
1,3-Dichloropropane	ug/l	20	-	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Dibromoethane	ug/l	-		-	< 1	-	-	< 1.0
Styrene	ug/l	20	50	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Propylbenzene	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
2-Chlorotoluene	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
1,2,4-Trimethylbenzene	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
4-Chlorotoluene	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
t-butylbenzene	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
1,3,5-Trimethylbenzene	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
1-methylpropylbenzene	ug/l	-		-	< 1	-	-	-
p-cymene	ug/l	-		-	< 1	-	-	-
1,3-Dichlorobenzene	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
Butylbenzene	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
1,2-Dibromo-3-chloropropane	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
Hexachlorobutadiene	ug/l	0.6	0.6	< 3.0 ###	< 1	< 3.0 ###	< 3.0 ###	< 1.0
1-2-3 - Trichlorobenzene	ug/l	-		< 3.0	< 1	< 3.0	< 3.0	< 1.0
Naphthalene	ug/l	-	2	-	< 1	-	-	-
1-2-4 - Trichlorobenzene	ug/l	-		< 3.0 #	< 1	< 3.0 #	< 3.0 #	< 1.0
1,4-Dichlorobenzene	ug/l	300	-	< 3.0	< 1	< 3.0	< 3.0	< 1.0
1,2-Dichlorobenzene	ug/l	1000	-	< 3.0	< 1	< 3.0	< 3.0	< 1.0
Chloromethane	ug/l	-		< 3.0	-	< 3.0	< 3.0	< 1.0
Chloroethane	ug/l	0.5	-	< 3.0	-	< 3.0	< 3.0	< 1.0
Bromomethane	ug/l	-		< 3.0	-	< 3.0	< 3.0	< 1.0
Vinyl Chloride	ug/l	0.5	-	< 3.0	-	< 3.0	< 3.0	< 1.0
Trichlorofluoromethane	ug/l	-		< 3.0	-	< 3.0	< 3.0	< 1.0
1,1-Dichloroethene	ug/l	-		< 3.0	-	< 3.0	< 3.0	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l	-		< 3.0	-	< 3.0	< 3.0	< 1.0
1,2-Dibromoethane	ug/l	0.4	-	< 3.0	-	< 3.0	< 3.0	< 1.0
sec-Butylbenzene	ug/l	-		< 3.0	-	< 3.0	< 3.0	< 1.0
Isopropylbenzene	ug/l	-		< 3.0	-	< 3.0	< 3.0	< 1.0
p-Isopropyltoluene	ug/l	-		< 3.0	-	< 3.0	< 3.0	< 1.0
Trans 1,2-dichloroethylene	ug/l	-		< 3.0	-	< 3.0	< 3.0	-

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplementary

Key:

Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

otprint

					WS13			RB 101
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	229311	272025	221609	229312	1835880
Exploratory Location Ref.				WS09A	WS13	WS13	WS13	RB 101
Sample Date				13/06/2024	15/03/2022	05/06/2024	13/06/2024	13/04/2021
Aquifer Unit				MG	MG	MG	MG	Chester Formation
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA					
1,1-Dichloropropene	ug/l	-		< 3.0	-	< 3.0	< 3.0	-
Carbontetrachloride	ug/l	3	12	< 3.0	-	< 3.0	< 3.0	-
Cis-1,3-dichloropropene	ug/l	-		< 3.0	-	< 3.0	< 3.0	-
Trans-1,3-dichloropropene	ug/l	-		< 3.0	-	< 3.0	< 3.0	-
1,1,2,2-Tetrachloroethane	ug/l	-	140	< 3.0	-	< 3.0	< 3.0	-

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplementary

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Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

otprint

					WS13			RB 101
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	229311	272025	221609	229312	1835880
Exploratory Location Ref.				WS09A	WS13	WS13	WS13	RB 101
Sample Date				13/06/2024	15/03/2022	05/06/2024	13/06/2024	13/04/2021
Aquifer Unit				MG	MG	MG	MG	Chester Formation
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA					
SVOC								
Phenol	ug/l	-	7.7	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Aniline	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Bis(2-chloroethyl)ether	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
2-Chlorophenol	ug/l	-	50	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
1,3-Dichlorobenzene	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	ug/l	300	-	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Benzyl Alcohol	ug/l	-		-	< 1.00	-	-	-
1,2-Dichlorobenzene	ug/l	1000	-	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
2-Methylphenol	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
3 and 4-methylphenol	ug/l	-		-	< 1.00	-	-	-
N-Nitrosodi-n-propylamine	ug/l	-		-	< 1.00	-	-	-
Hexachloroethane	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Nitrobenzene	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Isophorone	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
2-Nitrophenol	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
2,4-Dichlorophenol	ug/l	-	4.2	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
1,3,5-Trichlorobenzene	ug/l	-		-	< 1.00	-	-	-
Naphthalene	ug/l	-	2	-	0.01	-	-	< 0.01
3-Chloroaniline	ug/l	-		-	< 1.00	-	-	-
Hexachloro-1,3-butadiene	ug/l	-		-	< 1.00	-	-	-
4-Chloro-3-methylphenol	ug/l	-	40	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
2-Methynaphthalene	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
1-Methylnaphthalene	ug/l	-		-	< 1.00	-	-	-
Hexachlorocyclopentadiene	ug/l	-		-	< 1.00	-	-	-
2,4,6-Trichlorophenol	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
1-Chloronaphthalene	ug/l	-		-	< 1.00	-	-	-
2-Nitroaniline	ug/l	-		-	< 1.00	-	-	-
1,4-Dinitrobenzene	ug/l	-		-	< 1.00	-	-	-
Dimethyl phthalate	ug/l	-	800	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
1-3-dinitrobenzene	ug/l	-		-	< 1.00	-	-	< 0.05
2-6-dinitrotoluene	ug/l	-		-	< 1.00	-	-	< 0.05
Acenaphthylene	ug/l	-		-	0.01	-	-	< 0.01
1,2-Dinitrobenzene	ug/l	-		-	< 1.00	-	-	-
3-Nitroaniline	ug/l	-		-	< 1.00	-	-	-
Acenaphthene	ug/l	-		-	< 0.01	-	-	-

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplementary

Key:

Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

otprint

					WS13			RB 101
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	229311	272025	221609	229312	1835880
Exploratory Location Ref.				WS09A	WS13	WS13	WS13	RB 101
Sample Date				13/06/2024	15/03/2022	05/06/2024	13/06/2024	13/04/2021
Aquifer Unit				MG	MG	MG	MG	Chester Formation
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA					
4-nitrophenol	ug/l	-		-	< 1.00	-	-	-
Dibenzofuran	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
2,3,5,6-Tetrachlorophenol	ug/l	-		-	< 1.00	-	-	-
2,3,4,6-Tetrachlorophenol	ug/l	-		-	< 1.00	-	-	-
Diethyl phthalate	ug/l	-	200	-	< 1.00	-	-	< 0.05
1-chloro-4-phenoxybenzene	ug/l	-		-	< 1.00	-	-	-
Fluorene	ug/l	-		-	< 0.01	-	-	< 0.01
4-Nitroaniline	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Dinitro-o-cresol	ug/l	-		-	< 1.00	-	-	-
Diphenylamine	ug/l	-		-	< 1.00	-	-	-
Azobenzene	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
1-bromo-4-phenoxybenzene	ug/l	-		-	< 1.00	-	-	-
Hexachlorobenzene	ug/l	0.05	-	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Pentachlorophenol	ug/l	9	0.4	-	< 1.00	-	-	-
Phenanthrene	ug/l	-		-	0.05	-	-	< 0.01
Anthracene	ug/l	-	0.1	-	0.01	-	-	< 0.01
Carbazole	ug/l	-		< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Dibutyl phthalate	ug/l	-	8	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Fluoranthene	ug/l	-	0.0063		0.15			< 0.01
Pyrene	ug/l	-			0.16			< 0.01
Butyl benzyl phthalate	ug/l	-	7.5	< 0.05	< 1.00	< 0.05	< 0.05	< 0.05
Bis-2-ethylhexyladipate	ug/l	8	1.3	-	< 1.00	-	-	-
Diisooctyl phthalate	ug/l	-		-	< 1.00	-	-	-
Benzo(a)anthracene	ug/l	-		-	0.08	-	-	< 0.01
Chrysene	ug/l	-		-	0.10	-	-	< 0.01
Bis(2-ethylhexyl)phthalate	ug/l	-		-	< 1.00	-	-	-
Benzo(b)fluoranthene	ug/l	0.1 (sum)	-	-	0.08	-	-	< 0.01
Benzo(k)fluoranthene	ug/l		-	-	0.08	-	-	< 0.01
Benzo(ghi)perylene	ug/l		-	-	0.06	-	-	< 0.01
Indeno(1,2,3-CD)pyrene	ug/l		-	-	0.05	-	-	< 0.01
Dibenzo(a,h)anthracene	ug/l	-		-	0.02	-	-	< 0.01
Benzo(a)pyrene	ug/l	0.01	0.0002	-	0.10	-	-	< 0.01
4-Methylphenol	ug/l	-		< 0.05	-	< 0.05	< 0.05	< 0.05
1,2,4-Trichlorobenzene	ug/l	-		< 0.05	-	< 0.05	< 0.05	< 0.05
4-Chloroaniline	ug/l	-		< 0.05	-	< 0.05	< 0.05	< 0.05
Hexachlorobutadiene	ug/l	0.6	0.6	< 0.05	-	< 0.05	< 0.05	< 0.05
2-Chloronaphthalene	ug/l	-		< 0.05	-	< 0.05	< 0.05	< 0.05
2,4-Dinitrotoluene	ug/l	-		-	-	-	-	< 0.05
3&4-Methylphenol	ug/l	-		<0.1	-	<0.1	<0.1	< 0.10
Anthraquinone	ug/l	-		< 0.05	-	< 0.05	< 0.05	< 0.05

Controlled Waters Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplementary

Key:

Exceedance of the Drinking Water GAC

Exceedance of Environmental Quality GAC

Exceedance of both GAC

GAC - Generic Assessment Criteria

otprint

					WS13			RB 101
Laboratory Report Ref.	**Units**	**Drinking Water GAC**	**Environmental Quality GAC**	229311	272025	221609	229312	1835880
Exploratory Location Ref.				WS09A	WS13	WS13	WS13	RB 101
Sample Date				13/06/2024	15/03/2022	05/06/2024	13/06/2024	13/04/2021
Aquifer Unit				MG	MG	MG	MG	Chester Formation
GAC Refs.		UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA					
Bromophenyl phenyl ether	ug/l	-		< 0.05	-	< 0.05	< 0.05	< 0.05
2,6-Dinitrotoluene	ug/l	-		< 0.05	-	< 0.05	< 0.05	-
2,4-Dinitrotoluene	ug/l	-		< 0.05	-	< 0.05	< 0.05	-
Dimethylphthalate	ug/l	0	800	< 0.05	-	< 0.05	< 0.05	-
4-Chlorophenyl phenyl ether	ug/l	-		< 0.05	-	< 0.05	< 0.05	-
Phenolics								
Total Phenol	ug/l	-	7.7	<3.5	< 1	<3.5	<3.5	-
M,P-Cresol	ug/l	-		-	-	-	-	-
O-Cresol	ug/l	-		-	-	-	-	-
3,4-Dimethylphenol	ug/l	-		-	-	-	-	-
2,3-Dimethylphenol	ug/l	-		-	-	-	-	-
2,3,5-trimethylphenol	ug/l	-		-	-	-	-	-
Total Monohydric Phenols	ug/l	-	7.7	-	-	-	-	4.8
Catechol	ug/l	-		< 0.5	-	< 0.5	< 0.5	-
Resorcinol	ug/l	-		< 0.5	-	< 0.5	< 0.5	-
Cresols	ug/l	-		< 0.5	-	< 0.5	< 0.5	-
Naphthols	ug/l	-		< 0.5	-	< 0.5	< 0.5	-
Isopropylphenol	ug/l	-		< 0.5	-	< 0.5	< 0.5	-
Phenol	ug/l	-		< 0.5	-	< 0.5	< 0.5	-
Total Xylenols & Ethylphenols	ug/l	-		< 0.5	-	< 0.5	< 0.5	-
Trimethylphenol (2,3,5-)	ug/l	-		< 0.5	-	< 0.5	< 0.5	-

Human Health Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

Key:

Exceedance of the residential GAC

Exceedance of the commercial GAC

GAC - Generic Assessment Criteria

Laboratory Report Ref.	Units	GAC		272020	1835881	272021	1835882	272022	272023	272024	272025	1835880
Exploratory Location Ref.				RB103	RB 104	RB104	RB 105	RB105	RB106	WS09	WS13	RB 101
Sample Date				15/03/2022	13/04/2021	15/03/2022	13/04/2021	15/03/2022	15/03/2022	15/03/2022	15/03/2022	13/04/2021
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG	Chester Formation
		Residentail	Commercial									
Miscellaneous												
Dissolved organic carbon	mg/l	-		3.3	6.01	11	0.97	2.2	2.7	3.0	3.5	0.80
pH	pH units	-		6.7	10.2	7.3	10.0	8.3	7.4	7.4	7.0	7.3
Suspended Solids	mg/l	-		26	-	120	-	8.0	24	12	74	-
Total Organic Carbon	mg/l	-		3	-	18	-	2	3	3	4	-
Anions and Other												
Sulphate	mg/l	-		416	-	175	-	23.1	146	69.1	63.2	-
Free Cyanide	ug/l	-		< 5	-	< 5	-	< 5	< 5	< 5	< 5	-
Hexavalent Chromium (Dissolved)	ug/l	-		<0.5	-	≤ 1.0	-	≤ 1.2	≤ 0.6	≤ 2.4	<0.5	-
Total Cyanide	ug/l	-		6	< 1.0	< 5	< 1.0	< 5	< 5	< 5	< 5	< 1.0
Heavy Metals and Metalloids												
Arsenic	ug/l	-		< 0.5	2.93	3.0	1.18	0.6	< 0.5	2.3	1.8	0.39
Boron	ug/l	-		206	-	111	-	45	13	83	87	-
Barium	ug/l	-		38	-	90	-	41	191	38	80	-
Beryllium	ug/l	-		< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
Cadmium	ug/l	-		< 0.5	0.03	< 0.5	< 0.02	< 0.5	< 0.5	< 0.5	< 0.5	< 0.02
Chromium	ug/l	-		< 0.5	3.8	1.0	1.6	1.2	0.6	2.4	< 0.5	1.2
Chromium (III)	ug/l	-		<0.5	3.8	≤ 1.0	1.6	≤ 1.2	≤ 0.6	≤ 2.4	<0.5	1.2
Copper	ug/l	-		0.6	8.4	7.4	2.9	< 0.5	0.5	3.4	2.9	3.1
Mercury	ug/l	-		< 0.05	1.22	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum	ug/l	-		< 1	-	6	-	< 1	< 1	7	4	-
Nickel	ug/l	-		2.1	2.1	8.3	0.5	< 0.5	1.8	1.2	2.3	1.2
Lead	ug/l	-		< 0.5	< 0.2	< 0.5	< 0.2	< 0.5	< 0.5	< 0.5	2.1	0.2
Selenium	ug/l	-		< 1	2.8	4	2.2	< 1	2	2	< 1	< 0.6
Vanadium	ug/l	-		< 0.5	-	7.0	-	< 0.5	< 0.5	1.6	< 0.5	-
Zinc	ug/l	-		10.9	2.7	23.3	2.2	< 1.2	16.8	3.0	13.8	7.8
PAHs												
Naphthalene GCMS	ug/l	200	23000	0.01	-	0.02	-	0.02	0.01	0.02	0.01	-
Acenaphthylene GCMS	ug/l	220000	20000000	< 0.01	-	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	-
Acenaphthene GCMS	ug/l	170000	15000000	< 0.01	-	0.02	-	< 0.01	< 0.01	< 0.01	< 0.01	-
Fluorene GCMS	ug/l	210000	18000000	< 0.01	-	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	-
Phenanthrene GCMS	ug/l	-		0.02	-	0.06	-	0.01	< 0.01	0.02	0.05	-
Anthracene GCMS	ug/l	-		< 0.01	-	0.01	-	< 0.01	< 0.01	< 0.01	0.01	-
Fluoranthene GCMS	ug/l	-		0.02	-	0.06	-	< 0.01	< 0.01	0.02	0.12	-
Pyrene GCMS	ug/l	-		0.02	-	0.06	-	< 0.01	< 0.01	0.02	0.13	-
Benzo (a) anthracene GCMS	ug/l	-		0.02	-	0.03	-	< 0.01	< 0.01	< 0.01	0.06	-
Chrysene GCMS	ug/l	-		0.02	-	0.04	-	< 0.01	< 0.01	0.01	0.07	-
Benzo (b) fluoranthene GCMS	ug/l	-		0.04	-	0.33	-	< 0.01	< 0.01	< 0.01	0.16	-
Benzo (k) fluoranthene GCMS	ug/l	-		0.03	-	0.26	-	< 0.01	< 0.01	< 0.01	0.42	-

Human Health Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

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Exceedance of the commercial GAC

GAC - Generic Assessment Criteria

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Exploratory Location Ref.				RB103	RB 104	RB104	RB 105	RB105	RB106	WS09	WS13	RB 101
Sample Date				15/03/2022	13/04/2021	15/03/2022	13/04/2021	15/03/2022	15/03/2022	15/03/2022	15/03/2022	13/04/2021
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG	Chester Formation
		Residentail	Commercial									
Benzo (a) pyrene GCMS	ug/l	-		0.04	-	0.03	-	< 0.01	< 0.01	0.01	0.09	-
Indeno (1,2,3-cd) pyrene GCMS	ug/l	-		0.08	-	0.02	-	0.01	0.02	< 0.01	0.05	-
Dibenzo(a,h)anthracene GCMS	ug/l	-		0.08	-	< 0.01	-	< 0.01	0.01	< 0.01	0.02	-
Benzo(ghi)perylene GCMS	ug/l	-		0.08	-	0.03	-	< 0.01	< 0.01	< 0.01	0.06	-
Total PAH(16) GCMS	ug/l	-		0.48	-	0.98	-	0.13	0.09	0.15	1.26	-
TPH												
>C5-C6 Aliphatic	ug/l	1900	190000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C6-C8 Aliphatic	ug/l	1500	150000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aliphatic	ug/l	57	5700	7.8	< 1.0	< 5.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0
>C10-C12 Aliphatic	ug/l	37	3600	< 5.0	< 10	< 5.0	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 10
>C12-C16 Aliphatic	ug/l	-		< 5.0	< 10	< 5.0	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 10
>C16-C21 Aliphatic	ug/l	-		< 5.0	< 10	< 5.0	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 10
>C21-C35 Aliphatic	ug/l	-		5.5	< 10	76.4	< 10	< 5.0	17.6	< 5.0	6.2	< 10
>C35-C40 Aliphatic	ug/l	-		< 5.0	-	< 5.0	-	< 5.0	< 5.0	< 5.0	< 5.0	-
Total (>C5-35) Aliphatic	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
Total (>C5-C40) Aliphatic	ug/l	-		13.2	-	76.4	-	< 5.0	17.6	< 5.0	6.2	-
>C5-C7 Aromatic	ug/l	210000	20000000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C7-C8 Aromatic	ug/l	220000	21000000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aromatic	ug/l	1900	190000	< 5.0	< 10	< 5.0	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 10
>C10-C12 Aromatic	ug/l	6800	660000	< 5.0	< 10	< 5.0	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 10
>C12-C16 Aromatic	ug/l	39000	3700000	< 5.0	< 10	< 5.0	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 10
>C16-C21 Aromatic	ug/l	-		< 5.0	< 10	5.6	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 10
>C21-C35 Aromatic	ug/l	-		< 5.0	< 10	69.8	< 10	< 5.0	8.3	< 5.0	< 5.0	< 10
>C35-C40 Aromatic	ug/l	-		< 5.0	-	< 5.0	-	< 5.0	< 5.0	< 5.0	< 5.0	-
Total (>C5-C35) Aromatic	ug/l	-		-	< 10	-	< 10	-	-	-	-	< 10
Total (>C5-C40) Aromatic	ug/l	-		< 5.0	-	75.4	-	< 5.0	8.3	< 5.0	< 5.0	-
Total (>C5-C40) Ali/Aro	ug/l	-		13.2	< 10	152	< 10	< 5.0	25.9	< 5.0	6.2	< 10
BTEX and MTBE												
Benzene	ug/l	210	20000	< 1.00	< 1.0	< 1.00	< 1.0	< 1.00	< 1.00	< 1.00	< 1.00	< 1.0
Toluene	ug/l	230000	21000000	< 1.00	< 1.0	< 1.00	< 1.0	< 1.00	< 1.00	< 1.00	< 1.00	< 1.0
Ethylbenzene	ug/l	10000	960000	< 1.00	< 1.0	< 1.00	< 1.0	< 1.00	< 1.00	< 1.00	< 1.00	< 1.0

Human Health Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

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Exploratory Location Ref.				RB103	RB 104	RB104	RB 105	RB105	RB106	WS09	WS13	RB 101
Sample Date				15/03/2022	13/04/2021	15/03/2022	13/04/2021	15/03/2022	15/03/2022	15/03/2022	15/03/2022	13/04/2021
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG	Chester Formation
		Residentail	Commercial									
Xylenes	ug/l	9500	940000	< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
p & m-xylene	µg/l	9500	940000	-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
o-xylene	µg/l	12,000	1,100,000	-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
MTBE	ug/l	83000	7800000	< 1.00	< 1.0	< 1.00	< 1.0	< 1.00	< 1.00	< 1.00	< 1.00	< 1.0
VOC												
MTBE	ug/l	83,000	7800000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Heptane	ug/l	-		< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
Octane	ug/l	-		< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
Nonane	ug/l	-		< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
Benzene	ug/l	210	20000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Toluene	ug/l	230,000	21000000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Ethylbenzene	ug/l	10,000	960000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
m+p-xylene	ug/l	9,500	1,920,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
o-xylene	ug/l	12,000	1,100,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
cis-1,2-dichloroethene	ug/l	130	13000	8	< 1.0	< 1	< 1.0	< 1	< 1	2	1	< 1.0
1,1-Dichloroethane	ug/l	2,700	260,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Chloroform	ug/l	790	85000	< 1	8.6	< 1	7.9	8	2	< 1	< 1	18.8
Tetrachloromethane	ug/l	5.3	770	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
1,1,1-Trichloroethane	ug/l	3,000	290,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Trichloroethylene	ug/l	5.7	530	27	< 1.0	< 1	< 1.0	< 1	< 1	1	< 1	< 1.0
Tetrachloroethylene	ug/l	34	4,600	79	< 1.0	< 1	< 1.0	< 1	< 1	13	< 1	< 1.0
1,1,1,2-Tetrachloroethane	ug/l	240	22,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
1,1,2,2-Tetrachloroetha	ug/l	1,600	150,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Chlorobenzene	ug/l	98	15,000	< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
Bromobenzene	ug/l	220	20,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Bromodichloromethane	ug/l	17	1,600	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Methylethylbenzene	ug/l	-		< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
1,1-Dichloro-1-propene	ug/l	-		< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
Trans - 1-2 -dichloroethylene	ug/l	160	16,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
2,2-Dichloropropane	ug/l	-		< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Bromochloromethane	ug/l	-		< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
1,2-Dichloroethane	ug/l	8.9	2,600	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Dibromomethane	ug/l	-		< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
1,2-Dichloropropane	ug/l	22	2,600	< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
cis-1,3-Dichloro-1-propene	ug/l	-		< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
trans-1,3-Dichloro-1-propene	ug/l	-		< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
1,1,2-Trichloroethane	ug/l	520	49,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Dibromochloromethane	ug/l	-		< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
1,3-Dichloropropane	ug/l	-		< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Dibromoethane	ug/l	-		< 1	-	< 1	-	< 1	< 1	< 1	< 1	-

Human Health Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

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Exploratory Location Ref.				RB103	RB 104	RB104	RB 105	RB105	RB106	WS09	WS13	RB 101
Sample Date				15/03/2022	13/04/2021	15/03/2022	13/04/2021	15/03/2022	15/03/2022	15/03/2022	15/03/2022	13/04/2021
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG	Chester Formation
		Residentail	Commercial									
Styrene	ug/l	8,800	810,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Propylbenzene	ug/l	2,700	240,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
2-Chlorotoluene	ug/l	-		< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
1,2,4-Trimethylbenzene	ug/l	24	2,200	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
4-Chlorotoluene	ug/l	-		< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
t-butylbenzene	ug/l	-		< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
1,3,5-Trimethylbenzene	ug/l	-		< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
1-methylpropylbenzene	ug/l	-		< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
p-cymene	ug/l	-		< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
1,3-Dichlorobenzene	ug/l	31	2,800	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Butylbenzene	ug/l	-		< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
1,2-Dibromo-3-chloropropane	ug/l	-		< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Hexachlorobutadiene	ug/l	1.7	230	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
1-2-3 - Trichlorobenzene	ug/l	35	3,100	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Naphthalene	ug/l	220	23,000	< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
1-2-4 - Trichlorobenzene	ug/l	68	7,200	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
1,4-Dichlorobenzene	ug/l	5,000	460,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
1,2-Dichlorobenzene	ug/l	2,000	220,000	< 1	< 1.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1.0
Bromoform	ug/l	3,100	400,000	< 1	-	< 1	-	< 1	< 1	< 1	< 1	-
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
Vinyl Chloride	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
1,2-Dichloropropane	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
1,1-Dichloropropene	ug/l	22	2600	-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
Isopropylbenzene	ug/l	850	86,000	-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
sec-Butylbenzene	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
p-Isopropyltoluene	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
Butylbenzene	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
Chloromethane	ug/l	14	1400	-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
Chloroethane	ug/l	10000	1000000	-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
Bromomethane	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
Trichlorofluoromethane	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
1,1-Dichloroethene	ug/l	160	16000	-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
1,1-Dichloropropene	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
1,2-Dibromoethane	ug/l	-		-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
Chlorobenzene	ug/l	98	15000	-	< 1.0	-	< 1.0	-	-	-	-	< 1.0
SVOC												
Phenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-

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Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG	Chester Formation
		Residentail	Commercial									
Aniline	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Bis(2-chloroethyl)ether	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
2-Chlorophenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
1,3-Dichlorobenzene	ug/l	31	2800	< 1.00	< 0.05	< 1.00	< 0.05	< 1.00	< 1.00	< 1.00	< 1.00	< 0.05
1,4-Dichlorobenzene	ug/l	5,000	460,000	< 1.00	< 0.05	< 1.00	< 0.05	< 1.00	< 1.00	< 1.00	< 1.00	< 0.05
Benzyl Alcohol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
1,2-Dichlorobenzene	ug/l	2,000	220,000	< 1.00	< 0.05	< 1.00	< 0.05	< 1.00	< 1.00	< 1.00	< 1.00	< 0.05
2-Methylphenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Bis(2-chloroisopropyl)ether	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
3 and 4-methylphenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
N-Nitrosodi-n-propylamine	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Hexachloroethane	ug/l	8.5	740	< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Nitrobenzene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Isophorone	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
2-Nitrophenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
2,4-Dimethylphenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Bis(2-chloroethoxy)methane	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
2,4-Dichlorophenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
1,3,5-Trichlorobenzene	ug/l	7.4	660	< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
3-Chloroaniline	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Hexachloro-1,3-butadiene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
4-Chloro-3-methylphenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-

Human Health Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

Key:

Exceedance of the residential GAC

Exceedance of the commercial GAC

GAC - Generic Assessment Criteria

Laboratory Report Ref.	Units	GAC		272020	1835881	272021	1835882	272022	272023	272024	272025	1835880
Exploratory Location Ref.				RB103	RB 104	RB104	RB 105	RB105	RB106	WS09	WS13	RB 101
Sample Date				15/03/2022	13/04/2021	15/03/2022	13/04/2021	15/03/2022	15/03/2022	15/03/2022	15/03/2022	13/04/2021
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG	Chester Formation
		Residentail	Commercial									
2-Methynaphthalene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
1-Methylnaphthalene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Hexachlorocyclopentadiene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
2,4,6-Trichlorophenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
2,4,5-Trichlorophenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
1-Chloronaphthalene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
2-Nitroaniline	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
1,4-Dinitrobenzene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Dimethyl phthalate	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
1-3-dinitrobenzene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
2-6-dinitrotoluene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Acenaphthylene	ug/l	220,000	20,000,000	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01
1,2-Dinitrobenzene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
3-Nitroaniline	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
4-nitrophenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Dibenzofuran	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
2,3,5,6-Tetrachlorophenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
2,3,4,6-Tetrachlorophenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Diethyl phthalate	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
1-chloro-4-phenoxybenzene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Fluorene	ug/l	210,000	18,000,000	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
4-Nitroaniline	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Dinitro-o-cresol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Diphenylamine	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Azobenzene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
1-bromo-4-phenoxybenzene	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Hexachlorobenzene	ug/l	16	1400	< 1.00	< 0.05	< 1.00	< 0.05	< 1.00	< 1.00	< 1.00	< 1.00	< 0.05
Pentachlorophenol	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Phenanthrene	ug/l	-		0.02	-	0.06	-	0.01	< 0.01	0.02	0.05	-
Anthracene	ug/l	-		< 0.01	-	0.02	-	< 0.01	< 0.01	< 0.01	0.01	-
Carbazole	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Dibutyl phthalate	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Fluoranthene	ug/l	-		0.02	-	0.06	-	< 0.01	< 0.01	0.02	0.15	-
Pyrene	ug/l	-		0.03	-	0.06	-	< 0.01	< 0.01	0.02	0.16	-
Butyl benzyl phthalate	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Bis-2-ethylhexyladipate	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Diisooctyl phthalate	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Bis(2-ethylhexyl)phthalate	ug/l	-		< 1.00	-	< 1.00	-	< 1.00	< 1.00	< 1.00	< 1.00	-
Phenolics												
Phenol	ug/l	-		1	-	< 1	-	< 1	< 1	< 1	< 1	-
M,P-Cresol	ug/l	-		1	-	< 1	-	< 1	< 1	< 1	< 1	-
O-Cresol	ug/l	-		1	-	< 1	-	< 1	< 1	< 1	< 1	-
3,4-Dimethylphenol	ug/l	-		1	-	< 1	-	< 1	< 1	< 1	< 1	-

Human Health Generic Quantitative Assessment for Groundwater

3199 - Renaissance Manchester Supplamentary

Key:

Exceedance of the residential GAC

Exceedance of the commercial GAC

GAC - Generic Assessment Criteria

Laboratory Report Ref.	Units	GAC		272020	1835881	272021	1835882	272022	272023	272024	272025	1835880
Exploratory Location Ref.				RB103	RB 104	RB104	RB 105	RB105	RB106	WS09	WS13	RB 101
Sample Date				15/03/2022	13/04/2021	15/03/2022	13/04/2021	15/03/2022	15/03/2022	15/03/2022	15/03/2022	13/04/2021
Aquifer Unit				Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	Chester Formation	MG	MG	Chester Formation
		Residentail	Commercial									
2,3-Dimethylphenol	ug/l	-		1	-	< 1	-	< 1	< 1	< 1	< 1	-
2,3,5-trimethylphenol	ug/l	-		1	-	< 1	-	< 1	< 1	< 1	< 1	-
Total Monohydric Phenols	ug/l	-		1	4.8	< 1	3.4	< 1	< 1	< 1	< 1	4.8

Controlled Waters Generic Quantitative Assessment for Surface waters

3199 - Renaissance Manchester Supplamentary

Key:

- Exceedance of the Drinking Water GAC
- Exceedance of Environmental Quality GAC
- Exceedance of both GAC

GAC - Generic Assessment Criteria

Laboratory Report Ref.	Units	Environmental Quality GAC	221610	229313	221611	229314
Exploratory Location Ref.			Upstream	Upstream	Downstream	Downstream
Sample Date			05/06/2024	13/06/2024	05/06/2024	13/06/2024
Aquifer Unit			-	-	-	-
GAC Refs.		Environmental Quality Standards (EQS) published by the UK, EU and EA				
Miscellaneous						
Dissolved organic carbon	mg/l	-	6.97	7.38	6.81	7.43
pH	pH units	-	7.8	7.8	7.8	7.7
Suspended Solids	mg/l	-	3	42	3	19
Total Organic Carbon	mg/l	-	7.28	7.48	7.16	7.46
Anions and Other						
Sulphate	mg/l	400	50.9	53.9	49.5	53.7
Free Cyanide	ug/l	1	< 10	< 10	< 10	< 10
Hexavalent Chromium (Dissolved)	ug/l	3.4	< 5.0	< 5.0 [Th]	< 5.0	< 5.0
Total Cyanide	ug/l	-	< 10	< 10	< 10	< 10
Heavy Metals and Metalloids						
Arsenic	ug/l	50	1.03	0.74	0.92	0.74
Boron	ug/l	2000	54	46	55	45
Barium	ug/l	-	36	31	38	31
Beryllium	ug/l	-	< 0.1	< 0.1	< 0.1	< 0.1
Cadmium	ug/l	0.08	0.02	< 0.02	< 0.02	< 0.02
Chromium	ug/l	4.7	1.4	0.8	1.2	0.7
Chromium (III)	ug/l	4.7	< 5.0	< 5.0 [Th]	< 5.0	< 5.0
Copper	ug/l	1	6.4	3.5	6.8	2.8
Mercury	ug/l	-	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	ug/l	4	0.99	0.88	0.97	0.83
Lead	ug/l	1.2	2.9	2	3	2
Selenium	ug/l	-	< 0.6	< 0.6	< 0.6	< 0.6
Vanadium	ug/l	20	0.8	0.4	0.8	0.4
Zinc	ug/l	10.9	12	5.9	11	5.6
PAHs						
Naphthalene GCMS	ug/l	2	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene GCMS	ug/l	0.1	< 0.01	< 0.01	< 0.01	< 0.01

Controlled Waters Generic Quantitative Assessment for Surface waters

3199 - Renaissance Manchester Supplamentary

Key:	
	Exceedance of the Drinking Water GAC
	Exceedance of Environmental Quality GAC
	Exceedance of both GAC
GAC - Generic Assessment Criteria	

Laboratory Report Ref.	Units	Environmental Quality GAC	221610	229313	221611	229314
Exploratory Location Ref.			Upstream	Upstream	Downstream	Downstream
Sample Date			05/06/2024	13/06/2024	05/06/2024	13/06/2024
Aquifer Unit			-	-	-	-
GAC Refs.		Environmental Quality Standards (EQS) published by the UK, EU and EA				
Fluoranthene GCMS	ug/l	0.0063	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Benzo (a) anthracene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Benzo (b) fluoranthene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Benzo (k) fluoranthene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Indeno (1,2,3-cd) pyrene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene GCMS	ug/l	-	< 0.01	< 0.01	< 0.01	< 0.01
Benzo (a) pyrene GCMS	ug/l	0.0002	< 0.01	< 0.01	< 0.01	< 0.01
Total PAH(16) GCMS	ug/l	-	< 0.16	< 0.16	< 0.16	< 0.16
TPH						
>C5-C6 Aliphatic	ug/l	20	< 1.0	< 1.0	< 1.0	< 1.0
>C6-C8 Aliphatic	ug/l	20	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aliphatic	ug/l	20	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	ug/l	20	< 10	< 10	< 10	< 10
>C12-C16 Aliphatic	ug/l	20	< 10	< 10	< 10	< 10
>C16-C21 Aliphatic	ug/l	Insoluble	< 10	< 10	< 10	< 10
>C21-C35 Aliphatic	ug/l		< 10	< 10	< 10	< 10
>C35-C40 Aliphatic	ug/l	Insoluble	< 10	< 10	< 10	< 10
Total (>C5-C35) Aliphatic	ug/l	-	< 10	< 10	< 10	< 10
Total (>C5-C40) Aliphatic	ug/l	-	< 10	< 10	< 10	< 10
>C5-C7 Aromatic	ug/l	10	< 1.0	< 1.0	< 1.0	< 1.0
>C7-C8 Aromatic	ug/l	74	< 1.0	< 1.0	< 1.0	< 1.0
>C8-C10 Aromatic	ug/l	20	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	ug/l	20	< 10	< 10	< 10	< 10
>C12-C16 Aromatic	ug/l	20	< 10	< 10	< 10	< 10
>C16-C21 Aromatic	ug/l	20	< 10	< 10	< 10	< 10
>C21-C35 Aromatic	ug/l	20	< 10	< 10	< 10	< 10
>C35-C40 Aromatic	ug/l	20	< 10	< 10	< 10	< 10
Total (>C5-C35) Aromatic	ug/l	-	< 10	< 10	< 10	< 10
Total (>C5-C40) Aromatic	ug/l	-	< 10	< 10	< 10	< 10
Total (>C5-C40) Ali/Aro	ug/l	-	< 10	< 10	< 10	< 10

Controlled Waters Generic Quantitative Assessment for Surface waters

3199 - Renaissance Manchester Supplamentary

Key:
Exceedance of the Drinking Water GAC
Exceedance of Environmental Quality GAC
Exceedance of both GAC
GAC - Generic Assessment Criteria

Laboratory Report Ref.	Units	Environmental Quality GAC	221610	229313	221611	229314
Exploratory Location Ref.			Upstream	Upstream	Downstream	Downstream
Sample Date			05/06/2024	13/06/2024	05/06/2024	13/06/2024
Aquifer Unit			-	-	-	-
GAC Refs.		Environmental Quality Standards (EQS) published by the UK, EU and EA				
BTEX and MTBE						
Benzene	ug/l	10	< 3.0	< 3.0	< 3.0	< 3.0
Toluene	ug/l	74	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	ug/l	20	< 3.0	< 3.0	< 3.0	< 3.0
Xylenes	ug/l	30	-	-	-	-
p & m-xylene	µg/l	30	< 3.0	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	30	< 3.0	< 3.0	< 3.0	< 3.0
MTBE	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
VOC						
MTBE	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Heptane	ug/l	-	-	-	-	-
Octane	ug/l	-	-	-	-	-
Nonane	ug/l	-	-	-	-	-
Benzene	ug/l	10	< 3.0	< 3.0	< 3.0	< 3.0
Toluene	ug/l	74	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	ug/l	20	< 3.0	< 3.0	< 3.0	< 3.0
m+p-xylene	ug/l	30	< 3.0	< 3.0	< 3.0	< 3.0
o-xylene	ug/l	30	< 3.0	< 3.0	< 3.0	< 3.0
cis-1,2-dichloroethene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloroethane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Chloroform	ug/l	2.5	< 3.0	< 3.0	< 3.0	< 3.0
Bromoform	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Dibromochloromethane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Bromodichloromethane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Tetrachloromethane	ug/l	12	-	-	-	-
1,1,1-Trichloroethane	ug/l	100	< 3.0	< 3.0	< 3.0	< 3.0
Trichloroethylene	ug/l	10	< 3.0	< 3.0	< 3.0	< 3.0
Tetrachloroethylene	ug/l	10	< 3.0	< 3.0	< 3.0	< 3.0
1,1,1,2-Tetrachloroethane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2,2-Tetrachloroetha	ug/l	-	-	-	-	-
Chlorobenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Bromobenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Methylethylbenzene	ug/l	-	-	-	-	-
1,1-Dichloro-1-propene	ug/l	-	-	-	-	-
Trans - 1-2 - dichloroethylene	ug/l	-	-	-	-	-
2,2-Dichloropropane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Bromochloromethane	ug/l	-	-	-	-	-

Controlled Waters Generic Quantitative Assessment for Surface waters

3199 - Renaissance Manchester Supplamentary

Key:	
	Exceedance of the Drinking Water GAC
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GAC - Generic Assessment Criteria	

Laboratory Report Ref.	Units	Environmental Quality GAC	221610	229313	221611	229314
Exploratory Location Ref.			Upstream	Upstream	Downstream	Downstream
Sample Date			05/06/2024	13/06/2024	05/06/2024	13/06/2024
Aquifer Unit			-	-	-	-
GAC Refs.		Environmental Quality Standards (EQS) published by the UK, EU and EA				
1,2-Dichloroethane	ug/l	10	< 3.0	< 3.0	< 3.0	< 3.0
Dibromomethane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dichloropropane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
cis-1,3-Dichloro-1-propene	ug/l	-	-	-	-	-
trans-1,3-Dichloro-1-propene	ug/l	-	-	-	-	-
1,1,2-Trichloroethane	ug/l	400	< 3.0	< 3.0	< 3.0	< 3.0
1,3-Dichloropropane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Dibromoethane	ug/l	-	-	-	-	-
Styrene	ug/l	50	< 3.0	< 3.0	< 3.0	< 3.0
Propylbenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
2-Chlorotoluene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,2,4-Trimethylbenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
4-Chlorotoluene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
t-butylbenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,3,5-Trimethylbenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1-methylpropylbenzene	ug/l	-	-	-	-	-
p-cymene	ug/l	-	-	-	-	-
1,3-Dichlorobenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Butylbenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dibromo-3-chloropropane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Hexachlorobutadiene	ug/l	0.6	< 3.0	< 3.0	< 3.0	< 3.0
1-2-3 - Trichlorobenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Naphthalene	ug/l	2	-	-	-	-
1-2-4 - Trichlorobenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,4-Dichlorobenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dichlorobenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Chloromethane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Chloroethane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Bromomethane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Vinyl Chloride	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Trichlorofluoromethane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloroethene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dibromoethane	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
sec-Butylbenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Isopropylbenzene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0

Controlled Waters Generic Quantitative Assessment for Surface waters

3199 - Renaissance Manchester Supplamentary

Key:	
	Exceedance of the Drinking Water GAC
	Exceedance of Environmental Quality GAC
	Exceedance of both GAC
GAC -	Generic Assessment Criteria

Laboratory Report Ref.	Units	Environmental Quality GAC	221610	229313	221611	229314
Exploratory Location Ref.			Upstream	Upstream	Downstream	Downstream
Sample Date			05/06/2024	13/06/2024	05/06/2024	13/06/2024
Aquifer Unit			-	-	-	-
GAC Refs.		Environmental Quality Standards (EQS) published by the UK, EU and EA				
p-Isopropyltoluene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Trans 1,2-dichloroethylene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloropropene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Carbontetrachloride	ug/l	12	< 3.0	< 3.0	< 3.0	< 3.0
Cis-1,3-dichloropropene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
Trans-1,3-dichloropropene	ug/l	-	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2,2-Tetrachloroethane	ug/l	140	< 3.0	< 3.0	< 3.0	< 3.0

Controlled Waters Generic Quantitative Assessment for Surface waters

3199 - Renaissance Manchester Supplamentary

Key:

- Exceedance of the Drinking Water GAC
- Exceedance of Environmental Quality GAC
- Exceedance of both GAC

GAC - Generic Assessment Criteria

Laboratory Report Ref.	Units	Environmental Quality GAC	221610	229313	221611	229314
Exploratory Location Ref.			Upstream	Upstream	Downstream	Downstream
Sample Date			05/06/2024	13/06/2024	05/06/2024	13/06/2024
Aquifer Unit			-	-	-	-
GAC Refs.		Environmental Quality Standards (EQS) published by the UK, EU and EA				
SVOC						
Phenol	ug/l	7.7	< 0.05	< 0.05	< 0.05	< 0.05
Aniline	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethyl)ether	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
2-Chlorophenol	ug/l	50	< 0.05	< 0.05	< 0.05	< 0.05
1,3-Dichlorobenzene	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Benzyl Alcohol	ug/l	-	-	-	-	-
1,2-Dichlorobenzene	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylphenol	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
3 and 4-methylphenol	ug/l	-	-	-	-	-
N-Nitrosodi-n-propylamine	ug/l	-	-	-	-	-
Hexachloroethane	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Isophorone	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
2-Nitrophenol	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dichlorophenol	ug/l	4.2	< 0.05	< 0.05	< 0.05	< 0.05
1,3,5-Trichlorobenzene	ug/l	-	-	-	-	-
3-Chloroaniline	ug/l	-	-	-	-	-
Hexachloro-1,3-butadiene	ug/l	-	-	-	-	-
4-Chloro-3-methylphenol	ug/l	40	< 0.05	< 0.05	< 0.05	< 0.05
2-Methynaphthalene	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
1-Methylnaphthalene	ug/l	-	-	-	-	-
Hexachlorocyclopentadiene	ug/l	-	-	-	-	-
2,4,6-Trichlorophenol	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
1-Chloronaphthalene	ug/l	-	-	-	-	-
2-Nitroaniline	ug/l	-	-	-	-	-
1,4-Dinitrobenzene	ug/l	-	-	-	-	-
Dimethyl phthalate	ug/l	800	41 [$+]	13	20 [$+]	37
1-3-dinitrobenzene	ug/l	-	-	-	-	-
2-6-dinitrotoluene	ug/l	-	-	-	-	-
Acenaphthylene	ug/l	-	-	-	-	-
1,2-Dinitrobenzene	ug/l	-	-	-	-	-
3-Nitroaniline	ug/l	-	-	-	-	-
Acenaphthene	ug/l	-	-	-	-	-

Controlled Waters Generic Quantitative Assessment for Surface waters

3199 - Renaissance Manchester Supplamentary

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Exploratory Location Ref.			Upstream	Upstream	Downstream	Downstream
Sample Date			05/06/2024	13/06/2024	05/06/2024	13/06/2024
Aquifer Unit			-	-	-	-
GAC Refs.		Environmental Quality Standards (EQS) published by the UK, EU and EA				
4-nitrophenol	ug/l	-	-	-	-	-
Dibenzofuran	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
2,3,5,6-Tetrachlorophenol	ug/l	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	ug/l	-	-	-	-	-
Diethyl phthalate	ug/l	200	-	-	-	-
1-chloro-4-phenoxybenzene	ug/l	-	-	-	-	-
Fluorene	ug/l	-	-	-	-	-
4-Nitroaniline	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Dinitro-o-cresol	ug/l	-	-	-	-	-
Diphenylamine	ug/l	-	-	-	-	-
Azobenzene	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
1-bromo-4-phenoxybenzene	ug/l	-	-	-	-	-
Hexachlorobenzene	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Pentachlorophenol	ug/l	0.4	-	-	-	-
Phenanthrene	ug/l	-	-	-	-	-
Anthracene	ug/l	0.1	-	-	-	-
Carbazole	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Dibutyl phthalate	ug/l	8	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	ug/l	0.0063				
Pyrene	ug/l	-				
Butyl benzyl phthalate	ug/l	7.5	< 0.05	< 0.05	< 0.05	< 0.05
Bis-2-ethylhexyladipate	ug/l	1.3	-	-	-	-
Diisooctyl phthalate	ug/l	-	-	-	-	-
Benzo(a)anthracene	ug/l	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	ug/l	-	-	-	-	-
4-Methylphenol	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
1,2,4-Trichlorobenzene	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloroaniline	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobutadiene	ug/l	0.6	< 0.05	< 0.05	< 0.05	< 0.05
2-Chloronaphthalene	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dinitrotoluene	ug/l	-	-	-	-	-
3&4-Methylphenol	ug/l	-	<0.1	<0.1	<0.1	<0.1
Anthraquinone	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Bromophenyl phenyl ether	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
2,6-Dinitrotoluene	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dinitrotoluene	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05
Dimethylphthalate	ug/l	800	< 0.05	< 0.05	< 0.05	< 0.05
4-Chlorophenyl phenyl ether	ug/l	-	< 0.05	< 0.05	< 0.05	< 0.05

Controlled Waters Generic Quantitative Assessment for Surface waters

3199 - Renaissance Manchester Supplamentary

Key:	
	Exceedance of the Drinking Water GAC
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Exploratory Location Ref.			Upstream	Upstream	Downstream	Downstream
Sample Date			05/06/2024	13/06/2024	05/06/2024	13/06/2024
Aquifer Unit			-	-	-	-
GAC Refs.		Environmental Quality Standards (EQS) published by the UK, EU and EA				
Phenolics						
Total Phenol	ug/l	7.7	< 3.5	< 3.5	< 3.5	< 3.5
M,P-Cresol	ug/l	-	-	-	-	-
O-Cresol	ug/l	-	-	-	-	-
3,4-Dimethylphenol	ug/l	-	-	-	-	-
2,3-Dimethylphenol	ug/l	-	-	-	-	-
2,3,5-trimethylphenol	ug/l	-	-	-	-	-
Total Monohydric Phenols	ug/l	7.7	-	-	-	-
Catechol	ug/l	-	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	ug/l	-	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	ug/l	-	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	ug/l	-	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	ug/l	-	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	ug/l	-	< 0.5	< 0.5	< 0.5	< 0.5
Total Xylenols & Ethylphenols	ug/l	-	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol (2,3,5-)	ug/l	-	< 0.5	< 0.5	< 0.5	< 0.5

Appendix E: Risk Assessment Matrix

A-squared Studio Engineers Ltd. qualitative risk assessment for geo-environmental purposes is undertaken in accordance with *CIRIA C552: Contaminated Land Risk Assessment, A Guide to Good Practice (Rudland et al., 2001)*. The CIRIA C552 risk categories and the assessment methodology are summarised below in Table E.1, Table E.2 and Table E.3. Potential magnitude and potential likelihood are both classified to enable a risk rating to be assessed.

Potential magnitude takes into account the potential consequences should a complete source–pathway–receptor linkage be present. Potential magnitude is classified as per Table E.1.

Table E.1 Definition of potential magnitude of consequence

Category	Definition
Severe	Acute risks to human health, catastrophic damage to buildings / property, major pollution to controlled waters.
Medium	Chronic risk to human health, pollution of sensitive controlled waters, significant effects on sensitive ecosystems or species, significant damage to buildings or structures.
Mild	Pollution of non-sensitive waters, minor damage to buildings or structures.
Minor	Damage to non-sensitive ecosystems or species.

Potential likelihood takes into account the presence of the hazard and receptor as well as the integrity of the pathway for exposure, i.e., whether a source-pathway-receptor linkage is present or not. Potential likelihood is classified as per Table E.2.

Table E.2 Definition of potential likelihood of exposure

Category	Definition
High Likelihood	Pollutant linkage may be present and is almost certain to occur in the long-term. Or there is evidence of harm to the receptor.
Likely	Pollutant linkage may be present, and it is probable that it will occur over the long-term.
Low Likelihood	Pollutant linkage may be present, and there is a possibility that it will occur, although there is no certainty that it will do so.
Unlikely	Pollutant linkage may be present, but it is improbable that it will occur.

The potential magnitude of consequence and the potential likelihood of exposure are assessed in accordance with the risk matrix presented in Table E.3.

Table E.3 Geo-environmental risk assessment matrix

		Potential Magnitude of Consequence			
		Severe	Medium	Mild	Minor
Potential Likelihood of Exposure	High Likelihood	Very High	High	Moderate	Low to Moderate
	Likely	High	Moderate	Low to Moderate	Low
	Low Likelihood	Moderate	Low to Moderate	Low	Very Low
	Unlikely	Low to Moderate	Low	Very Low	Very Low

Appendix F: Proposed Floor Plans (Residential Area Lower Levels)

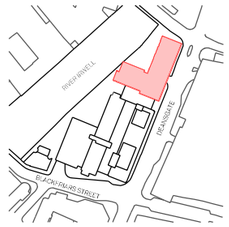
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All Contractors must visit the site and are responsible for carrying out checking all information relative to their work and Jon Matthews Architects are not to be accepted for any variation between drawings and site conditions.

Electronic data / drawings issued as "read only" are for information purposes only and are not to be interrogated for measurement. All dimensions and levels should be taken only from those recorded on hard copy / paper working drawings.

⚠ CONSTRUCT ON ▸ I am considered at this proposed work stage NOT the issue of a competent Contractor or the use of such unusual materials have been used/fitted, refer to 'Stage 4 Key Sensitive Design Risk Assessment'

Key Plan:



Site Location
Site Boundary

GENERAL NOTES:

To be printed and read in colour.

To be read in conjunction with Consultant's Reports & Specification information:
- Structure
- MEP
- Fire Engineering
- Façade Engineer
- Landscape Architect

To be read in conjunction with JMA information:
- 02 Series_GA Plan Drawings
- 03 Series_RCP Drawings
- 04 Series_GA Elevation Drawings
- 05 Series_GA Section Drawings
- 07 Series_Stairs
- 08 Series_Section Details
- 09 Series_Plan Details
- 10 Series_Bay Study Drawings
- 11 Series_Wet Areas
- 13 Series_Door Schedule & Elevations
- 18 Series_Internal Finishes Drawings

All design information and dimensions shown to be verified with accurate site surveys following demolition.

Do not use these drawings for fabrication. An allowance for possible survey discrepancies must be accounted for and all fabrication must only be done following specific measured surveys.

Positions of RWP outlets TBC

All Finishes to front of house areas subject to interior design concept currently under development.

HEALTH AND SAFETY KEY:

Drawings are to be read in conjunction with the Designers Risk Assessment.

For all other consultant identified residula risks/hazards, refer to individula consultant information

PLAN KEY

AP	Access Panel
AH	Access Hatch
AOV	Automatic Opening Vent
SVP	Soil Vent Pipe
RWP	Rainwater Pipe
SS	Stub Stack
RWO	Rainwater Outlet
VP	Vent Pipe
WR	Wet Riser

Rev.	Date:	Details:
E	11.02.22	Stage 2 Tender Issue
D	29.10.21	Stage 2 Tender Issue
C	28.07.21	Stage 1 Tender Issue
B	09.07.21	Issued for Coordination
A	02.07.21	Issued for Coordination
-	25.06.21	Issued for Coordination

Jon Matthews Architects
4th Floor, Centurion House, 129 Deansgate, Manchester, M3 3WR

Project:
Renaissance Site, Deansgate
Manchester

Title:
Proposed Level -02
General Arrangement Plan

Scale:	Origin Date:	Drawn:	Checked:
1:100@A1	June 21	FM	JC

Status:
Work Stage 4 - Design for Stage 2 Tender

Project:	Drawing No:	Rev:
150	B2_02_2298	E

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All Contractors must verify all the relevant dimensions on site before commencing any work or shop drawings and any discrepancy is to be notified to the Architect immediately. Figured dimensions are to be taken in preference to scaled dimensions. Any discrepancies between the drawings and specification are to be notified to the Architect immediately.

Electronic data / drawings issued as "read only" or hard copies are not to be interrogated for measurements. All dimensions and levels should be read only from those issued as part of the hard copy drawings.

CONSTRUCT CDM • Is considered at the proposed design stage and if the scope of a competent Contractor is not as such or unusual hazards have been identified, refer to 'Designers Risk Schedule' / Designers Risk Assessment

Key Plan:



Site Location
Site Boundary

GENERAL NOTES:

To be printed and read in colour.

To be read in conjunction with Consultant's Reports & Specification information:
- Structure
- MEP
- Fire Engineering
- Façade Engineer
- Landscape Architect

To be read in conjunction with JMA information:
- 02 Series_GA Plan Drawings
- 03 Series_RCP Drawings
- 04 Series_GA Elevation Drawings
- 05 Series_GA Section Drawings
- 07 Series_Stairs
- 08 Series_Section Details
- 09 Series_Plan Details
- 10 Series_Bay Study Drawings
- 11 Series_Wet Areas
- 13 Series_Door Schedule & Elevations
- 16 Series_Internal Finishes Drawings

All design information and dimensions shown to be verified with accurate site surveys following demolition.

Do not use these drawings for fabrication. An allowance for possible survey discrepancies must be accounted for and all fabrication must only be done following specific measured surveys.

Positions of RWP outlets TBC

All finishes to front of house areas subject to interior design concept currently under development.

HEALTH AND SAFETY KEY:

Drawings are to be read in conjunction with the Designers Risk Assessment.

For all other consultant identified residula risks/hazards, refer to individula consultant information

PLAN KEY

AP	Access Panel
AH	Access Hatch
AOV	Automatic Opening Vent
SVP	Soil Vent Pipe
RWP	Rainwater Pipe
SS	Stub Stack
RWO	Rainwater Outlet
VP	Vent Pipe
WR	Wet Riser

Rev.	Date:	Details:
E	11.02.22	Stage 2 Tender Issue
D	29.10.21	Stage 2 Tender Issue
C	28.07.21	Stage 1 Tender Issue
B	09.07.21	Issued for Coordination
A	02.07.21	Issued for Coordination
-	25.06.21	Issued for Coordination

Jon Matthews Architects
4th Floor, Centurion House, 129 Deansgate, Manchester, M3 3WR

Project:
Renaissance Site, Deansgate
Manchester

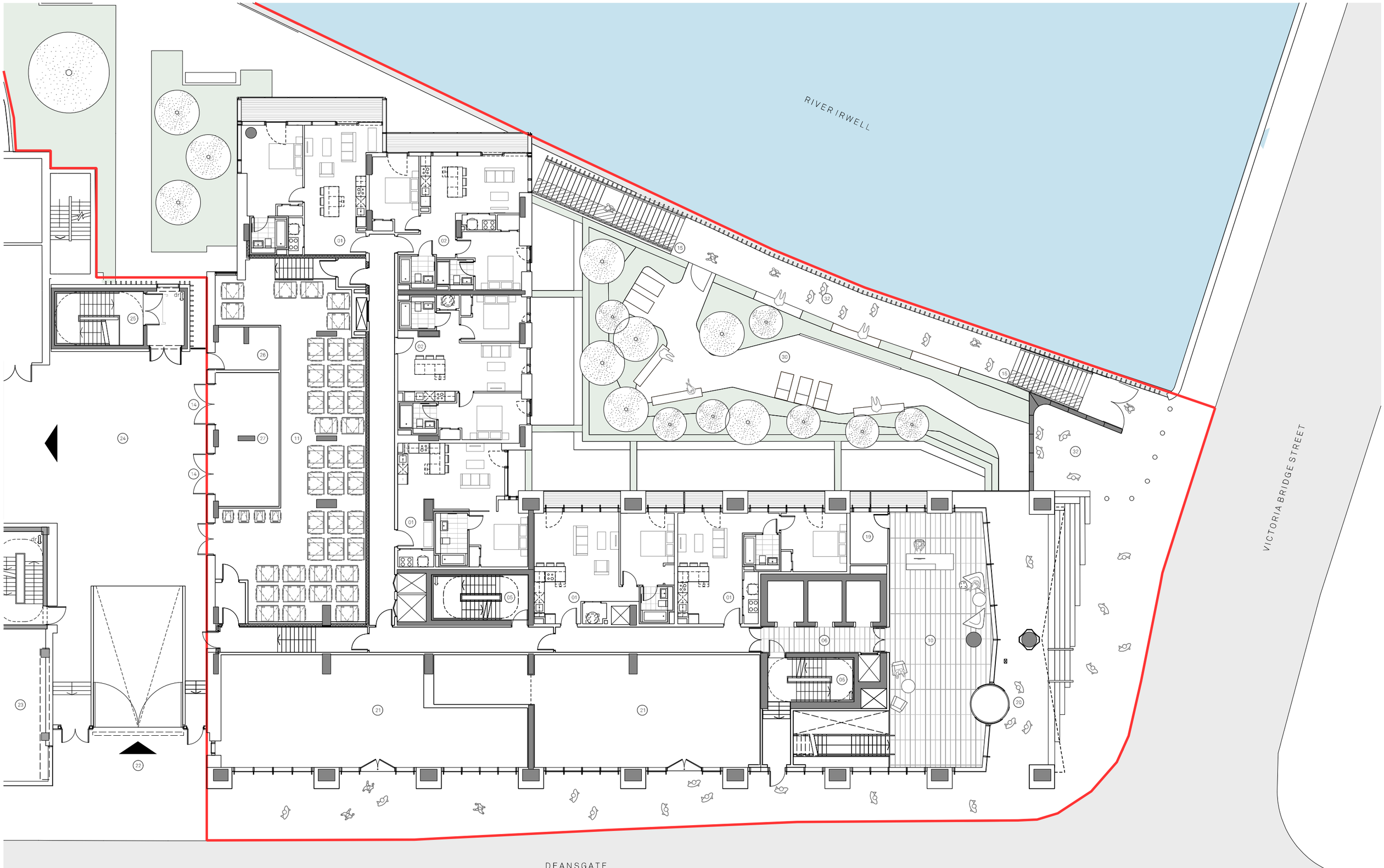
Title:
Proposed Level -01
General Arrangement Plan

Scale:	Origin Date:	Drawn:	Checked:
1:100@A1	June 21	FM	JC

Work Stage 4 • Design for Stage 2 Tender

Project:	Drawing No:	Rev:
150	BZ_07_2299	E

LEVEL -01



Notes:

Site Application Boundary

PLAN KEY:

01 One Bedroom
02 Two Bedroom
03 Three Bedroom
04 Riverside Access
05 Fire Escape Stair
06 Lift Lobby
07 Storage Tanks
08 Cycle Store
09 Cinema Room
10 Reception
11 Refuse Store
12 Gym
13 Yoga Studio
14 Substation Entrance
15 Accessible Stair Lift
16 Secondary Access
17 Roof Garden
18 Comms Room
19 Parcel Store
20 Main Entrance
21 Retail Unit
22 Service Yard Entrance
23 Premier House
24 Service Yard
25 Carpark Escape Stair
26 Switch Room
27 Substation
28 Cleaners Storage
29 Staff Welfare
30 Resident's Riverside Garden
31 Postal Lounge
32 Public Walkway/ Viewing Deck
33 Private Terrace
34 Communal Roof Terrace
35 Residential Car Park
36 Garden store

Project Name: Renaissance
Title: Block 2 Residential Building Proposed Ground Floor GA Plan
Scale: 1:100 @A1
Drawn: FM
Checked: JC
Status: Planning
Project: 150
Drawing No: B2_02_2200
Rev: -
Details: 22.10.21 Issued for Planning

Jon Matthews Architects
4th Floor, Centurion House, 129 Deansgate, Manchester, M3 3WR 0161 974 3680

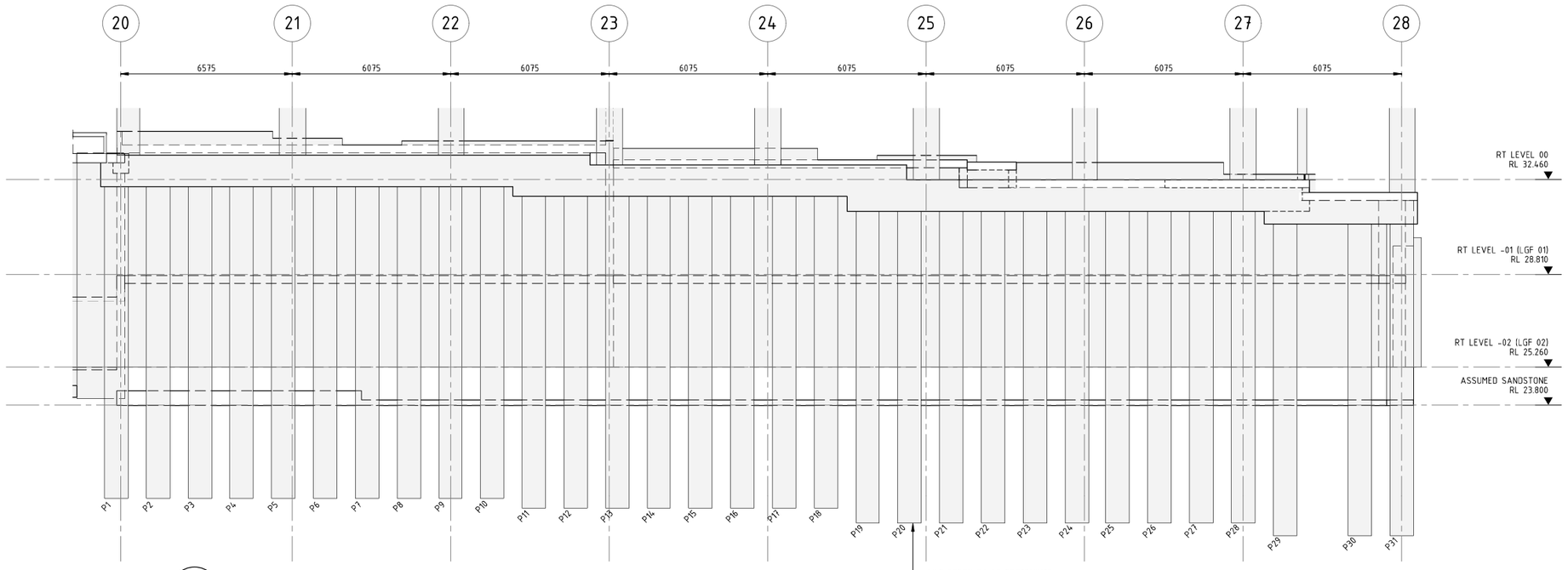
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Appendix G: INTENTIONALLY LEFT BLANK

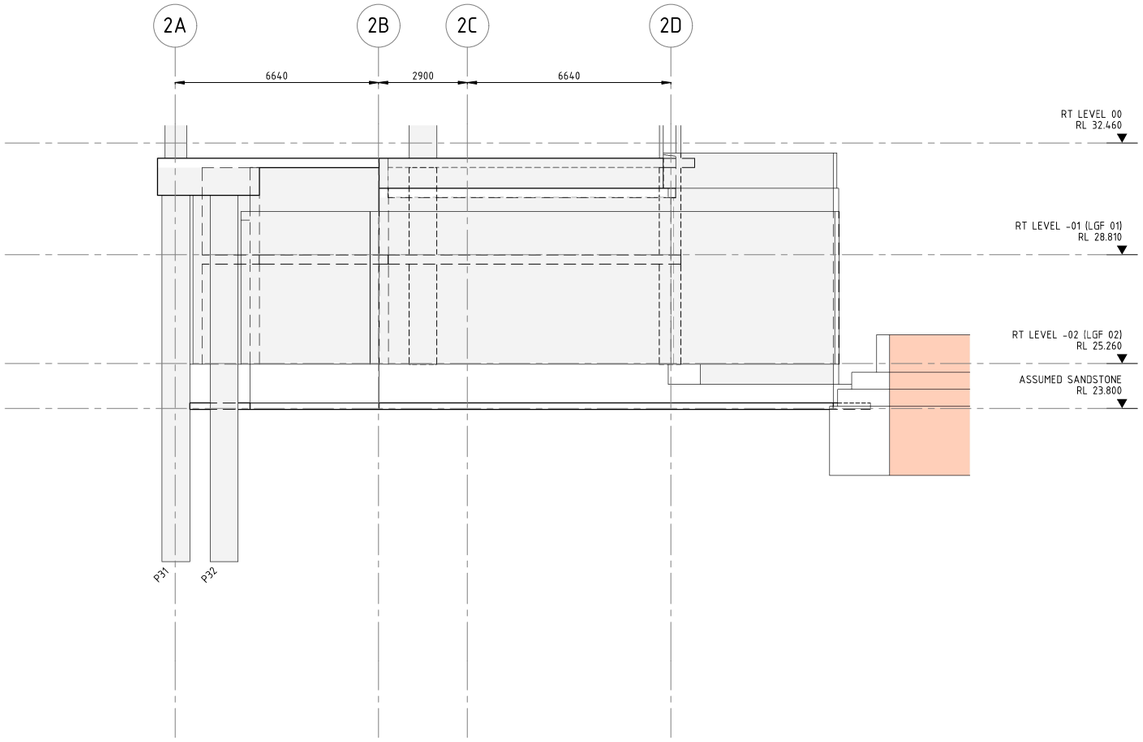
Appendix H: Proposed Pile Wall Drawings

NOTES:

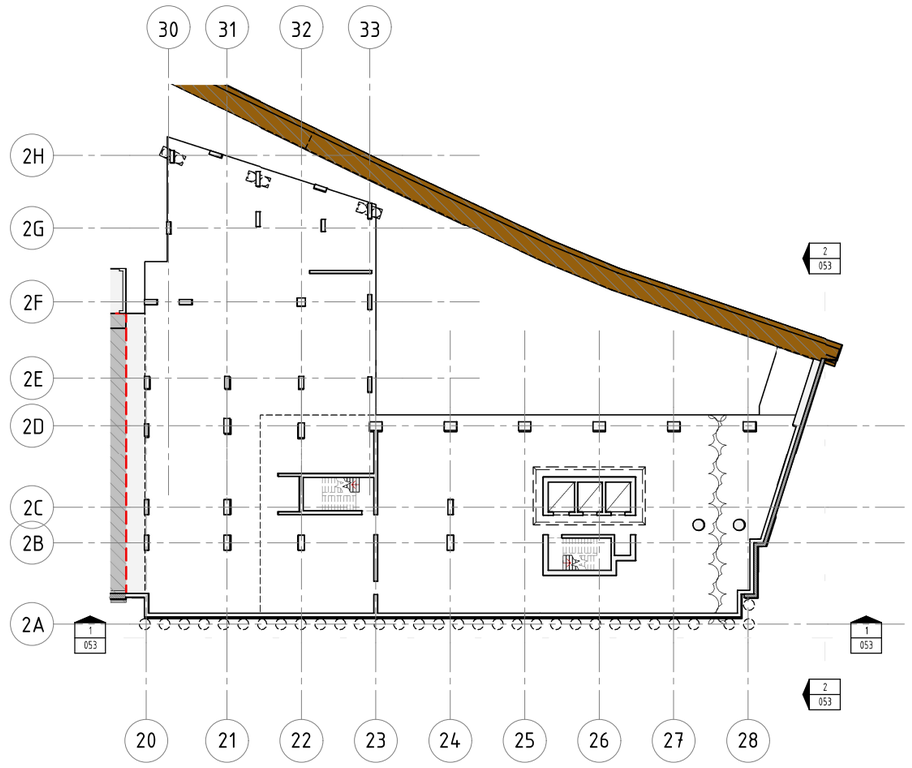
1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH OTHER STRUCTURAL DRAWINGS.
2. FOR INDEX SHEET OF STRUCTURAL DRAWINGS REFER TO DRAWING REN-BGE-S-GEN-002.
3. FOR GENERAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO 012
4. FOR STANDARD DETAILS REFER TO DRAWINGS REN-BGE-S-016 TO 025.
5. REFER TO PILING NOTE DRAWING REN-BGE-S-RT-050.
6. REFER TO PILING SCHEDULE DRAWING REN-BGE-S-RT-051.



SECTION 1
SCALE 1 : 100 053



SECTION 2
SCALE 1 : 100 053



REV	DATE	DESCRIPTION	RVD
P02	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW
P01	14.10.2021	RIBA STAGE 4 - ISSUED FOR PLANNING	JW
P00	5.10.2021	RIBA STAGE 4 - ISSUED FOR PLANNING	JW

REVISIONS

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PROJECT
RENAISSANCE
STRUCTURAL
RESIDENTIAL TOWER

STATUS
ISSUED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

DATUM	GRID	SCALE
		As indicated AT A1 SIZE

TITLE
PILING ELEVATION

PROJECT No	DRAWING No	REV
L20081	REN-BGE-S-RT-053	P02

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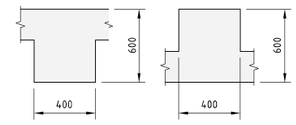
1. FOR GENERAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO 012.
2. FOR STANDARD DETAILS REFER TO DRAWINGS REN-BGE-S-GEN-016 TO 025.
3. COLUMNS ARE SETOUT AGAINST THEIR CENTROID RELATIVE TO THE GRID. WHERE NO DIMENSION IS GIVEN THE COLUMN CENTROID IS ON THE GRIDLINE.
4. REFER TO ARCHITECTURAL DRAWINGS FOR NON-STRUCTURAL MASONRY WALL POSITIONS.
5. ALL CORE SLABS AND STAIR LANDINGS TO BE 200 RC U.N.O.
6. BALCONIES ARE SHOWN INDICATIVELY ONLY, REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS. STEEL BALCONIES ARE CONTRACTOR DESIGNED.

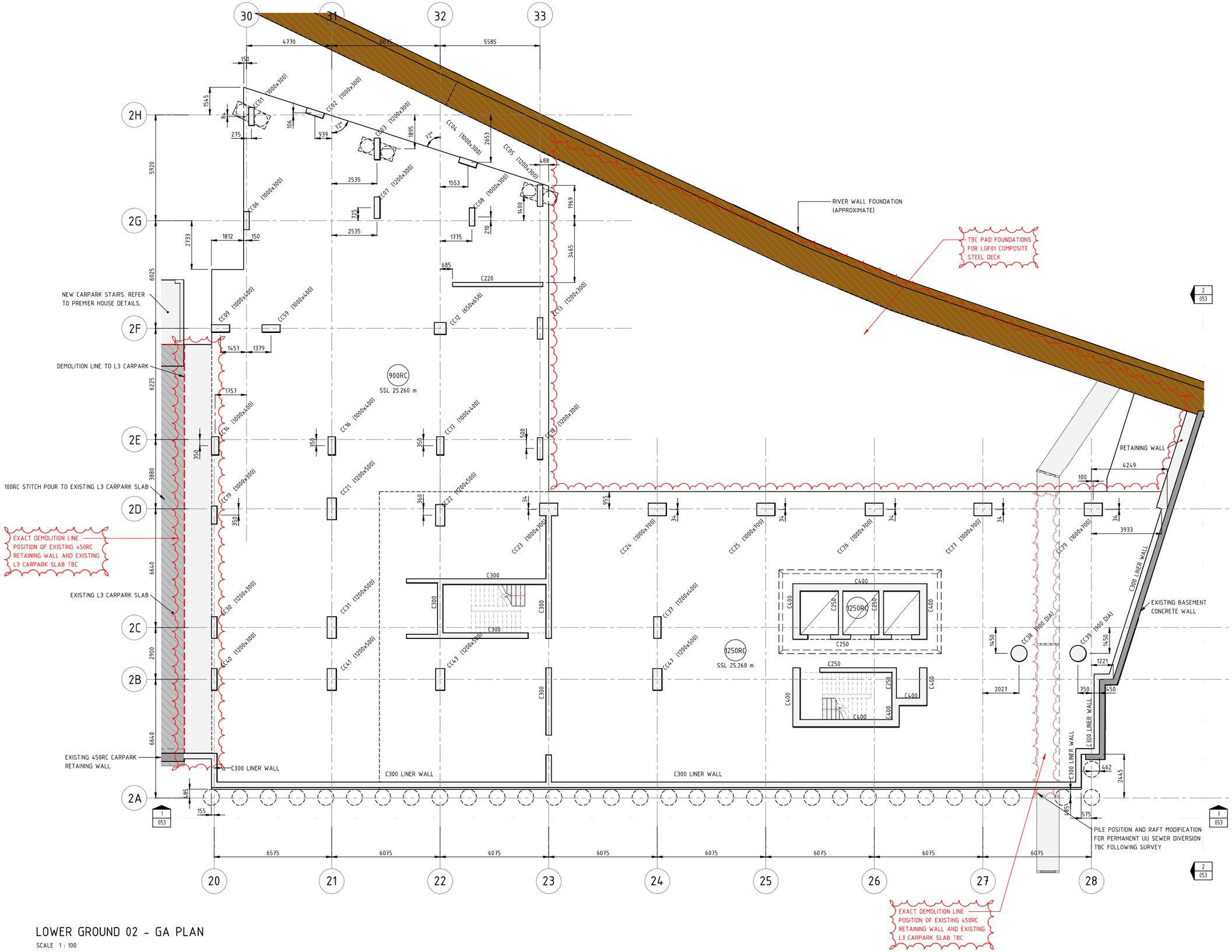
LEGEND:

- 200PT — 200mm THICK POST TENSION SLAB
- 200RC — 200mm THICK REINFORCED CONCRETE SLAB
- LOADBEARING WALL/COLUMN OVER
- LOADBEARING WALL/COLUMN UNDER
- 50 — 50mm STEP IN SLAB - REFER TO ARCH DRAWINGS FOR ALL LEVELS & FALLS IN SLAB
- CJ — CONSTRUCTION JOINT
- DEMOLITION LINE
- PENETRATION
- SLEEVE ZONE
- EMBEDDED DAVIT ARM CRANE CONNECTION POSITION
- BOLT-ON BALCONY

BEAM NOTATION:

BEAM SIZES ARE GIVEN DEPTH x WIDTH (EG 600 x 400)





LOWER GROUND 02 - GA PLAN

SCALE 1 : 100

REV.	DATE	DESCRIPTION	RVD
P04	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW
P03	19.10.2021	RIBA STAGE 3 – ISSUED FOR COORDINATION	JW
P02	14.10.2021	RIBA STAGE 3 – ISSUED FOR PILING INFORMATION	JW
P01	28.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT
P00	23.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT

REVISIONS

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bgeeng.com —

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PROJECT
RENAISSANCE
STRUCTURAL
RESIDENTIAL TOWER

STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

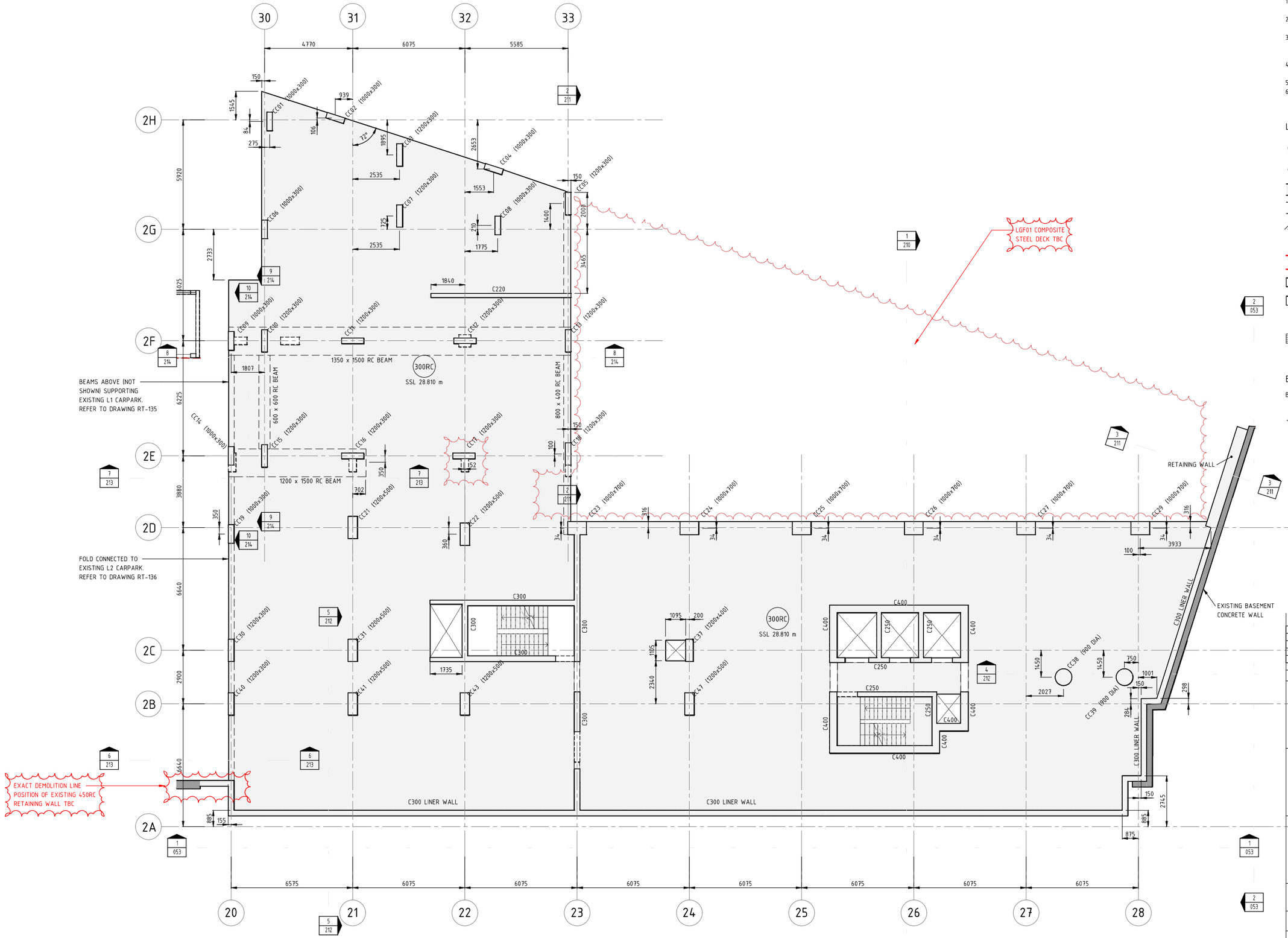
DATUM	GRID	SCALE
		As indicated AT A1 SIZE

TITLE
GENERAL ARRANGEMENT - LOWER GROUND FLOOR 02

PROJECT No	DRAWING No	REV.
L20081	REN-BGE-S-RT-098	P04

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NOTES:

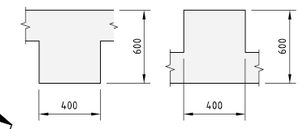
1. FOR GENERAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO 012.
2. FOR STANDARD DETAILS REFER TO DRAWINGS REN-BGE-S-GEN-016 TO 025.
3. COLUMNS ARE SETOUT AGAINST THEIR CENTROID RELATIVE TO THE GRID. WHERE NO DIMENSION IS GIVEN THE COLUMN CENTROID IS ON THE GRIDLINE.
4. REFER TO ARCHITECTURAL DRAWINGS FOR NON-STRUCTURAL MASONRY WALL POSITIONS.
5. ALL CORE SLABS AND STAIR LANDINGS TO BE 200 RC U.N.O.
6. BALCONIES ARE SHOWN INDICATIVELY ONLY, REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS. STEEL BALCONIES ARE CONTRACTOR DESIGNED.

LEGEND:

- 200PT — 200mm THICK POST TENSION SLAB
- 200RC — 200mm THICK REINFORCED CONCRETE SLAB
- LOADBEARING WALL/COLUMN OVER
- LOADBEARING WALL/COLUMN UNDER
- 50 — 50mm STEP IN SLAB - REFER TO ARCH DRAWINGS FOR ALL LEVELS & FALLS IN SLAB
- CJ — CONSTRUCTION JOINT
- DEMOLITION LINE
- PENETRATION
- SLEEVE ZONE
- EMBEDDED DAVIT ARM CRANE CONNECTION POSITION
- BOLT-ON BALCONY

BEAM NOTATION:

BEAM SIZES ARE GIVEN DEPTH x WIDTH (EG 600 x 400)



LOWER GROUND 01 - GA PLAN

SCALE 1 : 100

REV.	DATE	DESCRIPTION	RVD
P04	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW
P03	19.10.2021	RIBA STAGE 3 - ISSUED FOR COORDINATION	JW
P02	14.10.2021	RIBA STAGE 3 - ISSUED FOR PILING INFORMATION	JW
P01	28.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT
P00	23.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT

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PROJECT
RENAISSANCE
STRUCTURAL
RESIDENTIAL TOWER

STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

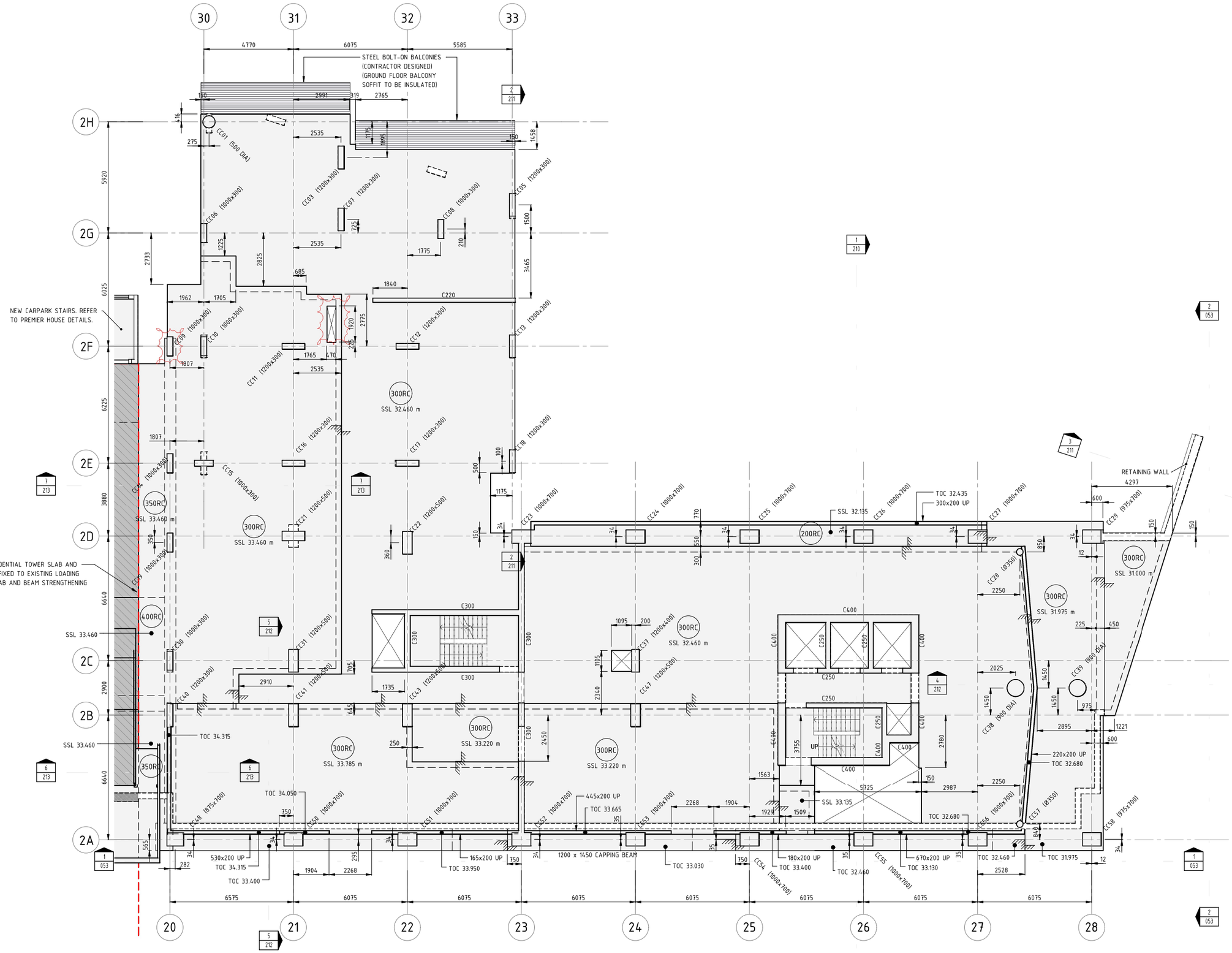
DATUM	GRID	SCALE	
		As indicated	AT A1 SIZE

TITLE
GENERAL ARRANGEMENT - LOWER GROUND FLOOR 01

PROJECT No.	DRAWING No.	REV.
L20081	REN-BGE-S-RT-099	P04

L20081_MOD_S_R22
5/11/2021 11:11:02 AM

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LEVEL 00 (GROUND FLOOR) - GA PLAN

SCALE 1 : 100

NOTES:

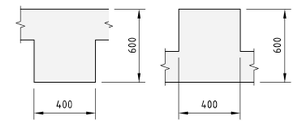
1. FOR GENERAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO 012.
2. FOR STANDARD DETAILS REFER TO DRAWINGS REN-BGE-S-GEN-016 TO 025.
3. COLUMNS ARE SETOUT AGAINST THEIR CENTROID RELATIVE TO THE GRID. WHERE NO DIMENSION IS GIVEN THE COLUMN CENTROID IS ON THE GRIDLINE.
4. REFER TO ARCHITECTURAL DRAWINGS FOR NON-STRUCTURAL MASONRY WALL POSITIONS.
5. ALL CORE SLABS AND STAIR LANDINGS TO BE 200 RC U.N.O.
6. BALCONIES ARE SHOWN INDICATIVELY ONLY, REFER TO ARCHITECTURAL DRAWINGS FOR DETAILS. STEEL BALCONIES ARE CONTRACTOR DESIGNED.

LEGEND:

- 200PT — 200mm THICK POST TENSION SLAB
- 200RC — 200mm THICK REINFORCED CONCRETE SLAB
- LOADBEARING WALL/COLUMN OVER
- LOADBEARING WALL/COLUMN UNDER
- 50 — 50mm STEP IN SLAB - REFER TO ARCH DRAWINGS FOR ALL LEVELS & FALLS IN SLAB
- CJ — CONSTRUCTION JOINT
- DEMOLITION LINE
- PENETRATION
- SLEEVE ZONE
- EMBEDDED DAVIT ARM CRANE CONNECTION POSITION
- BOLT-ON BALCONY

BEAM NOTATION:

BEAM SIZES ARE GIVEN DEPTH x WIDTH (EG 600 x 400)



REV.	DATE	DESCRIPTION	RVD
P04	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW
P03	19.10.2021	RIBA STAGE 3 - ISSUED FOR COORDINATION	JW
P02	14.10.2021	RIBA STAGE 3 - ISSUED FOR PILING INFORMATION	JW
P01	28.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT
P00	23.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT

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PROJECT

RENAISSANCE

STRUCTURAL

RESIDENTIAL TOWER

STATUS

ISSUED FOR INFORMATION

NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

DATUM	GRID	SCALE
		As indicated at A1 SIZE

TITLE

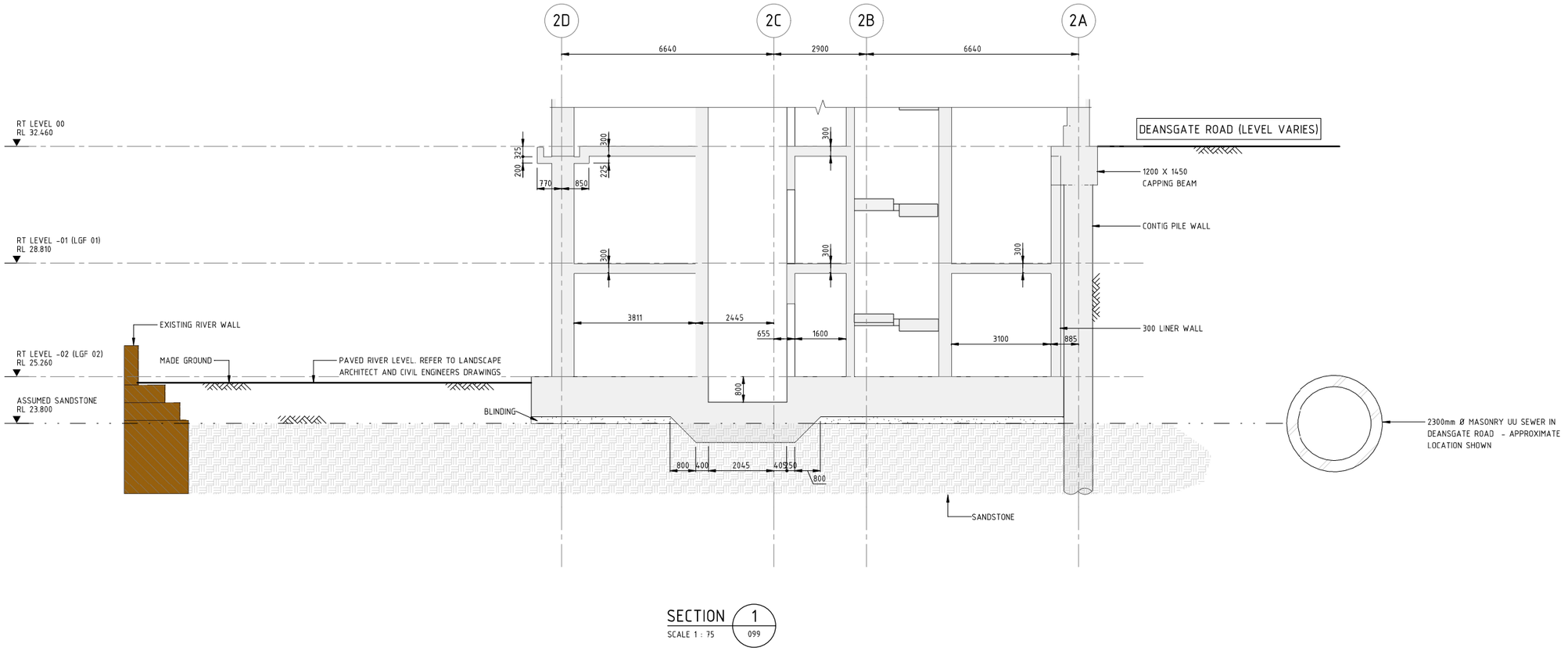
GENERAL ARRANGEMENT - LEVEL 00

PROJECT No.	DRAWING No.	REV.
L20081	REN-BGE-S-RT-100	P04

L20081_MOD_S_R22

5/11/2021 11:17:04 AM

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SECTION 1
SCALE 1 : 75
099

NOTES:

1. FOR STRUCTURAL DRAWING INDEX REFER TO DRAWING REN-BGE-S-GEN-002 TO REN-BGE-S-GEN-004.
2. FOR STANDARD STRUCTURAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO REN-BGE-S-GEN-012.
3. FOR STANDARD STRUCTURAL DETAILS REFER TO DRAWINGS REN-BGE-S-GEN-016 TO REN-BGE-S-GEN-025.
4. APPROXIMATE SANDSTONE LEVEL SHOWN BASED ON SOIL INVESTIGATION BOREHOLES. LEVEL WILL VARY.
5. FOUNDATIONS TO BE EXCAVATED TO SOUND SANDSTONE AND INSPECTED BY GEOTECHNICAL ENGINEER PRIOR TO BACKFILLING WITH BLINDING CONCRETE
6. FOR LOCATION OF WATERPROOF CONCRETE AND WATERPROOF MEMBRANES REFER TO THE PERFORMANCE SPECIFICATION AND THE WATERPROOFING SPECIALIST DESIGN DRAWINGS

KEY:

- EXISTING STRUCTURE
- PROPOSED STRUCTURE
- EXISTING MASONRY
- PROPOSED MASONRY
- STRUCTURE TO BE DEMOLISHED
- VOIDFORMER - FILCOR45
- VOIDFORMER - FILCOR70
- DEMOLITION LINE
- EXISTING EXPANSION JOINT
- MATCH LINE FOR RESIDENTIAL TOWER
- HOTEL STRUCTURE

REV.	DATE	DESCRIPTION	RVD
P01	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW
P00	28.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT

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bgeeng.com —
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PROJECT
RENAISSANCE
STRUCTURAL
RESIDENTIAL TOWER

STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

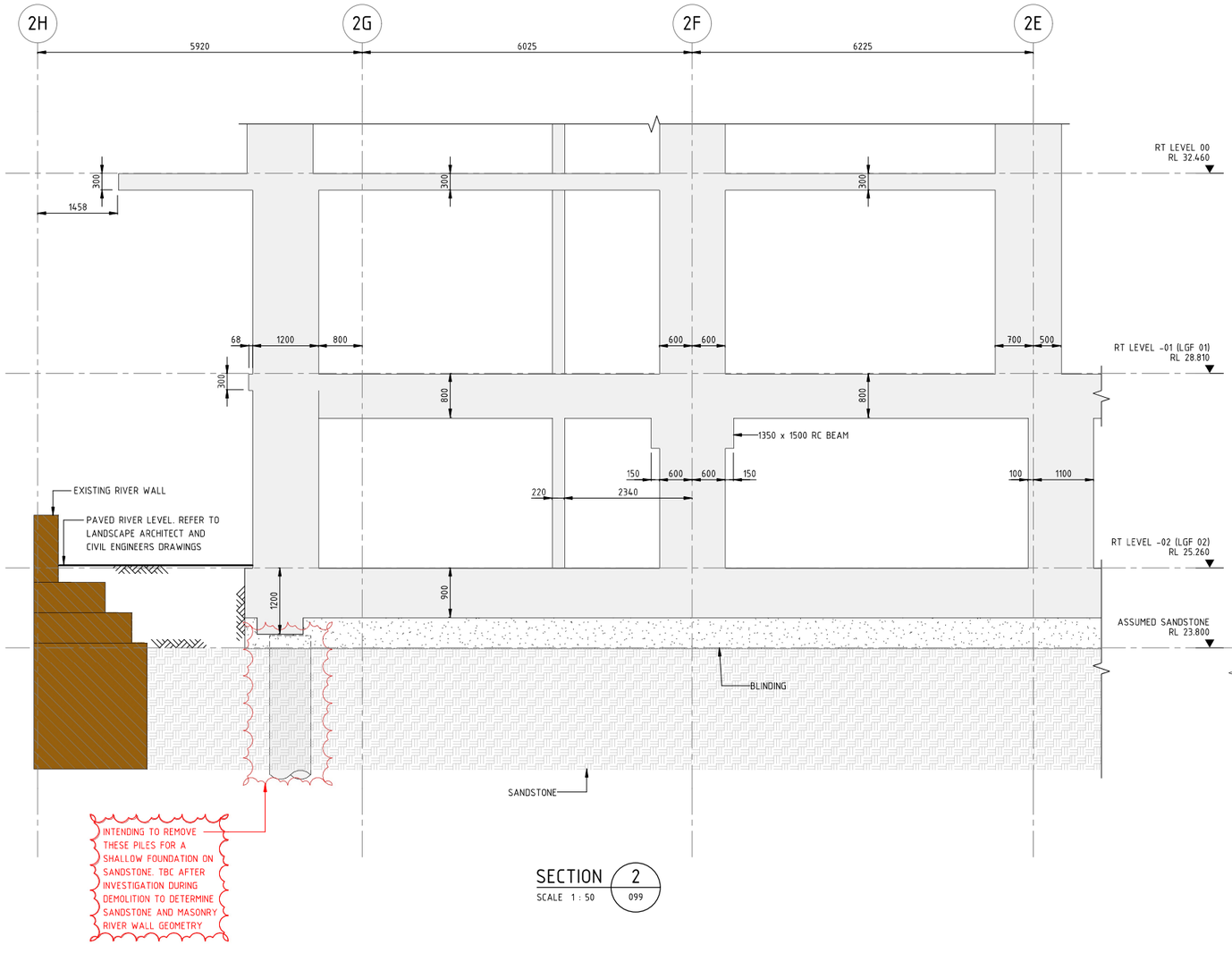
DATUM	GRID	SCALE
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TITLE
BASEMENT SECTIONS - SHEET 1

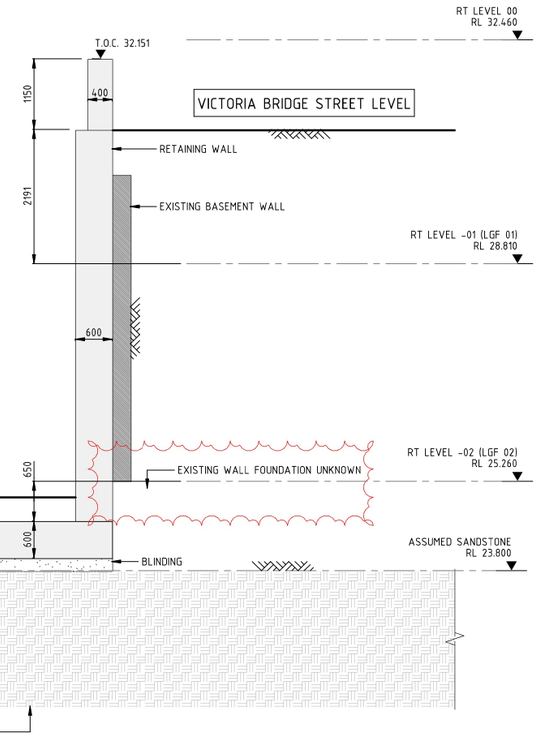
PROJECT No	DRAWING No	REV.
L20081	REN-BGE-S-RT-210	P01

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SECTION 2
SCALE 1 : 50
099



SECTION 3
SCALE 1 : 50
099

NOTES:

1. FOR STRUCTURAL DRAWING INDEX REFER TO DRAWING REN-BGE-S-GEN-002 TO REN-BGE-S-GEN-004.
2. FOR STANDARD STRUCTURAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO REN-BGE-S-GEN-012.
3. FOR STANDARD STRUCTURAL DETAILS REFER TO DRAWINGS REN-BGE-S-GEN-016 TO REN-BGE-S-GEN-025.
4. APPROXIMATE SANDSTONE LEVEL SHOWN BASED ON SOIL INVESTIGATION BOREHOLES. LEVEL WILL VARY.
5. FOUNDATIONS TO BE EXCAVATED TO SOUND SANDSTONE AND INSPECTED BY GEOTECHNICAL ENGINEER PRIOR TO BACKFILLING WITH BLINDING CONCRETE
6. FOR LOCATION OF WATERPROOF CONCRETE AND WATERPROOF MEMBRANES REFER TO THE PERFORMANCE SPECIFICATION AND THE WATERPROOFING SPECIALIST DESIGN DRAWINGS

KEY:

- EXISTING STRUCTURE
- PROPOSED STRUCTURE
- EXISTING MASONRY
- PROPOSED MASONRY
- STRUCTURE TO BE DEMOLISHED
- VOIDFORMER - FILCOR45
- VOIDFORMER - FILCOR70
- DEMOLITION LINE
- EXISTING EXPANSION JOINT
- MATCH LINE FOR RESIDENTIAL TOWER
- HOTEL STRUCTURE

REV	DATE	DESCRIPTION	
P01	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW
P00	28.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT

REVISIONS

CLIENT
PROPERTY ALLIANCE GROUP LTD
ALLIANCE

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bgeeng.com —
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PROJECT
RENAISSANCE
STRUCTURAL
RESIDENTIAL TOWER

STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

DATUM	GRID	SCALE
		As indicated AT A1 SIZE

TITLE
BASEMENT SECTIONS - SHEET 2

PROJECT No.	DRAWING No.	REV.
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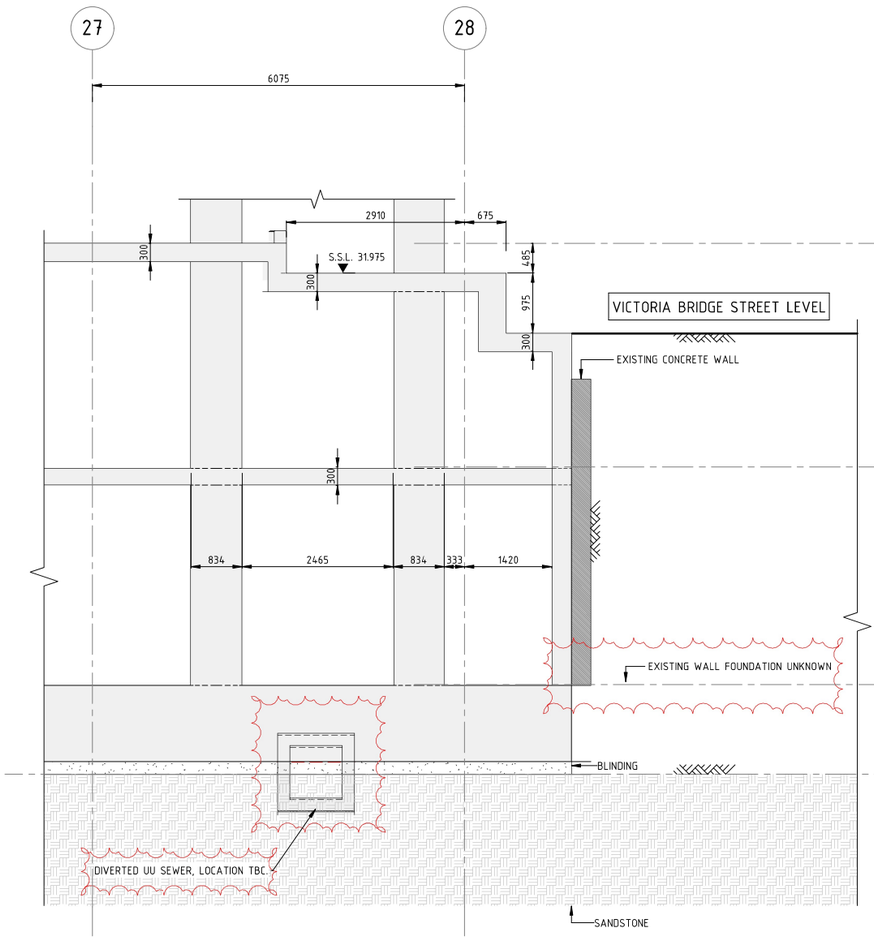
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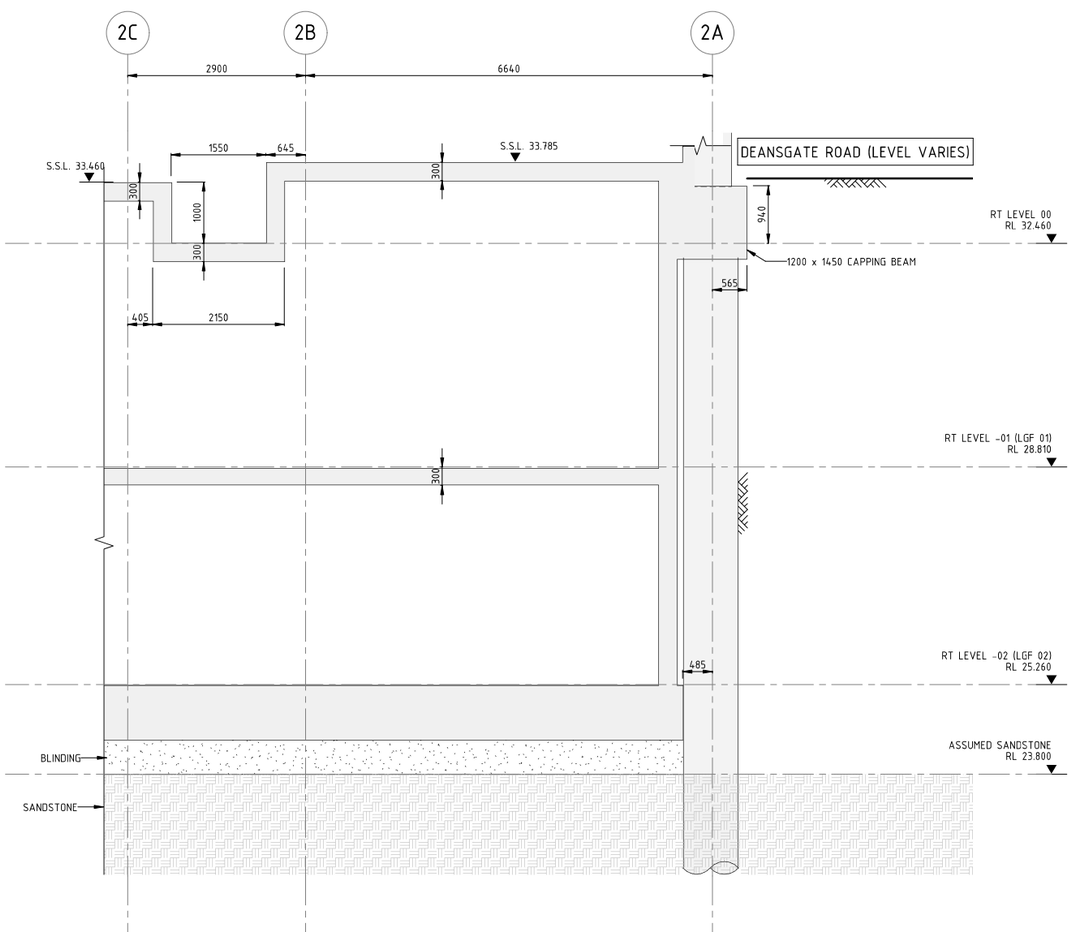
1. FOR STRUCTURAL DRAWING INDEX REFER TO DRAWING REN-BGE-S-GEN-002 TO REN-BGE-S-GEN-004.
2. FOR STANDARD STRUCTURAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO REN-BGE-S-GEN-012.
3. FOR STANDARD STRUCTURAL DETAILS REFER TO DRAWINGS REN-BGE-S-GEN-016 TO REN-BGE-S-GEN-025.
4. APPROXIMATE SANDSTONE LEVEL SHOWN BASED ON SOIL INVESTIGATION BOREHOLES. LEVEL WILL VARY.
5. FOUNDATIONS TO BE EXCAVATED TO SOUND SANDSTONE AND INSPECTED BY GEOTECHNICAL ENGINEER PRIOR TO BACKFILLING WITH BLINDING CONCRETE
6. FOR LOCATION OF WATERPROOF CONCRETE AND WATERPROOF MEMBRANES REFER TO THE PERFORMANCE SPECIFICATION AND THE WATERPROOFING SPECIALIST DESIGN DRAWINGS

KEY:

- EXISTING STRUCTURE
- PROPOSED STRUCTURE
- EXISTING MASONRY
- PROPOSED MASONRY
- STRUCTURE TO BE DEMOLISHED
- VOIDFORMER - FILCOR45
- VOIDFORMER - FILCOR70
- DEMOLITION LINE
- EXISTING EXPANSION JOINT
- MATCH LINE FOR RESIDENTIAL TOWER
- HOTEL STRUCTURE



SECTION 4
SCALE 1 : 50 099



SECTION 5
SCALE 1 : 50 099

REV	DATE	DESCRIPTION	RVD
P01	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW
P00	28.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT

REVISIONS

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bgeeng.com —

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PROJECT
RENAISSANCE
STRUCTURAL
RESIDENTIAL TOWER

STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

DATUM	GRID	SCALE
		As indicated AT A1 SIZE

TITLE
BASEMENT SECTIONS - SHEET 3

PROJECT No	DRAWING No	REV.
L20081	REN-BGE-S-RT-212	P01

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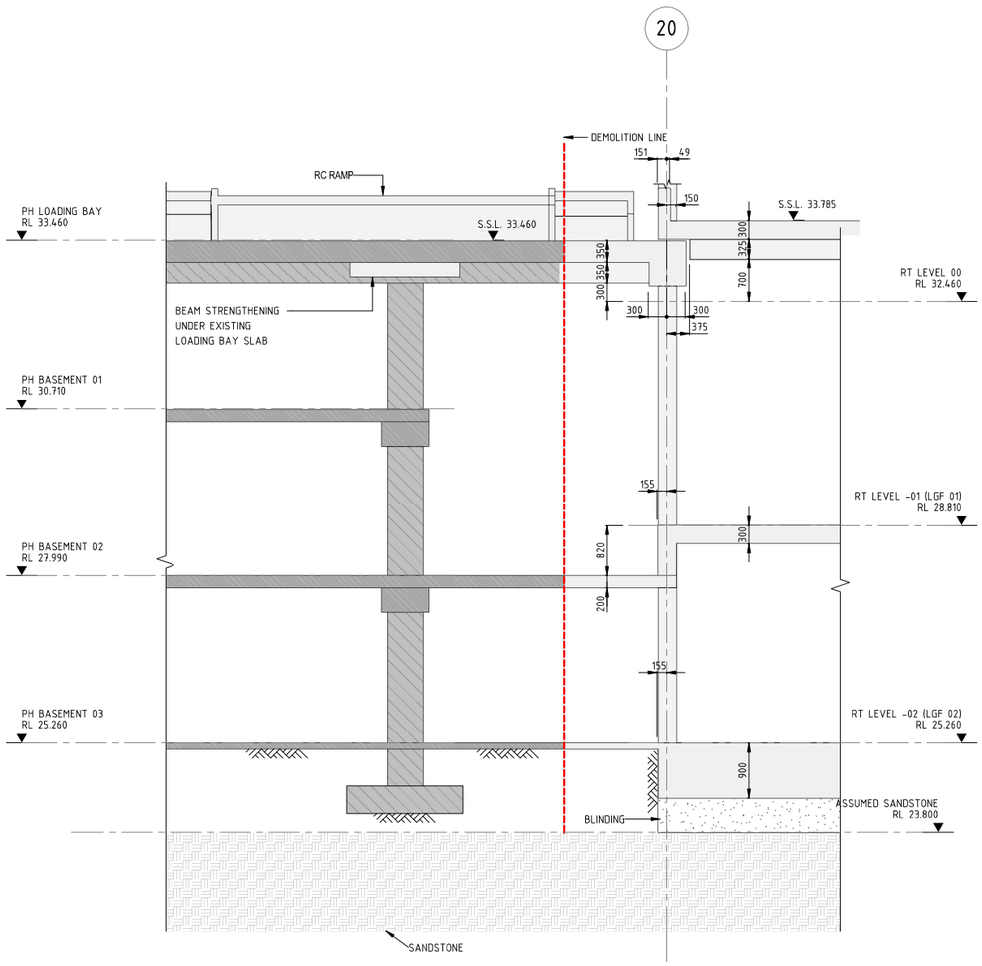
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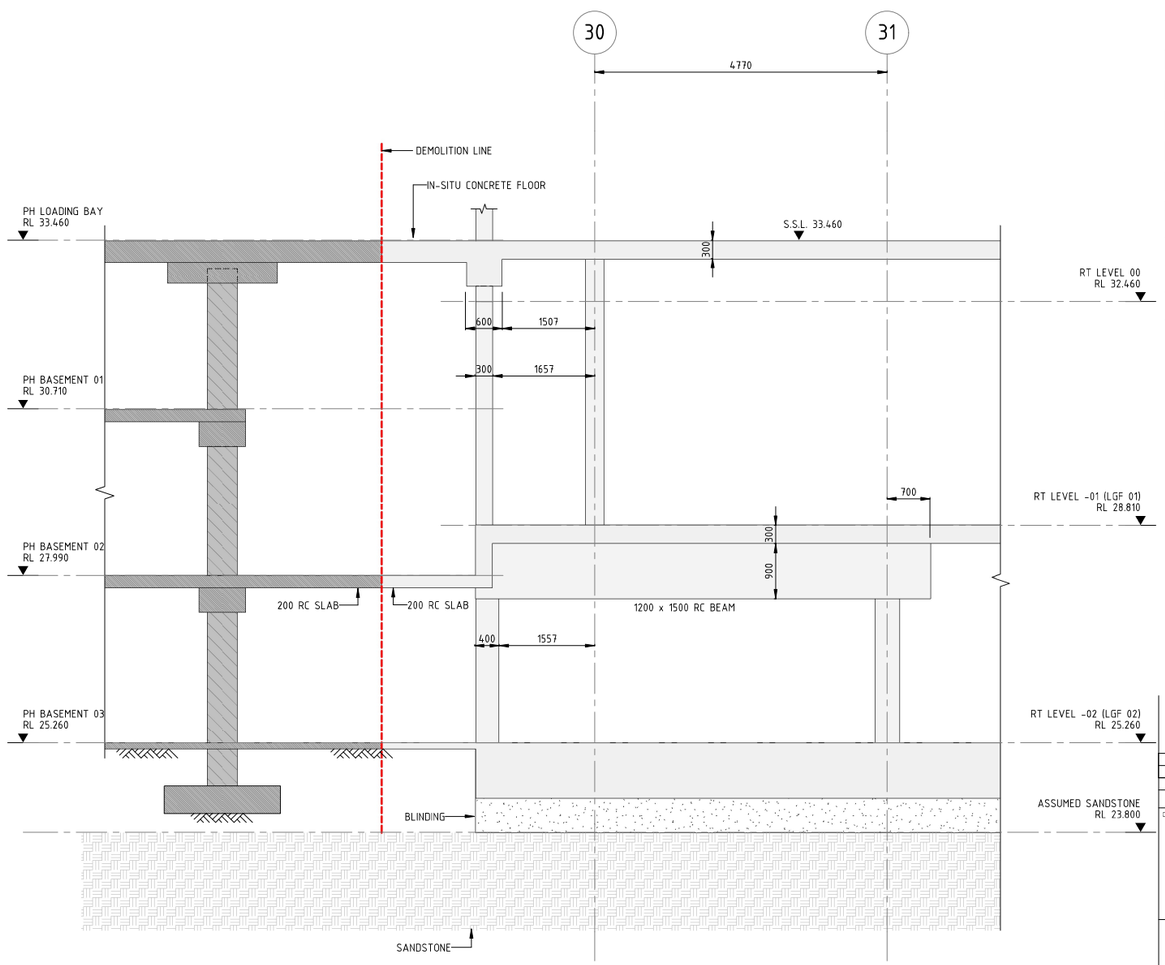
1. FOR STRUCTURAL DRAWING INDEX REFER TO DRAWING REN-BGE-S-GEN-002 TO REN-BGE-S-GEN-004.
2. FOR STANDARD STRUCTURAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO REN-BGE-S-GEN-012.
3. FOR STANDARD STRUCTURAL DETAILS REFER TO DRAWINGS REN-BGE-S-GEN-016 TO REN-BGE-S-GEN-025.
4. APPROXIMATE SANDSTONE LEVEL SHOWN BASED ON SOIL INVESTIGATION BOREHOLES. LEVEL WILL VARY.
5. FOUNDATIONS TO BE EXCAVATED TO SOUND SANDSTONE AND INSPECTED BY GEOTECHNICAL ENGINEER PRIOR TO BACKFILLING WITH BLINDING CONCRETE
6. FOR LOCATION OF WATERPROOF CONCRETE AND WATERPROOF MEMBRANES REFER TO THE PERFORMANCE SPECIFICATION AND THE WATERPROOFING SPECIALIST DESIGN DRAWINGS

KEY:

- EXISTING STRUCTURE
- PROPOSED STRUCTURE
- EXISTING MASONRY
- PROPOSED MASONRY
- STRUCTURE TO BE DEMOLISHED
- VOIDFORMER - FILCOR45
- VOIDFORMER - FILCOR70
- DEMOLITION LINE
- EXISTING EXPANSION JOINT
- MATCH LINE FOR RESIDENTIAL TOWER
- HOTEL STRUCTURE



SECTION 6
SCALE 1 : 50 099



SECTION 7
SCALE 1 : 50 099

REV.	DATE	DESCRIPTION	
P01	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW
P00	28.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT

REVISIONS

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PROJECT
RENAISSANCE
STRUCTURAL
RESIDENTIAL TOWER

STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

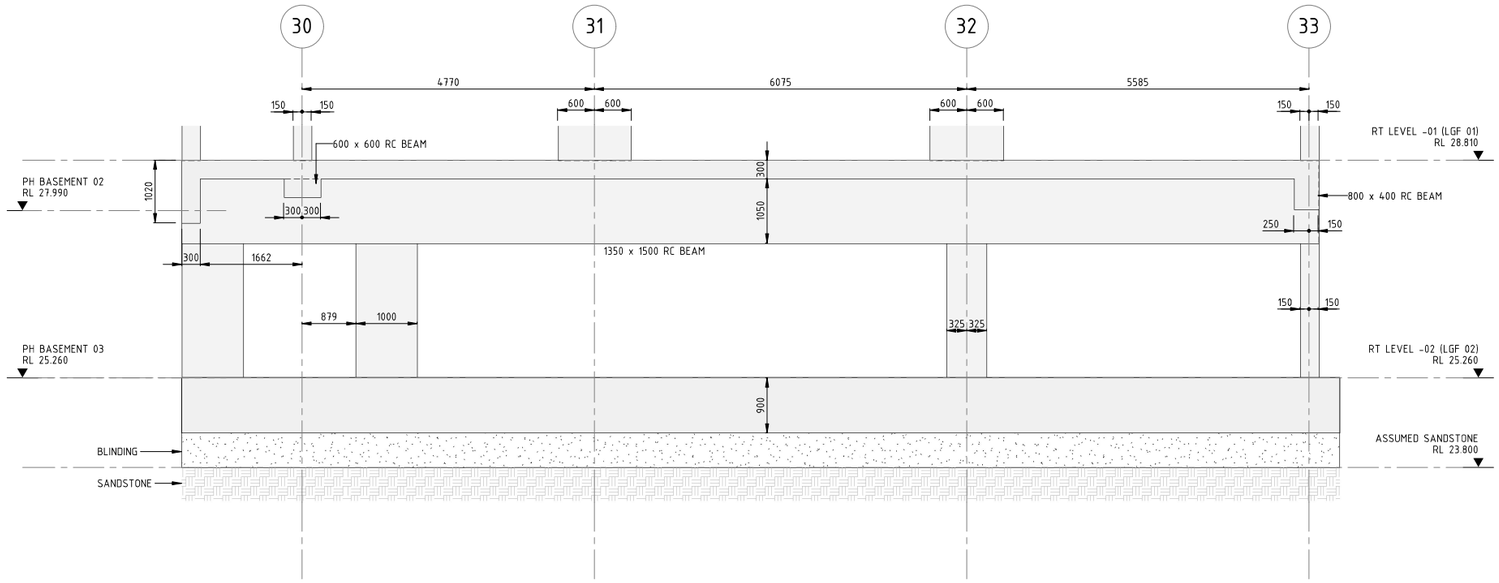
DATUM	GRID	SCALE
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TITLE
BASEMENT SECTIONS - SHEET 4

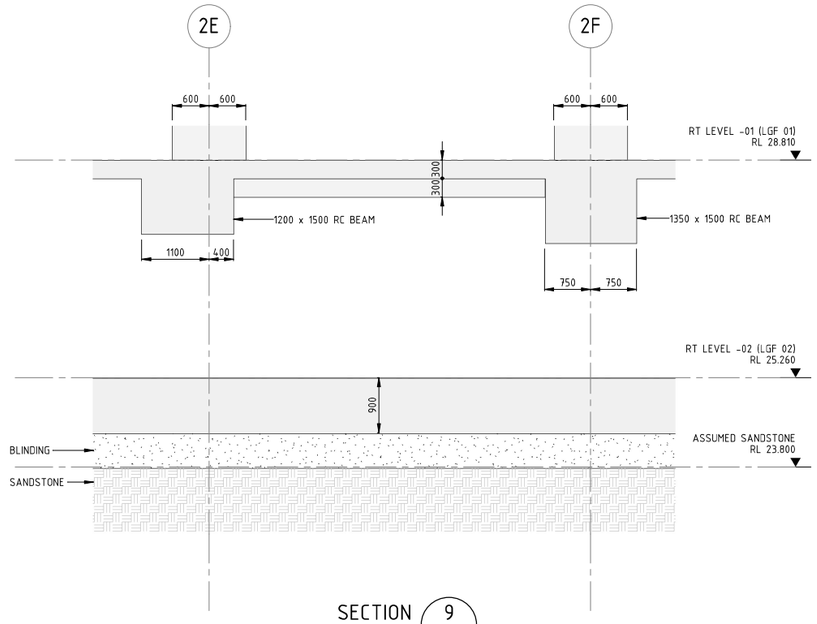
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L20081	REN-BGE-S-RT-213	P01

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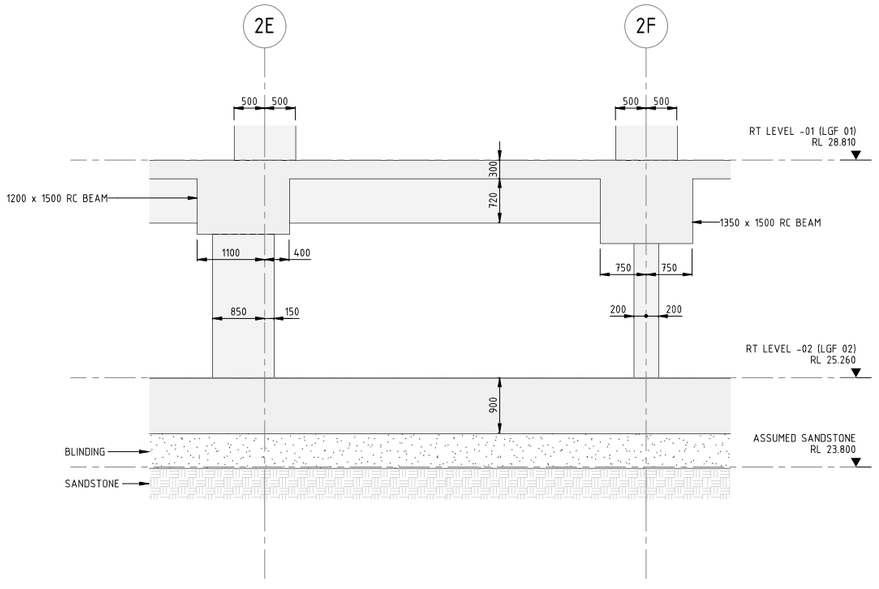
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SECTION 8
SCALE 1 : 50 099



SECTION 9
SCALE 1 : 50 099



SECTION 10
SCALE 1 : 50 099

NOTES:

1. FOR STRUCTURAL DRAWING INDEX REFER TO DRAWING REN-BGE-S-GEN-002 TO REN-BGE-S-GEN-004.
2. FOR STANDARD STRUCTURAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO REN-BGE-S-GEN-012.
3. FOR STANDARD STRUCTURAL DETAILS REFER TO DRAWINGS REN-BGE-S-GEN-016 TO REN-BGE-S-GEN-025.
4. APPROXIMATE SANDSTONE LEVEL SHOWN BASED ON SOIL INVESTIGATION BOREHOLES. LEVEL WILL VARY.
5. FOUNDATIONS TO BE EXCAVATED TO SOUND SANDSTONE AND INSPECTED BY GEOTECHNICAL ENGINEER PRIOR TO BACKFILLING WITH BLINDING CONCRETE
6. FOR LOCATION OF WATERPROOF CONCRETE AND WATERPROOF MEMBRANES REFER TO THE PERFORMANCE SPECIFICATION AND THE WATERPROOFING SPECIALIST DESIGN DRAWINGS

KEY:

- EXISTING STRUCTURE
- PROPOSED STRUCTURE
- EXISTING MASONRY
- PROPOSED MASONRY
- STRUCTURE TO BE DEMOLISHED
- VOIDFORMER - FILCOR45
- VOIDFORMER - FILCOR70
- DEMOLITION LINE
- EXISTING EXPANSION JOINT
- MATCH LINE FOR RESIDENTIAL TOWER
- HOTEL STRUCTURE

REV	DATE	DESCRIPTION	
P00	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW

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PROJECT
RENAISSANCE
STRUCTURAL
RESIDENTIAL TOWER

STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

DATUM	GRID	SCALE
		As indicated AT A1 SIZE

TITLE
BASEMENT SECTIONS - SHEET 5

PROJECT No	DRAWING No	REV
L20081	REN-BGE-S-RT-214	P00

L20081_MOD_S_R22
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RENAISSANCE - PILING NOTES - SHEET 1

1. THESE PILING NOTES ARE TO BE READ IN CONJUNCTION WITH THE GENERAL NOTES, ENGINEER'S SPECIFICATION D30 'PILING WORK' AND D40 'EMBEDDED RETAINING WALL'. ALL PILES TO BE CONSTRUCTED WITHIN THE TOLERANCE CITED IN THE SPECIFICATIONS.

2. PILE INFORMATION SHOWN ON ENGINEER DRAWINGS IS BASED ON PRELIMINARY CALCULATIONS ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CARRY OUT THE DETAILED DESIGN OF ALL PILES. THIS INCLUDES DESIGN FOR VERTICAL LOADING AND HORIZONTAL SHORING LOADING. HORIZONTAL SHORING LOADING TO CONSIDER BOTH THE TEMPORARY AND PERMANENT LOAD CASES.

3. PILES ARE EXPECTED TO BE ROTARY BORED, WITH SLEEVES FOR THE CONTIGUOUS PILES ALONG DEANSGATE ROAD. OTHER METHODS MAY BE CONSIDERED BY THE CONTRACTOR PROVIDED VIBRATIONS ARE SUFFICIENTLY CONTROLLED WITHIN 3RD PARTY AGREEMENTS AND THE METHOD IS SUFFICIENTLY CAPABLE OF PILING INTO THE SANDSTONE.

4. PILE VIBRATIONS ARE TO BE MONITORED AND CONTROLLED TO WITHIN 3rd PARTY ASSET OWNERS AGREEMENTS. THIS INCLUDES THE UNITED UTILITIES SEWERS AND VICTORIA BRIDGE.

5. UNLESS AGREED OTHERWISE, PILING TOLERANCES ARE AS FOLLOWS:
   A. PLAN POSITION +/- 25mm
   B. VERTICALITY 1 in 75

6. CONTIGUOUS PILES TO BE CONSTRUCTED WITH GUIDE WALLS

7. PILES TO BE DESIGNED AND CONSTRUCTED TO BS EN 1997, BS EN 1536, BS EN 1992, PD 6694-1 AND ICE SPECIFICATION FOR PILING AND EMBEDDED RETAINING WALLS 3rd EDITION.

8. ALL BEARING PILES TO BE SPACED OUT NOT LESS THAN 3 TIMES THE LARGEST DIAMETER (D) OF ADJACENT PILES. WHERE THE SPACING IS LESS THAN 3D THE DESIGNER MUST CONSIDER THE EFFECTS OF CLOSE PILE SPACING ON THE CAPACITY AND SETTLEMENT OF THE GROUP AND PRESENT CALCULATIONS SHOWING THE EXPECTED GROUP SETTLEMENT. PILE GROUP SETTLEMENT CALCULATIONS MUST ALSO BE PRESENTED FOR GROUPS WITH SPACING EQUAL TO 3D OR GREATER.

9. DEPENDING ON THE PILE DESIGNER'S DESIGN PHILOSOPHY ALLOW 1% OF PILES TO BE TESTED TO 1.5 * WORKING LOADS WITH MINIMUM OF 1 PER PILE DIAMETER IF EQUIVALENT OVERALL FACTOR OF SAFETY IS LOWER THAN 2.6 (OR IF EC7 PARTIAL FACTORS AND MODEL FACTOR USED REQUIRE VERIFICATION BY TESTING). IN ADDITION, A PRELIMINARY (SACRIFICIAL) PILE TEST MAY BE ALLOWED IF THIS IS PART OF THE DESIGN PHILOSOPHY. IF SO THIS MUST BE CLEARLY STATED WITH THE RETURN OF TENDER.

10. ALL BEARING PILES SHALL BE SUBJECT TO NON-DESTRUCTIVE INTEGRITY TESTS. FOR PILES WITH L/D GREATER THAN 30, CONTRACTOR TO SUBMIT INTEGRITY TESTING PROPOSALS ALTERNATIVE TO SONIC ECHO TESTING, FOR EXAMPLE THERMAL IMAGE PROFILING (TIP) OR SIMILAR.

11. PILE LOADS GIVEN ARE BASED ON INDICATED PILE CONFIGURATION. LOADS MAY REQUIRE RE-ASSESSMENT BY ENGINEER FOLLOWING FINAL POSITION.

12. BEARING PILES TO BE DESIGNED TO COMPLY WITH ALL OF THE FOLLOWING SETTLEMENT CRITERIA, UNDER THE MOST ONEROUS COMBINATION OF WORKING LOADS:

    i. A MAXIMUM DIFFERENTIAL MOVEMENT OF 5 mm OR SPACING OVER 500 WHICH EVER IS THE GREATER BETWEEN ADJACENT MAIN COLUMNS.

    ii. MAXIMUM TOTAL SETTLEMENT OF SINGLE PILES NOT TO EXCEED THE VALUES GIVEN IN THE TABLE BELOW (INCLUDING ELASTIC SHORTENING).

    iii. MAXIMUM DIFFERENTIAL MOVEMENT CRITERIA TO BE SATISFIED FOR EACH PHASE OF CONSTRUCTION, INCLUDING ALLOWANCE FOR SHORT TERM AND LONG TERM MOVEMENTS.

PILE Φ, D RANGE (mm)	PILE SETTLEMENT AT SLS LOAD (% OF D IN mm)
300 ≤ D ≤ 400	5mm
450 ≤ D ≤ 900	1%
1000 ≤ D ≤ 1500	10mm
1800 ≤ D ≤ 2400	15mm

PILE Φ, D RANGE (mm)	PILE SETTLEMENT AT 1.5xSLS LOAD (% OF D IN mm)
300 ≤ D ≤ 400	10mm
450 ≤ D ≤ 900	2%
1000 ≤ D ≤ 1500	20mm
1800 ≤ D ≤ 2400	30mm

13. PILE SPECIALIST CONTRACTOR TO PROVIDE ENGINEER WITH EXPECTED LOAD/DISPLACEMENT CHARACTERISTICS OF ALL PILES PROVIDING VERTICAL SUPPORT, FOR AGREEMENT PRIOR TO CONSTRUCTION.

14. CONTRACTOR TO ALLOW FOR THE EFFECT OF REDUCTION OF VERTICAL LOAD CAPACITY OF PILES DUE TO GROUP EFFECT AND PRESENT PILE GROUP SETTLEMENT CALCULATIONS TO CAPTURE GROUP EFFECTS FOR EACH PHASE OF CONSTRUCTION INCLUDING NEGATIVE SKIN FRICTION, IF APPLICABLE.

15. CONTIGUOUS PILES TO BE DESIGNED BY THE CONTRACTOR FOR HORIZONTAL SHORING LOADS BASED ON THE PERMANENT CONFIGURATION AND THE TEMPORARY CONFIGURATION INLINE WITH THE CONTRACTORS CONSTRUCTION AND TEMPORARY WORKS SEQUENCE.

16. CONTIGUOUS PILES TO BE DESIGNED FOR HORIZONTAL SHORING LOADS BASED ON THE PERMANENT CONFIGURATION WITH AN ACCIDENTAL WATER LOAD 1m BELOW DEANSGATE ROAD LEVEL.

17. THE SIZES AND SPACINGS OF THE CONTIGUOUS PILES AND SECANT PILES ARE SHOWN INDICATIVELY ONLY ON ENGINEERS DRAWINGS. CONTRACTORS ARE TO CARRY OUT THE DETAILED DESIGN OF THESE ELEMENTS AND PRODUCE A GENERAL ARRANGEMENT SHOWING ACCURATELY THE SIZES, SPACINGS AND THE SETTING OUT OF THESE PILES.

    THE CONTRACTOR SHALL ALLOW FOR THE ACTUAL NUMBER OF PILES REQUIRED AND DETERMINED BY THEIR FINAL DESIGN IN PREPARING THEIR TENDER PRICE. IF THE NUMBER OF PILES NEEDED EXCEEDS THE NUMBER SHOWN ON THE DRAWINGS OR LISTED IN THE BILL OF QUANTITIES, NO ADDITIONAL PAYMENTS WILL BE MADE TO THE CONTRACTOR.

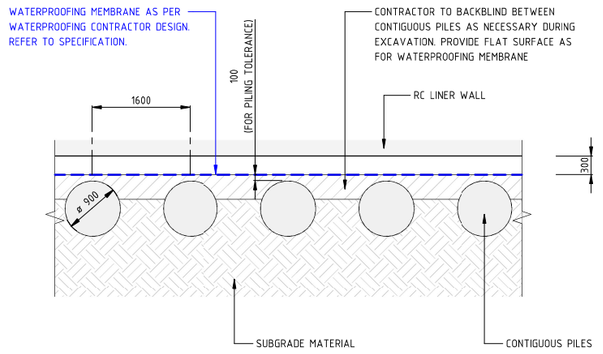
18. THE THICKNESS OF THE LINING WALL SHOWN ON ENGINEERS DRAWINGS IS THE MINIMUM THICKNESS NETT OF THE PILING CONSTRUCTION TOLERANCE.
    AFTER CLEANING THE PILE FACES OF ALL SOIL AND MUD THE CONTRACTOR SHALL MAKE ALLOWANCE FOR THE FOLLOWING REQUIREMENTS WHEN CONSTRUCTING THE LINING WALL:

    i. ENSURE SUFFICIENT TEMPORARY SHORING OF SOIL BETWEEN CONTIGUOUS PILES DURING EXCAVATION.

    ii. SUFFICIENTLY BACK-BUND THE FACE OF THE CONTIGUOUS PILES WITH AN APPROVED CONCRETE TO TAKE OUT THE CONSTRUCTION TOLERANCE OF THE PILED WALL AND TO PROVIDE A SUFFICIENT FACE FOR NECESSARY WATERPROOFING MEMBRANES.

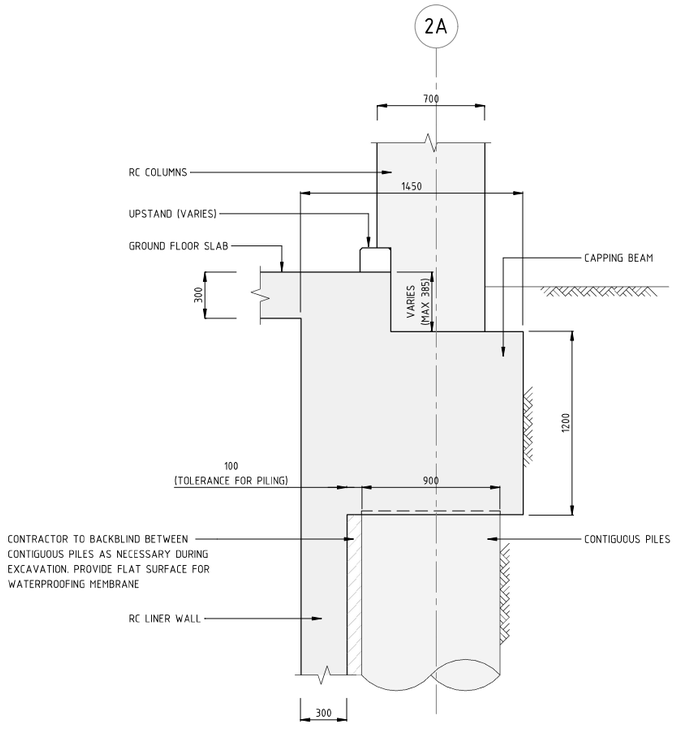
    iii. IF NECESSARY, INTRODUCE ADDITIONAL REINFORCEMENT TO CONTROL THE EARLY AGE THERMAL SHRINKAGE OF THE LINER WALL. PARTICULARLY IF, DUE TO TOLERANCES, THE LINER WALL IS THICKER THAN EXPECTED AND/OR THE WATERPROOFING ADDITIVE HAS SPECIFIC CRACK CONTROL REQUIREMENTS.

19. CONTRACTOR TO ALLOW FOR BREAKING DOWN LOCAL PROTRUSIONS WHEN EXPOSING BASEMENT WALL SURFACE.



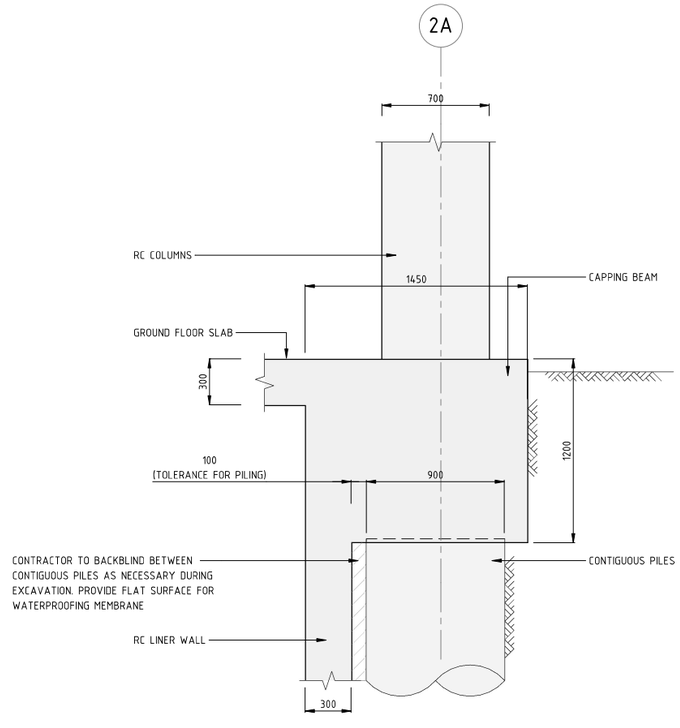
TYPICAL CONTIGUOUS PILING PLAN DETAIL

SCALE 1 : 50



TYPICAL CAPPING BEAM SECTION
(WHERE SLAB STEPS ABOVE CAPPING BEAM)

SCALE 1 : 20



TYPICAL CAPPING BEAM SECTION
(WHERE SLAB FLUSH WITH CAPPING BEAM)

SCALE 1 : 20

NOTES:

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH OTHER STRUCTURAL DRAWINGS.
2. FOR INDEX SHEET OF STRUCTURAL DRAWINGS REFER TO DRAWING REN-BGE-S-GEN-002.
3. FOR GENERAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO 012
4. FOR STANDARD DETAILS REFER TO DRAWINGS REN-BGE-S-016 TO 025.
5. REFER TO PILING NOTE DRAWING REN-BGE-S-RT-050.
6. REFER TO PILING SCHEDULE DRAWING REN-BGE-S-RT-051.

REV	DATE	DESCRIPTION	RVD
P03	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW
P02	5.10.2021	RIBA STAGE 4 - ISSUED FOR PLANNING	JW
P01	28.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT
P00	23.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT

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PROJECT
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STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

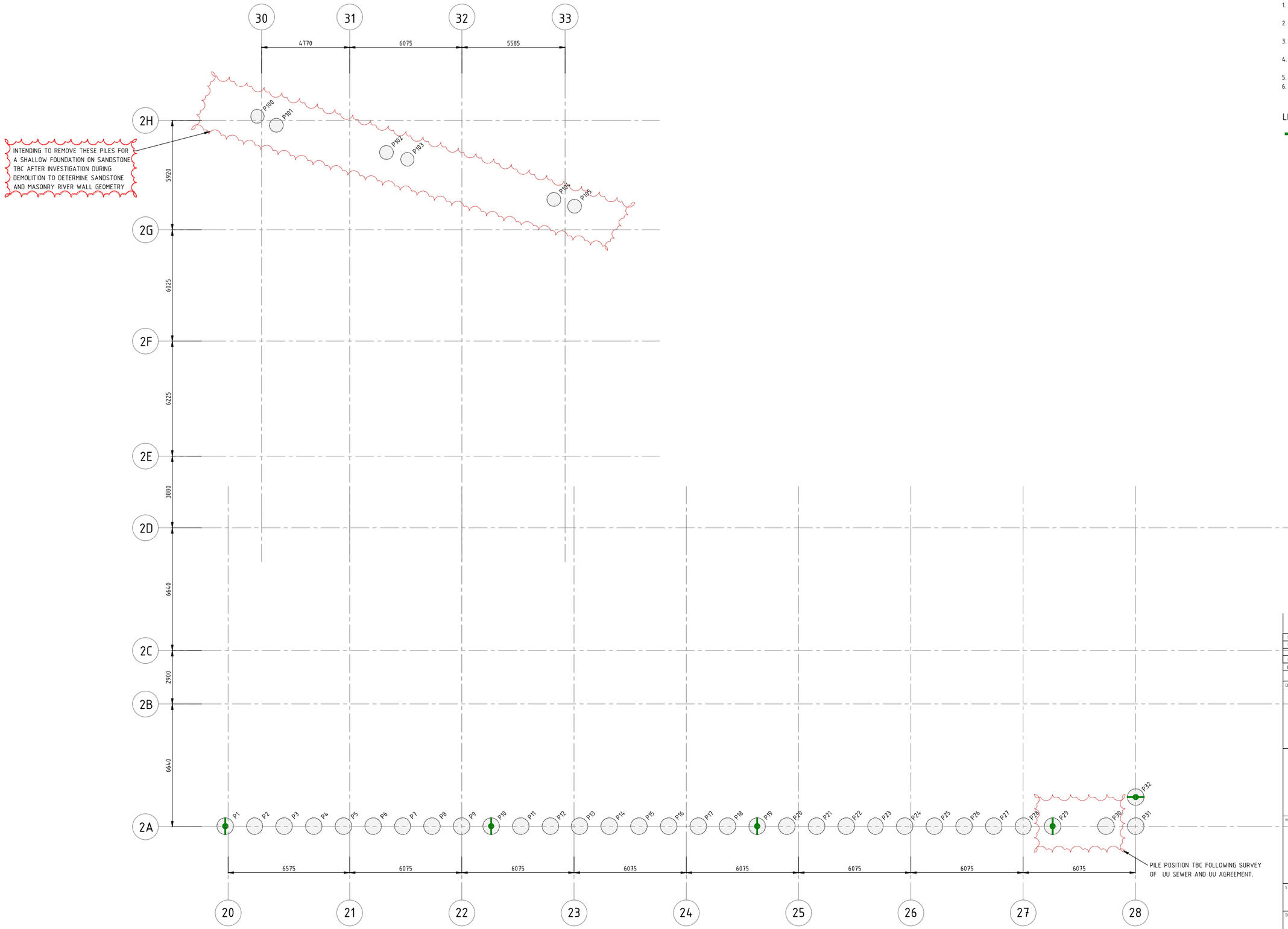
DATUM	GRID	SCALE
		As indicated AT A1 SIZE

TITLE
PILING NOTES

PROJECT No	DRAWING No	REV.
L20081	REN-BGE-S-RT-050	P03

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PILE LAYOUT

SCALE 1 : 100

NOTES:

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH OTHER STRUCTURAL DRAWINGS.
2. FOR INDEX SHEET OF STRUCTURAL DRAWINGS REFER TO DRAWING REN-BGE-S-GEN-002.
3. FOR GENERAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO 012
4. FOR STANDARD DETAILS REFER TO DRAWINGS REN-BGE-S-016 TO 025.
5. REFER TO PILING NOTE DRAWING REN-BGE-S-RT-050.
6. REFER TO PILING SCHEDULE DRAWING REN-BGE-S-RT-051.

LEGEND:

INCLINOMETER POSITION

REV	DATE	DESCRIPTION	RVD
P03	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW
P02	5.10.2021	RIBA STAGE 4 - ISSUED FOR PLANNING	JW
P01	28.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT
P00	23.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT

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PROJECT

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STRUCTURAL

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STATUS

ISSUED FOR INFORMATION

NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

DATUM	GRID	SCALE
		As indicated AT A1 SIZE

TITLE

PILING LAYOUT

PROJECT No.	DRAWING No.	REV.
L20081	REN-BGE-S-RT-051	P03

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PILE SCHEDULE P1-P99

PILE NUMBER	PILE DIAMETER (mm)	EASTING (mm)	NORTHING (mm)	CUT OFF LEVEL (mm OD)	DEAD LOAD (kN)	LIVE LOAD (kN)	WIND LOAD (+/-kN)	HORIZONTAL DEAD LOAD...	HOLIZONTAL LIVE LOAD (kN)	HORIZONTAL WIND LOAD (kN)
P1	Ø900	383779785	398633432	32225	1700	400	50	REFER NOTE 1	REFER NOTE 1	-
P2	Ø900	383780381	398634916	32225	1700	400	50	REFER NOTE 1	REFER NOTE 1	-
P3	Ø900	383780978	398636401	32225	1400	400	50	REFER NOTE 1	REFER NOTE 1	-
P4	Ø900	383781574	398637886	32225	1400	400	50	REFER NOTE 1	REFER NOTE 1	-
P5	Ø900	383782170	398639370	32225	1400	400	50	REFER NOTE 1	REFER NOTE 1	-
P6	Ø900	383782767	398640855	32225	1400	400	50	REFER NOTE 1	REFER NOTE 1	-
P7	Ø900	383783363	398642340	32225	1500	400	100	REFER NOTE 1	REFER NOTE 1	-
P8	Ø900	383783959	398643825	32225	1500	400	100	REFER NOTE 1	REFER NOTE 1	-
P9	Ø900	383784556	398645309	32225	1500	400	100	REFER NOTE 1	REFER NOTE 1	-
P10	Ø900	383785152	398646794	32225	1500	400	100	REFER NOTE 1	REFER NOTE 1	-
P11	Ø900	383785748	398648279	31855	1500	400	1150	REFER NOTE 1	REFER NOTE 1	-
P12	Ø900	383786345	398649763	31855	1500	400	1150	REFER NOTE 1	REFER NOTE 1	-
P13	Ø900	383786941	398651248	31855	1500	400	1150	REFER NOTE 1	REFER NOTE 1	-
P14	Ø900	383787537	398652733	31855	1500	400	1150	REFER NOTE 1	REFER NOTE 1	-
P15	Ø900	383788134	398654218	31855	2000	550	100	REFER NOTE 1	REFER NOTE 1	-
P16	Ø900	383788730	398655702	31855	2000	550	100	REFER NOTE 1	REFER NOTE 1	-
P17	Ø900	383789326	398657187	31855	2000	550	100	REFER NOTE 1	REFER NOTE 1	-
P18	Ø900	383789923	398658672	31855	2000	550	100	REFER NOTE 1	REFER NOTE 1	-
P19	Ø900	383790519	398660156	31285	1700	450	150	REFER NOTE 1	REFER NOTE 1	-
P20	Ø900	383791115	398661641	31285	1700	450	150	REFER NOTE 1	REFER NOTE 1	-
P21	Ø900	383791712	398663126	31285	1700	450	150	REFER NOTE 1	REFER NOTE 1	-
P22	Ø900	383792308	398664611	31285	1700	450	150	REFER NOTE 1	REFER NOTE 1	-
P23	Ø900	383792905	398666095	31285	1500	350	200	REFER NOTE 1	REFER NOTE 1	-
P24	Ø900	383793501	398667580	31285	1500	350	200	REFER NOTE 1	REFER NOTE 1	-
P25	Ø900	383794097	398669065	31285	1500	350	200	REFER NOTE 1	REFER NOTE 1	-
P26	Ø900	383794694	398670549	31285	1500	350	200	REFER NOTE 1	REFER NOTE 1	-
P27	Ø900	383795290	398672034	31285	1900	500	100	REFER NOTE 1	REFER NOTE 1	-
P28	Ø900	383795886	398673519	31285	1900	500	100	REFER NOTE 1	REFER NOTE 1	-
P29	Ø900	383796483	398675004	30800	1900	500	100	REFER NOTE 1	REFER NOTE 1	-
P30	Ø900	383797554	398677672	30800	2100	500	50	REFER NOTE 1	REFER NOTE 1	-
P31	Ø900	383798151	398679156	30800	2100	500	50	REFER NOTE 1	REFER NOTE 1	-
P32	Ø900	383796698	398679740	30800	2100	500	50	REFER NOTE 1	REFER NOTE 1	-

PILE POSITION TBC FOLLOWING SURVEY OF UU SEWER AND UU AGREEMENT

NOTES:

1) FOR THE CONTIGUOUS PILES HORIZONTAL DEAD AND LIVE LOADS ARE TO BE DETERMINED BY THE CONTRACTORS PILE DESIGNER BASED ON THE CONTRACTORS TEMPORARY WORKS SEQUENCE. THE FINAL PERMANENT STAGE HORIZONTAL ACTIONS SHOULD BE CONSIDERED IN CONJUNCTION WITH THE PERMANENT VERTICAL LOADING FROM THE SUPERSTRUCTURE PROVIDED IN THIS TABLE.

2) FOR THE CONTIGUOUS PILES THE REQUIRED PILE TOE DEPTH MAY BE CONTROLLED EITHER BY VERTICAL LOADING REQUIREMENTS OR BY MINIMUM SOCKET INTO THE SANDSTONE FOR LATERAL STABILITY DURING CONSTRUCTION.

PILE SCHEDULE P100-P199

PILE NUMBER	PILE DIAMETER (mm)	EASTING (mm)	NORTHING (mm)	CUT OFF LEVEL (mm OD)	DEAD LOAD (kN)	LIVE LOAD (kN)	WIND LOAD (+/-kN)	HORIZONTAL DEAD LOAD...	HOLIZONTAL LIVE LOAD (kN)	HORIZONTAL WIND LOAD (kN)
P100	Ø750	383744775	398649380	24035	1400	600	100	-	-	200
P101	Ø750	383745609	398650161	24035	1900	750	100	-	-	200
P102	Ø750	383749179	398655118	24035	2900	950	250	-	-	200
P103	Ø750	383749946	398656041	24035	3100	1000	200	-	-	200
P104	Ø750	383754904	398662598	24035	2700	950	200	-	-	200
P105	Ø750	383755671	398663521	24035	1700	650	200	-	-	200

INTENDING TO REMOVE THESE PILES FOR A SHALLOW FOUNDATION ON SANDSTONE. TBC AFTER INVESTIGATION DURING DEMOLITION TO DETERMINE SANDSTONE AND MASONRY RIVER WALL GEOMETRY

NOTES:

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH OTHER STRUCTURAL DRAWINGS.
2. FOR INDEX SHEET OF STRUCTURAL DRAWINGS REFER TO DRAWING REN-BGE-S-GEN-002.
3. FOR GENERAL NOTES REFER TO DRAWINGS REN-BGE-S-GEN-010 TO 012
4. FOR STANDARD DETAILS REFER TO DRAWINGS REN-BGE-S-016 TO 025.
5. REFER TO PILING NOTE DRAWING REN-BGE-S-RT-050.
6. REFER TO PILING SCHEDULE DRAWING REN-BGE-S-RT-051.

REV	DATE	DESCRIPTION	
P04	05.11.2021	ISSUED FOR STAGE 2 TENDER	JW
P03	14.10.2021	RIBA STAGE 4 - ISSUED FOR PLANNING	JW
P02	5.10.2021	RIBA STAGE 4 - ISSUED FOR PLANNING	JW
P01	28.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT
P00	23.07.2021	RIBA STAGE 3 ISSUED FOR STAGE 1 TENDER	NT

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PROJECT

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STRUCTURAL

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STATUS

ISSUED FOR INFORMATION

NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
JW	LK	KT	KT

DATUM	GRID	SCALE
		1 : 1 AT A1 SIZE

TITLE

PILING SCHEDULE

PROJECT No.	DRAWING No.	REV.
L20081	REN-BGE-S-RT-052	P04

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Appendix I: GQRA Screening Tables for the Deansgate Level

Controlled Waters Generic Quantitative Assessment for Soil Leachate (For the Deansgate Level FWRA)

Renaissance Hotel 1602

Key:

- Exceedance of the Drinking Water GAC
- Exceedance of Environmental Quality GAC
- Exceedance of both GAC

GAC - Generic Assessment Criteria

Laboratory Report Ref.		Drinking Water GAC	Environmental Quality GAC	262855	262862	262863	262865	262868	262871	262873
Exploratory Location Ref.				BH01	WS01	WS02	WS02	WS03	WS04	WS05
Sample Depth (m)				0.40	1.20	0.50	2.30	0.40	1.30	1.30
Sample Date				20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021
Made Ground / Natural ?				MG	MG	MG	MG	MG	MG	MG
GAC Ref.	Units	UK and EU Drinking Water Standards and WHO Guidline Values	Environmental Quality Standards (EQS) published by the UK, EU and EA							
Heavy Metals and Metalloids										
Chromium (III)	ug/l	50	4.7	15	< 5	< 5	< 5	< 5	< 5	6
Arsenic 2:1 extract	ug/l	10	50	99	22	< 5	< 5	6	11	24
Barium 2:1 extract	ug/l	700	-	17	5	33	25	15	11	< 5
Beryllium 2:1 extract	ug/l	12	-	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Boron 2:1 extract	ug/l	1000	2000	89	< 5	10	< 5	< 5	7	< 5
Cadmium 2:1 extract	ug/l	5	0.08	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chromium 2:1 extract	ug/l	50	4.7	15	< 5	< 5	< 5	< 5	< 5	6
Copper 2:1 extract	ug/l	2000	1 (bioavailable)	86	56	63	44	44	42	37
Lead 2:1 extract	ug/l	10	1.2	10	< 5	< 5	< 5	< 5	< 5	< 5
Mercury 2:1 extract	ug/l	1	-	0.2	0.1	0.1	0.1	< 0.1	0.2	0.1
Molybdenum 2:1 extract	ug/l	-	-	8	< 5	< 5	< 5	< 5	< 5	< 5
Nickel 2:1 extract	ug/l	20	4	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium 2:1 extract	ug/l	10	-	9	< 5	< 5	< 5	< 5	< 5	< 5
Vanadium 2:1 extract	ug/l	-	20	62	6	< 5	< 5	5	< 5	8
Zinc 2:1 extract	ug/l	3000	10.9 (bioavailable)	20	11	8	23	14	9	8
Inorganics										
Hexavalent chromium	ug/l	-	3.4	100	< 100	< 100	< 100	< 100	< 100	< 100
Free Cyanide	ug/l	-	1 (free)	5	< 5	< 5	< 5	< 5	< 5	< 5
Total Cyanide	ug/l	50 (total)	-	5	< 5	< 5	< 5	< 5	< 5	< 5
PAHs										
Naphthalene Leachate GCMS	ug/l	-	-	0.01	0.02	0.02	0.01	0.04	< 0.01	0.02
Acenaphthylene Leachate GCMS	ug/l	-	-	0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	0.01
Acenaphthene Leachate GCMS	ug/l	-	-	0.01	0.01	0.03	0.01	0.14	0.01	0.01
Fluorene Leachate GCMS	ug/l	-	-	0.01	< 0.01	0.01	< 0.01	0.02	< 0.01	0.01
Phenanthrene Leachate GCMS	ug/l	-	-	0.01	0.04	0.19	0.06	1.29	0.03	0.08
Anthracene Leachate GCMS	ug/l	-	0.1	0.01	0.01	0.05	0.01	0.13	0.01	0.03
Fluoranthene Leachate GCMS	ug/l	-	0.0063	0.01	0.02	0.18	0.02	0.22	0.05	0.09
Pyrene Leachate GCMS	ug/l	-	-	0.01	0.04	0.22	0.02	2.12	0.06	0.10
Benzo (a) anthracene Leachate GCMS	ug/l	-	-	0.01	0.01	0.04	< 0.01	0.27	0.03	0.05
Chrysene Leachate GCMS	ug/l	-	-	0.01	0.02	0.11	< 0.01	0.38	0.02	0.05
Benzo (b) fluoranthene Leachate GCMS	ug/l	0.1 (sum)	Use BaP marker	0.01	0.02	0.06	< 0.01	0.34	0.02	0.04
Benzo (k) fluoranthene Leachate GCMS	ug/l	0.1 (sum)	Use BaP marker	0.01	0.02	0.06	< 0.01	0.30	0.02	0.03
Benzo (a) pyrene Leachate GCMS	ug/l	0.01	0.0002	0.01	0.04	0.07	< 0.01	0.25	0.02	0.04
Indeno (1,2,3-cd) pyrene Leachate GCMS	ug/l	0.1 (sum)	Use BaP marker	0.01	0.01	0.03	< 0.01	0.26	< 0.01	0.02
Dibenzo(a,h)anthracene Leachate GCMS	ug/l	-	-	0.01	0.01	0.02	< 0.01	0.18	< 0.01	0.01
Benzo(ghi)perylene Leachate GCMS	ug/l	0.1 (sum)	Use BaP marker	0.01	0.02	0.04	< 0.01	0.38	0.01	0.03
Total PAH(16) Leachate GCMS	ug/l	-	-	0.01	0.32	1.15	0.18	6.31	0.32	0.62

Human Health Generic Quantitative Assessment for Soil (For the Deansgate Level FWRA)

Renaissance Hotel 1602

Key:

Exceedance of the GAC

GAC - Generic Assessment Criteria

Laboratory Report Ref.				262855	262862	262863	262865	262868	262871	262873	262868	262871	262873
Exploratory Location Ref.		Residential With Home Grown Produce		BH01	WS01	WS02	WS02	WS03	WS04	WS05	WS03	WS04	WS05
Sample Depth (m)				0.40	1.20	0.50	2.30	0.40	1.30	1.30	0.40	1.30	1.30
Sample Date				20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021
Made Ground / Natural ?	Units	1% SOM		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
		GAC	GAC Ref.										
Anions and Other													
Water Soluble Sulphate	g/l	-	-	n/t	0.02	< 0.02	0.03	n/t	n/t	n/t	n/t	n/t	n/t
Water Soluble Sulphate	mg/kg	-	-	180	n/t	n/t	n/t	41	182	210	166	180	54
Heavy Metals and Metalloids													
Arsenic	mg/kg	40	DEFRA C4SLs	37.5	n/t	n/t	n/t	17.2	8.3	7.8	14.7	22.8	18.9
Barium	mg/kg	1300	CL:AIRE GAC	325	n/t	n/t	n/t	238	1090	80.4	169	266	302
Beryllium	mg/kg	1.7	LQM S4ULs	4.0	n/t	n/t	n/t	1.1	1.1	< 1.0	1.4	1.3	1.1
Cadmium	mg/kg	150	DEFRA C4SLs	0.6	n/t	n/t	n/t	0.9	2.1	1.8	0.6	1.1	0.9
Chromium	mg/kg	910	LQM S4ULs	41.6	n/t	n/t	n/t	26.3	19.6	15.7	25.7	28.3	29.6
Chromium (III)	mg/kg	910	DEFRA C4SLs	41.6	n/t	n/t	n/t	26.3	19.6	15.7	25.7	28.3	29.6
Copper	mg/kg	7100	LQM S4ULs	154	n/t	n/t	n/t	77.2	29.8	19.8	55.2	128	89.1
Lead	mg/kg	310	DEFRA C4SLs	157	n/t	n/t	n/t	206	95.5	27.2	142	500	220
Mercury	mg/kg	15	LQM S4ULs	< 0.5	n/t	n/t	n/t	1.1	< 0.5	< 0.5	< 0.5	5.0	1.3
Molybdenum	mg/kg	670	CL:AIRE GAC	8.4	n/t	n/t	n/t	2.0	1.8	1.3	2.9	2.2	2.0
Nickel	mg/kg	180	LQM S4ULs	69.5	n/t	n/t	n/t	28.2	41.4	26.4	34.8	31.8	28.4
Selenium	mg/kg	430	LQM S4ULs	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	mg/kg	1200	LQM S4ULs	72.2	n/t	n/t	n/t	25.5	18.7	11.9	31.2	31.2	27.8
Zinc	mg/kg	40000	LQM S4ULs	192	n/t	n/t	n/t	144	169	197	129	217	155
Inorganics													
Free Cyanide	mg/kg	34	Atkins AtRisk S	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexavalent Chromium	mg/kg	21	LQM S4ULs	< 0.8	n/t	n/t	n/t	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Total Cyanide	mg/kg	34	Atkins AtRisk S	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	-	-	n/t	0.02	0.01	0.01	n/t	n/t	n/t	n/t	n/t	n/t
Acid Soluble Sulphate (SO4)	mg/kg	-	-	n/t	0.02	< 0.02	0.02	n/t	n/t	n/t	n/t	n/t	n/t
Water Soluble Boron	mg/kg	11000	LQM S4ULs	1.9	n/t	n/t	n/t	< 0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5
PAHs													
Naphthalene	mg/kg	2.3	LQM S4ULs	< 0.1	n/t	n/t	n/t	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	3000	LQM S4ULs	< 0.1	n/t	n/t	n/t	< 0.1	< 0.1	< 0.1	< 0.1	0.3	< 0.1
Acenaphthene	mg/kg	2900	LQM S4ULs	0.3	n/t	n/t	n/t	0.1	< 0.1	< 0.1	0.2	4.6	0.1
Fluorene	mg/kg	2800	LQM S4ULs	0.2	n/t	n/t	n/t	< 0.1	< 0.1	< 0.1	0.1	2.9	< 0.1
Phenanthrene	mg/kg	1300	LQM S4ULs	2.1	n/t	n/t	n/t	0.8	0.4	< 0.1	1.4	26.1	0.8
Anthracene	mg/kg	31000	LQM S4ULs	0.5	n/t	n/t	n/t	0.2	0.1	< 0.1	0.3	5.7	0.2
Fluoranthene	mg/kg	1500	LQM S4ULs	2.4	n/t	n/t	n/t	0.8	0.7	0.1	2.5	31.4	1.0
Pyrene	mg/kg	3700	LQM S4ULs	2.0	n/t	n/t	n/t	0.8	0.6	0.1	2.0	27.1	0.9
Benzo(a)anthracene	mg/kg	11	LQM S4ULs	1.0	n/t	n/t	n/t	0.4	0.3	< 0.1	1.0	12.2	0.5
Chrysene	mg/kg	30	LQM S4ULs	1.3	n/t	n/t	n/t	0.5	0.4	< 0.1	1.3	15.8	0.7
Benzo(b)fluoranthene	mg/kg	3.9	LQM S4ULs	1.1	n/t	n/t	n/t	0.5	0.3	< 0.1	1.0	17.1	0.5
Benzo(k)fluoranthene	mg/kg	110	LQM S4ULs	1.1	n/t	n/t	n/t	0.5	0.3	< 0.1	1.2	10.4	0.5
Benzo(a)pyrene	mg/kg	5.3	DEFRA C4SLs	1.1	n/t	n/t	n/t	0.5	0.3	< 0.1	1.1	13.2	0.5
Indeno(1,2,3-cd)pyrene	mg/kg	45	LQM S4ULs	0.7	n/t	n/t	n/t	0.2	0.2	< 0.1	0.7	8.0	0.4
Dibenzo(a,h)anthracene	mg/kg	0.31	LQM S4ULs	0.2	n/t	n/t	n/t	< 0.1	< 0.1	< 0.1	0.2	1.6	0.1
Benzo[g,h,i]perylene	mg/kg	360	LQM S4ULs	0.5	n/t	n/t	n/t	0.2	0.2	< 0.1	0.6	7.1	0.3
Total PAH(16)	mg/kg	-	-	14.6	n/t	n/t	n/t	5.6	4.1	0.8	13.8	184	6.7
TPH													
>C5-C6 Aliphatic (HS_1D_MS)	mg/kg	42	LQM S4ULs	< 0.01	n/t	n/t	n/t	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic (HS_1D_MS)	mg/kg	100	LQM S4ULs	< 0.01	n/t	n/t	n/t	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic (HS_1D_MS+EH_2D_AL)	mg/kg	27	LQM S4ULs	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic (EH_2D_AL)	mg/kg	130	LQM S4ULs	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0
>C12-C16 Aliphatic (EH_2D_AL)	mg/kg	1100	LQM S4ULs	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	2.9	< 1.0
>C16-C21 Aliphatic (EH_2D_AL)	mg/kg	65000	LQM S4ULs	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	4.2	< 1.0
>C21-C35 Aliphatic (EH_2D_AL)	mg/kg	65000	LQM S4ULs	7.3	n/t	n/t	n/t	< 1.0	6.4	< 1.0	14.4	11.9	< 1.0
>C35-C40 Aliphatic (EH_2D_AL)	mg/kg	65000	LQM S4ULs	< 1.0	n/t	n/t	n/t	< 1.0	1.8	< 1.0	4.3	2.8	< 1.0
Total aliphatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AL)	mg/kg	-	LQM S4ULs	8.2	n/t	n/t	n/t	< 1.0	8.8	< 1.0	20.6	23.3	< 1.0
>C5-C7 Aromatic (HS_1D_MS)	mg/kg	370	LQM S4ULs	< 0.01	n/t	n/t	n/t	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic (HS_1D_MS)	mg/kg	860	LQM S4ULs	< 0.01	n/t	n/t	n/t	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic (HS_1D_MS+EH_2D_AR)	mg/kg	47	LQM S4ULs	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0
>C10-C12 Aromatic (EH_2D_AR)	mg/kg	250	LQM S4ULs	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	< 1.0	11.9	< 1.0
>C12-C16 Aromatic (EH_2D_AR)	mg/kg	1800	LQM S4ULs	< 1.0	n/t	n/t	n/t	< 1.0	< 1.0	< 1.0	1.6	34.4	< 1.0
>C16-C21 Aromatic (EH_2D_AR)	mg/kg	1900	LQM S4ULs	2.8	n/t	n/t	n/t	1.1	1.2	< 1.0	3.1	80.7	< 1.0
>C21-C35 Aromatic (EH_2D_AR)	mg/kg	1900	LQM S4ULs	8.9	n/t	n/t	n/t	4.4	11.6	< 1.0	29.3	127	2.7
>C35-C40 Aromatic (EH_2D_AR)	mg/kg	1900	LQM S4ULs	< 1.0	n/t	n/t	n/t	1.0	3.0	< 1.0	14.5	8.7	< 1.0
Total aromatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AR)	mg/kg	-	LQM S4ULs	13.1	n/t	n/t	n/t	6.9	16.2	1.5	48.9	264	3.9
Total petroleum hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_Total)	mg/kg	-	LQM S4ULs	21.3	n/t	n/t	n/t	7.3	25.0	1.6	69.5	287	4.0
BTEX and MTBE													
Benzene	ug/kg	890	DEFRA C4SLs	< 10.0	n/t	n/t	n/t	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	ug/kg	880000	LQM S4ULs	< 10.0	n/t	n/t	n/t	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	ug/kg	83000	LQM S4ULs	< 10.0	n/t	n/t	n/t	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Xylenes	ug/kg	249000	LQM S4ULs	< 10.0	n/t	n/t	n/t	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
MTBE	ug/kg	-	LQM S4ULs	< 10.0	n/t	n/t	n/t	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Miscellaneous													
Fraction of Organic Carbon		-	-	0.0250	n/t	n/t	n/t	0.0100	0.0040	0.0020	0.0080	0.0150	0.0100
pH	pH units	-	-	9.7	8.7	8.8	8.5	9.0	8.9	8.8	9.7	9.4	9.2
Soil Organic Matter	%	-	-	4.0	n/t	n/t	n/t	1.6	0.5	0.2	1.1	2.4	1.5
Total Organic Carbon	%	-	-	2.5	n/t	n/t	n/t	1.0	0.40	0.20	0.80	1.5	1.0

Human Health Generic Quantitative Assessment for Soil (For the Deansgate Level FWRA)

Renaissance Hotel 1602

Key:

Exceedance of the GAC

GAC - Generic Assessment Criteria

Laboratory Report Ref.			**Residential With Home Grown Produce**	262855	262862	262863	262865	262868	262871	262873	262868	262871	262873
Exploratory Location Ref.				BH01	WS01	WS02	WS02	WS03	WS04	WS05	WS03	WS04	WS05
Sample Depth (m)				0.40	1.20	0.50	2.30	0.40	1.30	1.30	0.40	1.30	1.30
Sample Date				20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021	20/12/2021
Phenols													
Phenol	mg/kg	440	LQM S4ULs	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
M,P-Cresol	mg/kg	-	LQM S4ULs	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
O-Cresol	mg/kg	-	LQM S4ULs	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
3,4-Dimethylphenol	mg/kg	-	LQM S4ULs	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
2,3-Dimethylphenol	mg/kg	-	LQM S4ULs	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
2,3,5-trimethylphenol	mg/kg	-	LQM S4ULs	< 1	n/t	n/t	n/t	< 1	n/t	n/t	n/t	< 1	n/t
Total Monohydric Phenols	mg/kg	-	LQM S4ULs	< 5	n/t	n/t	n/t	< 5	n/t	n/t	n/t	< 5	n/t
VOCs and SVOCs													
Heptane	ug/kg	-		< 10.0	< 10.0				< 10.0				
Octane	ug/kg	-		< 10.0	< 10.0				< 10.0				
Nonane	ug/kg	-		< 10.0	< 10.0				< 10.0				
Benzene	ug/kg	-		< 10.0	< 10.0				< 10.0				
Toluene	ug/kg	-		< 10.0	< 10.0				< 10.0				
Ethylbenzene	ug/kg	-		< 10.0	< 10.0				< 10.0				
m+p-xylene	ug/kg	-		< 10.0	< 10.0				< 10.0				
o-xylene	ug/kg	-		< 10.0	< 10.0				< 10.0				
cis-1,2-dichloroethene	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,1-Dichloroethane	ug/kg	2500	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
Chloroform	ug/kg	1200	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
Tetrachloromethane	ug/kg	26	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
1,1,1-Trichloroethane	ug/kg	-		< 10.0	< 10.0				< 10.0				
Trichloroethylene	ug/kg	-		< 10.0	< 10.0				< 10.0				
Tetrachloroethylene	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,1,1,2-Tetrachloroethane	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,1,2,2-Tetrachloroetha	ug/kg	-		< 10.0	< 10.0				< 10.0				
Chlorobenzene	ug/kg	460	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
Bromobenzene	ug/kg	910	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
Bromodichloromethane	ug/kg	19	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
Methylethylbenzene	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,1-Dichloro-1-propene	ug/kg	-		< 10.0	< 10.0				< 10.0				
Trans - 1-2 -dichloroethylene	ug/kg	-		< 10.0	< 10.0				< 10.0				
2,2-Dichloropropane	ug/kg	-		< 10.0	< 10.0				< 10.0				
Bromochloromethane	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,2-Dichloroethane	ug/kg	-		< 10.0	< 10.0				< 10.0				
Dibromomethane	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,2-Dichloropropane	ug/kg	24	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
cis-1,3-Dichloro-1-propene	ug/kg	-		< 10.0	< 10.0				< 10.0				
trans-1,3-Dichloro-1-propene	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,1,2-Trichloroethane	ug/kg	-		< 10.0	< 10.0				< 10.0				
Dibromochloromethane	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,3-Dichloropropane	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,2-dibromoethane	ug/kg	-		< 10.0	< 10.0				< 10.0				
Styrene	ug/kg	35000	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
Propylbenzene	ug/kg	40000	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
2-Chlorotoluene	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,2,4-Trimethylbenzene	ug/kg	410	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
4-Chlorotoluene	ug/kg	-		< 10.0	< 10.0				< 10.0				
t-butylbenzene	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,3,5-Trimethylbenzene	ug/kg	-		< 10.0	< 10.0				< 10.0				
1-methylpropylbenzene	ug/kg	-		< 10.0	< 10.0				< 10.0				
p-cymene	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,3-Dichlorobenzene	ug/kg	440	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
Butylbenzene	ug/kg	-		< 10.0	< 10.0				< 10.0				
1,2-Dibromo-3-chloropropane	ug/kg	-		< 10.0	< 10.0				< 10.0				
Hexachlorobutadiene	ug/kg	320	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
1-2-3 - Trichlorobenzene	ug/kg	1500	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
Naphthalene	ug/kg	2300	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
1-2-4 - Trichlorobenzene	ug/kg	2600	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
1,4-Dichlorobenzene	ug/kg	61000	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
1,2-Dichlorobenzene	ug/kg	24000	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				
Bromoform	ug/kg	5200	CL:AIRE GAC	< 10.0	< 10.0				< 10.0				

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