



Our Ref: 03847AB_L_002C_JMLC-PileRisk.docx
Your Ref:

03 September 2025

RE: Fallowfield Campus DBFO – Initial Review of Piling Risk, Response to LPA

1 INTRODUCTION

Coffey Geotechnics Ltd (Coffey) have been instructed by Kennedy Redford to provide initial review of piling risk for a proposed student housing redevelopment at the University of Manchester Fallowfield Campus. A detailed Piling Risk Assessment should be prepared by the piling contractor after detailed design.

The redevelopment of the site includes several new buildings of varying height and arrangement. High-rise buildings and heavily loaded structures may require piled foundations into bedrock, depending on the depth to suitable bearing strata and the structural loads imposed.

Preliminary foundation design indicates piles are anticipated to have a rock socket length of between 2m and 4m into the extremely weak sandstone rock, depending on loading.

Our review of piling risk was issued in January 2025 and reissued in June 2025 at your request. This Issue C of this letter has been updated in response to comments from the local planning authority (LPA) to directly reference the March 2025 CL:AIRE document 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention', dated March 2025, see Section 4.6 below.

2 GROUND CONDITIONS

Table 1 gives a summary of findings of previous ground investigations at the site (2015). Additional ground investigations have been specified to cover the south-eastern corner of the proposed development and to validate the design ground model across the site to inform the design and construction methodology of piles. These are reported in the 2025 Geotechnical Interpretative Report (Ref.UMRF-COF-XX-XX-RP-Y-00003) and are generally consistent with the findings of the 2015 ground investigation.

The site area is underlain by bedrock designated as a Principal Aquifer, and the groundwater protection zone map identifies that the site is located in a Source Protection Zone III area.

During the 2015 ground investigation, groundwater entries were recorded in the exploratory holes during hole formation at depths of 0.8m to 1.5m bgl (in the Made Ground).

Groundwater installations across the site showed groundwater levels between 0.51m and 1.94m below ground level in the Made Ground. In the deeper installations with response zones in sandstone, the groundwater levels were measured at 2.15m and 8.44m bgl during hole formation, with one installation recorded as dry. These water levels in the deeper installations were only just above the base of the standpipes and it is expected water may have seeped into the installation from above the response zone and become trapped at the base of the pipe.

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During the 2025 ground investigation, groundwater levels across the site were measured between 2.7m and 2.8m below ground level in the Made Ground / Glacial Till.

In the deeper installations with response zones in sandstone, groundwater levels were measured during monitoring at between 4.8m and 15.18m below ground level. However, higher groundwater levels were measured during the 2015 investigation including water seepage during drilling at 0.5 m depth. Therefore, it is considered that the perched groundwater level may rise to around 0.5m bgl.

The results based on the first round of groundwater monitoring after the 2015 ground investigation indicate that groundwater is perched locally at shallow depths at the site within the Made Ground, overlying the more impermeable strata of the Glacial Till, expected to behave as an aquiclude.

As the Sandstone (Chester Pebble Bed Formation) is a Principal Aquifer it is anticipated to be water-bearing. The 2015 ground investigation indicated groundwater level at 8m bgl, but the 2025 ground investigation records groundwater level at 4.8m bgl.

Table 1 – Summary of Ground Conditions

Stratum	Description	Depth to base of stratum (m bgl)		Ground Model Ref: (Ref: UMRF-COF-XX-XX-RP-Y-00003) Depth to Base (m bgl)
		Min	Max	
Topsoil / Hardstanding	Topsoil / Tarmacadam	0	0.35	(Made Ground) 1
Made Ground	Mainly sand and gravel including sandstone, ash, clinker, and brick with pockets of clay.	0.2	3.1	
Glacial Till (absent in three locations where Made ground is deeper)	Generally, soft to firm becoming stiff slightly sandy CLAY with occasional gravel	1.2	4.6	(Soft to Firm) 2 (Firm to Stiff) 3
Upper Weathered Sandstone (not recorded in all places)	Fine to medium SAND	1.4	6.5	(Weathered Sandstone) 6.9
Weathered Sandstone	Extremely weak Sandstone (recovered as sand) was encountered over the majority of the site.	Top at 1.3m (Base not proven)	Top at 4.8m (Base not proven)	Not proven

3 SOIL CONTAMINATION

Review of contamination is based on information from the following reports that were produced by Coffey for a previous scheme at the site, and the 2025 Geotechnical Interpretative Report prepared for this site:

- Geoenvironmental and Geotechnical Interpretative Report – Stage 2a, dated 10 August 2015, 02428AA_R_002B_MJW-GIR- Stage 2a .
- Geoenvironmental and Geotechnical interpretative Report – Stage 2b, dated 4 September 2015, 02428AA_R_003B_MJW-GIR- Stage 2b.

- Geotechnical Interpretative Report, dated 05/06/2025, UMRF-COF-XX-XX-RP-Y-00003 (Coffey Ref. 03847AB_R_002C_RP-GIR).

The current site includes the areas of Phase 1B and Phase 2 only of the site covered by the 2015 scheme.

4 REVIEW OF PILING RISKS

The final piling design and methodology will be confirmed by the piling contractors at a later date.

At this stage Continuous Flight Auger (CFA) piles are proposed to achieve the required rock socket penetration. The piles will be founded in the weathered Sandstone.

4.1 Soil Contamination

The site contains significant deposits of Made Ground, up to 3.1m in depth, with concentrations of several potential contaminants found slightly above their respective detection limits, including but not limited to: arsenic, mercury, total polycyclic hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH). It is expected that fragments of asphalt / tarmac are present within the Made Ground which are likely to be the source of the TPHs and PAHs exceedances.

In addition, Chrysotile Asbestos was identified in two trial pits at the southern end of the site during the 2015 ground investigation, and asbestos was identified at the location of one boreholes during the 2025 ground investigation.

It is recommended that the localised presence of asbestos within the Made Ground at the site should be documented within all required Health & Safety (CDM or Contractor's) risk assessments required for construction work including the pre-construction information pack for tenderers.

The risk of chronic exposure to asbestos should be managed by the adoption of good general working practices (during all ground-works) such as dust suppression, use of standard PPE and good standards of hygiene, together with guidance and direction from a suitably qualified and experienced asbestos specialist.

Any Made Ground containing asbestos which is to be taken off site may need to be treated and would require disposal at a suitable licenced landfill site. In terms of post-construction site use, near-surface soils in the landscaped/soft-standing parts of the site need to be devoid of asbestos. This can be addressed by ensuring that the upper 600mm of all such areas consist of cover soils that are uncontaminated and in particular are devoid of asbestos.

4.2 Groundwater Contamination

During the 2015 ground investigation, slightly elevated levels of lead (0.011mg/l), nickel (0.027 mg/l) and PAH (0.0061mg/l) were detected in groundwater samples.

4.3 Obstruction and man-made voids

The presence of man-made voids or obstructions cannot be discounted and, if present, these may affect piling activities.

A post-demolition survey of the site is recommended to identify potential man-made voids, such that foundation design and arrangement can be adapted accordingly.

4.4 Unexploded Ordnance (UXO)

The during the Second World War, the site was situated within an area which recorded bombing, with a frequency of 26 strikes per 1000 acres, which is considered relatively low; however, the site was home or in close proximity to railway facilities and an anti-aircraft battery, which were potential targets. The site also recorded 2 direct bomb strikes.

It is recommended that UXO specialist is consulted in order to determine if any specific mitigations are required.

4.5 Summary

Soil contamination has been identified within the Made Ground and groundwater.

The proposed piling technique is CFA piling which involves casting the piles in situ against the formation as material is simultaneously removed from the excavation. Well-constructed piles should form a seal between the Made Ground and underlying materials. It is therefore anticipated that the CFA piling will not create an open vertical pathway through the geological strata at the site.

Piling may provide a more direct route for potentially contaminated groundwater entering the aquifer. However, on the basis of the site history, current features and observations made during the site inspection, gross/site-wide mobile ground contamination sources are considered unlikely to exist.

CFA piling will result in potentially contaminated materials being brought to the surface during piling activities. Previous reports have concluded that the main risk to site / construction workers is considered to be inhaling of the air-borne asbestos from disturbed Made Ground containing ACM. This can be addressed by taking appropriate precautions such as damping down ground to reduce air-borne fibres, wearing appropriate breathing apparatus and provision of appropriate training/guidance, PPE and welfare facilities during the works.

Previous reports have concluded that the main risk to end users is considered to be asbestos in the Made Ground which can be addressed by ensuring that the upper 600mm of all such areas consists of cover soils that are uncontaminated, and in particular are devoid of asbestos.

There is a risk that contamination of groundwater may occur locally to the piles as a result of the pile concrete or grout entering groundwater. It is considered that this additional risk may be mitigated by the contractor following good working practices.

On the basis of the above, it is considered that no significant pollutant source-pathway-receptor linkages are considered to be present as a result of the CFA piling activities.

4.6 CL:AIRE 2025

While we have not previously directly referenced the CL:AIRE 2025 document, our assessment has been undertaken in accordance with the principles of a Foundation Works Risk Assessment (FWRA), as summarised below:

- The GIR (Coffey Ref. 03847AB_R_002C_RP-GIR):
 - Gives detail of the site setting, geology, and groundwater conditions at the site.
 - Includes a CSM which identifies geological strata, proposed piling and receptors and Geo-Environmental Risk Assessment which concludes that the risk to groundwater is LOW.
 - Describes the proposed piling methodology (i.e. continuous flight auger CFA piling: a replacement piling technique) and its technical justification.
- The Initial Review of Piling Risk:
 - Summarises the site specific potential adverse environmental impacts that may affect or be caused by piling.
 - Considers the proposed piling methodology and concludes that these risks may be mitigated by the contractor following good working practices, which would include a robust QA/QC regime, as described in the Summary.

Our Initial Review of Piling Risk concluded that no significant pollutant source-pathway-receptor linkages are considered to be present as a result of the CFA piling activities. This is consistent with the CL:AIRE 2025 classification of B - Low Risk, subject to appropriate workmanship and outlined mitigation measures.

The CL:AIRE document provides seven Pollution Scenarios to consider in the assessment of piling risk. We have reviewed each of these for this site, as summarised in Table 2 at the end of this letter, to further justify our overall assessment of Low risk of CFA piling at this site.

The Initial Review of Piling Risk has been prepared on the basis of the GIR and, as stated within it, a detailed Piling Risk Assessment (or Foundation Works Risk Assessment) should be prepared by the piling contractor after detailed design. The approach presented is consistent with the activities identified for in advance of detailed design in Table 6.1: 'Foundation risk assessment process and stages' within the CL:AIRE 2025 document: "Develop preliminary risk assessment and options appraisal for foundations using site investigation data" [and] "For simple low risk sites the assessment maybe part of the GIR and a specific FWRA may not be required".

In summary, the GIR and Initial Review of Piling Risk show that there is no resultant unacceptable risk to groundwater from the proposed CFA piling and we consider that the requirements of the FWRA have been met.

Please don't hesitate to call if you'd like to discuss any aspect of the project.

Yours sincerely,

For and on behalf of Coffey Geotechnics Limited



Table 2: Summary of consideration of CL:AIRE 2025 Pollution Scenarios

Pollution Scenario	CL:AIRE 2025 Indicative Classification for Replacement Piles	Site-Specific Assessment of Classification	Mitigation Measures & Justification of Site-Specific Assessment
1. Creation of preferential pathways, through a low permeability layer, to cause contamination of groundwater in an aquifer	A-C (dependent on details of method)	B	CFA Piling proposed to maintain support to soil so low risk of collapse of soil to create preferential flow pathways. CFA Piling proposed to maintain support to soil so low risk of vertical water flow. Appropriate QA/QC methods should be incorporated into the works to enable workmanship to be monitored and verified.
2. The driving of solid contaminants down into an aquifer during pile driving	A	A	CFA Piling proposed so drag down cannot occur as the soil spoil is constantly moving up the auger flights.
3. Contamination of groundwater and subsequently surface waters by turbidity, support fluids, concrete, cement paste or grout	C-D (dependent on details of method)	A	CFA Piling proposed to maintain support to soil. Low risk as high groundwater flow rate not anticipated.
4. Direct contact with contaminated soil or leachate causing degradation of pile materials	A-C (dependent on pile materials and contaminants)	B	GIR concludes Design Sulphate Class and ACEC Class of DS-2 and AC-2 respectively. The pile materials have thus been appropriately specified to avoid degradation by surrounding soils.
5. Creation of preferential pathways to allow migration of landfill gas or contaminant vapours to surface	A	A	No landfill gas or contaminant vapours anticipated. CFA piling proposed to maintain support to soil so no formation of preferential pathways forward gas migration in any case.

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Pollution Scenario	CL:AIRE 2025 Indicative Classification for Replacement Piles	Site-Specific Assessment of Classification	Mitigation Measures & Justification of Site-Specific Assessment
6. Causing off site migration of ground gas or increased vertical emissions as a result of vibration or other effects from the pile installation process	A	A	No landfill gas or contaminant vapours anticipated. CFA piling proposed and would not cause disturbance of the ground sufficient to cause off site migration of gas in any case.
7. Direct contact with contaminated soil arisings that have been brought to the surface	B-C (dependent on contaminants)	B	CFA piling creates arising which will have to be dealt with in accordance with Waste Management Legislation. GIR assesses Low Risk to construction workers from contamination in the soils, and High/Moderate Risk from Asbestos (primarily in the Made ground). The Remediation Strategy should be followed where contamination or asbestos are identified. The Principal Contractor's Construction Phase Plan and Risk Assessment/Method Statements will be developed to manage these potential (low) risks to construction workers.

CL:AIRE 2025 classification

A: Negligible risk - Pollution scenario not likely to be an issue if using this method provided workmanship and QA/QC measures are appropriate

B: Low risk - Subject to appropriate workmanship, mitigation and QA/QC measures, to be outlined in the FWRA (as a section in the geoenvironmental report - see Chapter 17) and incorporated in the design and contract specification, this method is likely to be acceptable.

C: Moderate risk - This method may be considered acceptable, depending on specific type used and subject to appropriate workmanship, mitigation and QA/QC measures, to be outlined in the FWRA report. However, a more suitable piling or ground improvement method may be available.

D: High risk - This method should normally be avoided on sites where this pollution scenario is likely to be an issue.