25415 – Plot H, Sister.

Piling Strategy Contamination Risk Assessment.

RGRE Ltd, ID Manchester Ltd and The University of Manchester.

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Inspiring Built Environments

Civil & Structural Engineering
DfMA & Precast Concrete
Below Ground Drainage

Introduction

The contents of the Design Note cover the proposed form of the piling to be adopted for the foundations on the new residential development at Plot H of the Sister development at Charles St in Manchester.

The piles will be designed by a specialist subcontractor, Green Piling, who have input into this document, having undertaken numerous projects in Manchester.

The Site

The site (0.742 ha) is currently predominantly occupied by a vacant four-storey carpark and two-storey public house and coffee shop to the eastern end on Sackville Street. The carpark contains a basement, deepest to the eastern portion, that is formed with retaining walls to all sides. The western-most section of site is populated by mature trees which are to remain in the proposals.

To the north of the site a narrow strip of land, known as Altrincham Street, runs between the car park and the Altrincham Railway viaduct. To the south, the site is bounded by Charles Street.

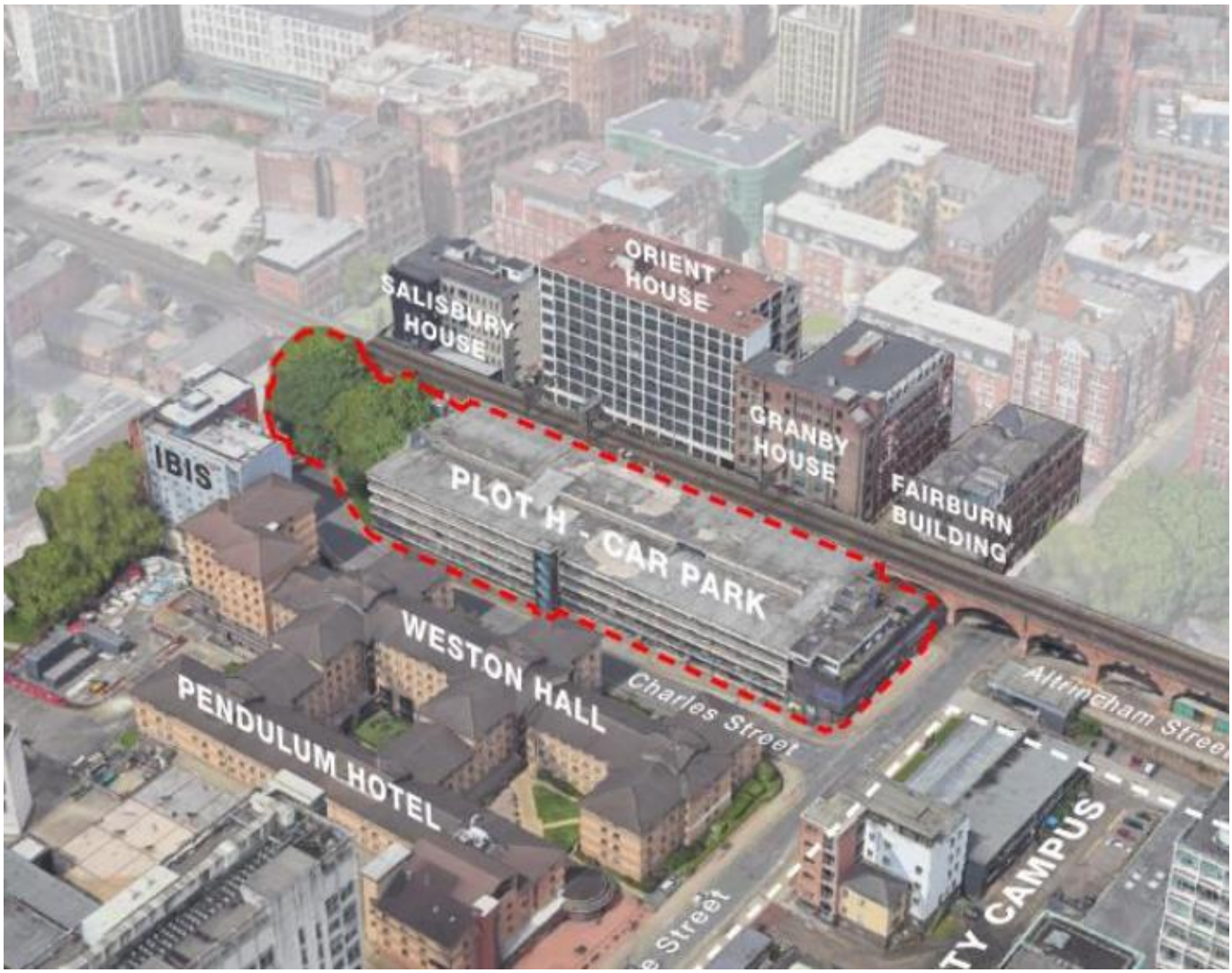


Figure 1 - Plot H in context of surroundings

Proposals

The proposed development comprises Purpose Built Student Accommodation (PBSA) with ground floor flexible commercial floorspace across three buildings of 8, 10 and 38 storeys, with a two-storey podium.

In order to facilitate this, the existing structures on the site are to be demolished in their entirety. This demolition is subject to a separate planning application (ref. 143741/FO/2025).

Geology

As part of the wider Sister masterplan a phase 2 detailed investigation was undertaken and Roscoe have been provided with a copy of the associated Interpretive Report (ref. UNMC-ARUP-ZZ-XX-RP-CG-0004, prepared by Ove Arup and dated 16th April 2020). The investigation included for two boreholes on the Plot H section of the site (ARP-BH013 and ARP-BH014).

Following demolition of the existing structures, a more detailed project specific site investigation is to be undertaken, however the existing investigation has enabled a pile design to be undertaken by specialist piling contractor Green Piling. A Phase 1 Preliminary Geoenvironmental Appraisal has been produced by Calabrian (Report No. 7356/1C) and is included as part of the planning application.

ARP-BH013 found made ground comprising a mix of granular and cohesive materials to 5.3m depth with medium dense gravelly sand (Alluvium) beneath. At 8.0m very dense sand was encountered (Weathered Sherwood Sandstone) which was cored below 10.5m and recovered as extremely weak to weak sandstone to the borehole's full depth at 16.5m.

Within ARP-BH14 similar ground conditions were found with made ground to 5.8m and granular Alluvium to 9.4m where again weathered sandstone and sand was found.

Groundwater monitoring within ARP-BH013 found groundwater at around 5.4m depth on six occasions. Samples taken of the groundwater appeared to be "clean". Samples of made ground from both boreholes found some slightly elevated concentrations of PAH compounds.

The site investigations undertaken identify the presence of aquifers (superficial and bedrock) beneath the site.

The Shooters Brook ordinary watercourse is culverted beneath the site. Roscoe have liaised with the LLFA and the EA with regards to the presence of this and gained agreement the building over this is acceptable.

Given the presence of secondary aquifers and the culverted watercourse beneath the site, it is considered to be of moderate sensitivity with regards to contamination.

The cross-section below, taken from the Phase 1 Preliminary Geoenvironmental Appraisal by Calabrian (Report No. 7356/1C), shows the preliminary conceptual site model.

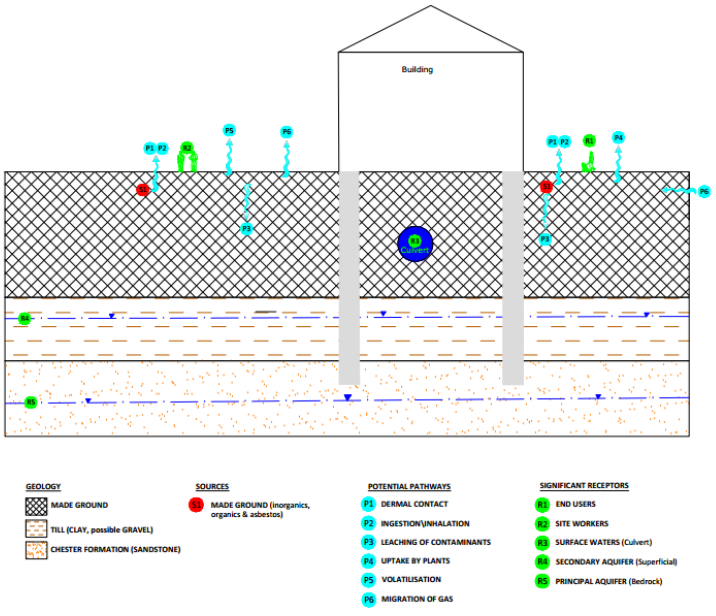


Figure 2 - Indicative conceptual site model

Foundation Solution

Foundations are to utilise piles which transfer loads into the adequate strata at depth. The basement will utilise contiguous bored piles to form retaining walls.

It is intended that piles will be formed via contiguous flight augur method, installed through made ground, overlaying occasional bands of sand/gravels, socketing into the sandstone bedrock at depth.

Foundations and floor slabs will bridge over the culvert thus avoiding any load being placed onto it.

Based on previous experience that Green Piling have in the locality, the ground water risk assessment below has concluded that CFA piles are the most appropriate to prevent any contamination of the aquifers.

Risk Assessment

Pollution Scenario	Source (S) Pathway (P) Receptor (R)		Comment
Creation of preferential pathways to allow potential contamination of an aquifer.	S	Contaminated Made Ground	**Risk: Low** The proposed piling method is CFA which is a non-displacement method of piling. Theoretically, any disturbance to the ground is minimal and there should be no formation of preferential pathways, as the concrete cast in intimate contact with the surrounding soil.
	P	Pile / soil interface	
	R	Secondary and Principal Aquifers	
The driving of solid contaminants down into an aquifer during pile driving.	S	Contaminated Made Ground	**Risk: Low** Proposed piling method is CFA which is a non-displacement method of piling.
	P	Pile / soil interface	
	R	Secondary and Principal Aquifers	
Contamination of groundwater, and subsequently, surface waters by wet concrete, cement paste or grout.	S	Construction Materials	**Risk: Low** The site is located within a Groundwater Source Protection Zone and piles are proposed to extend beneath groundwater levels within the upper and lower Aquifers. Whilst the risk of contamination cannot be discounted the impact is assessed as low as both concrete and grout have low mobility potential.
	P	Migration via permeable strata	
	R	Groundwater	
	P		
	R		

The below assessment outlines the bored CFA piling process to be undertaken by Green Piling.

Piling Assessment

During the pile boring process, no material is forced or transported downward. The maintenance of a positive outward pressure differential across the side wall of the pile inhibits the flow of any groundwater into the pile and the potential for migration of contaminated water to lower levels during excavation. Similarly, during concreting, a positive outward pressure differential is exerted across the side wall of the pile. Inward flow of groundwater to the pile is therefore inhibited and no new pathway for migration to lower levels is introduced. The National Groundwater & Contaminated Land Centre report NC/99/73 Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention states that “provided that the pile is formed or placed in intimate contact with the surrounding soil there should be no formation of preferential pathways”. This is the case with CFA piling where concrete is cast directly against the side walls of the pile. When exposed these side walls exhibit the surface characteristics of the adjacent soil (e.g. a roughened surface when cast against gravel) demonstrating the intimacy of contact that is achieved.

On the basis of this assessment, it is reasonable to conclude that the installation of CFA piles will not directly transfer contaminated material to lower levels, will not introduce preferential pathways for ground water migration during or following construction, and will therefore not lead to contamination of the lower aquifer.

Conclusion

As part of this assessment a number of potential adverse environmental impacts have been considered and assessed on a qualitive basis. The overall risks associated with the proposed foundation works are considered to be low and the use of CFA piles is considered appropriate for the ground conditions at the site. Nevertheless, site teams will be specifically briefed on the presence of contamination on the site. The briefing will highlight the importance of personal hygiene, use of personal protective equipment and spoil handling. This will all be in accord with established Green Piling procedures.

All piling works will be completed as per Green Piling RAMS.