Echoes of the past at the former Rochdale Road Gas Works, Manchester

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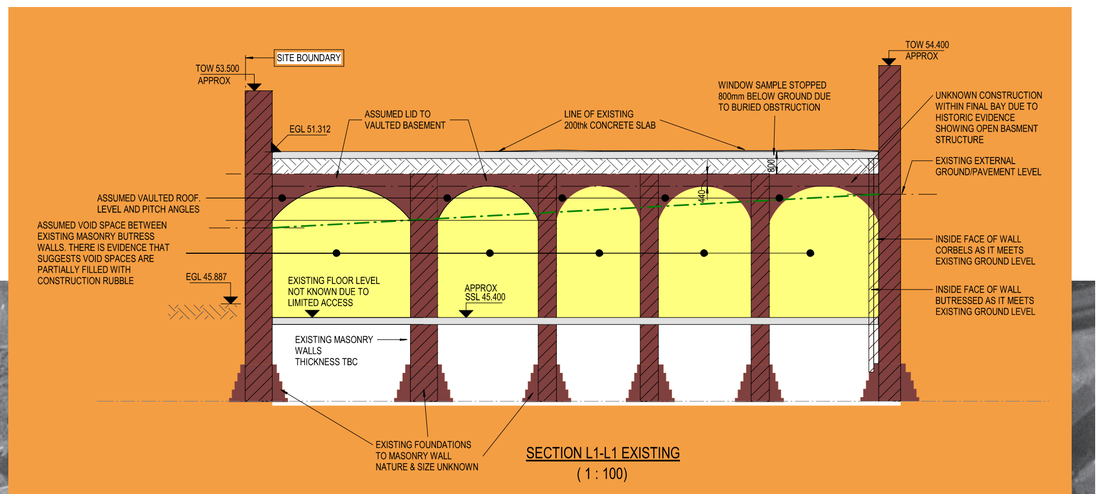
Setting the scene

Originally built in 1824, part of the former Rochdale Road Gas Works site will be brought back to life as part of the Rochdale Road regeneration. Part of Manchester City Council's Victoria North strategic regeneration framework, the development is set to include a multi-level residential scheme with basement and parking.

With a fascinating past, this site has been home to heavy industry and required accurate investigation and characterisation to identify potential contamination hazards. Waterman's team conducted a geo-environmental risk assessment. Following the Environment Agency's review the supplementary geotechnical and hydrogeological assessment of the Boulder Clay was undertaken.



Hidden challenges

The ground conditions at the site posed challenges due to the presence of both known and unknown extensive open tunnel network and masonry walls below the ground. Some areas were deemed unsafe for intrusive investigations, with some tunnels found to be infilled with asbestos tiles. This sparked local interest, with footage emerging from a local Manchester urban explorer venturing into the underground tunnels.

Through site characterisation elevated concentrations of diesel contamination were recorded at the base of made ground at the interface with the Glacial Till, heavy fraction TPH recorded within perched groundwater. The team also discovered that gas works waste had been used to infill one of the tunnels, whilst metals and PAHs, including Naphthalene, were found within the soil and perched groundwater across the site.

The recorded ground conditions included a thickness of Made Ground (1.1-7.8m) underlain by Glacial Till (Boulder Clay) (13.0-19.2m) with occasional lenses of sand, followed by Chester Formation (Sandstone), classified as a Principal Aquifer. This was discounted as a key receptor due to the significant thickness of low-permeability Glacial Till acting as a barrier for vertical migration.

Unlocking a legacy

The expansive site spanned over 9 acres, including 4 retort houses, with a capacity of producing 8,500,000 cubic feet of gas daily. Since the end of the 18th century, the site was home to a locomotive/goods shed outside of the main works tramline infrastructure which was used for coal transportation for off-site refining. In the early 1940s, reorganisation and reconstruction led to alterations and clearance of existing above-ground structures. The site retains several subterranean features, many of which remain un-categorised. Potential contamination which may result from historic gas works includes **tars**, **phenols**, **arsenic**, and **cyanide**.

A new lease of life

The Rochdale Road regeneration will transform the derelict former gas works site into a thriving multi-level scheme with 237 residential apartments and basement car parking. Waterman's team carried out extensive ground investigations, and analysis of soil and groundwater including ground gas monitoring. Based on the findings, we then prepared a remediation strategy for the proposed development.

"Altrincham based McGoff Construction Limited are undertaking this challenging brownfield City Centre regeneration project for Downtown Victoria North, expertly supported by our valued engineering consultants Waterman." - McGoff Construction

Assessing the risks to controlled waters: lines of evidence

The Environment Agency (EA) challenged the submitted risk assessment, expressing concerns about the underlying clay's cohesiveness as indicated by the exploratory logs. In addition, the EA had concerns regarding the proposed underground car park dig (c. 4.5m bgl) further reducing the possible protection to the Principal Aquifer.

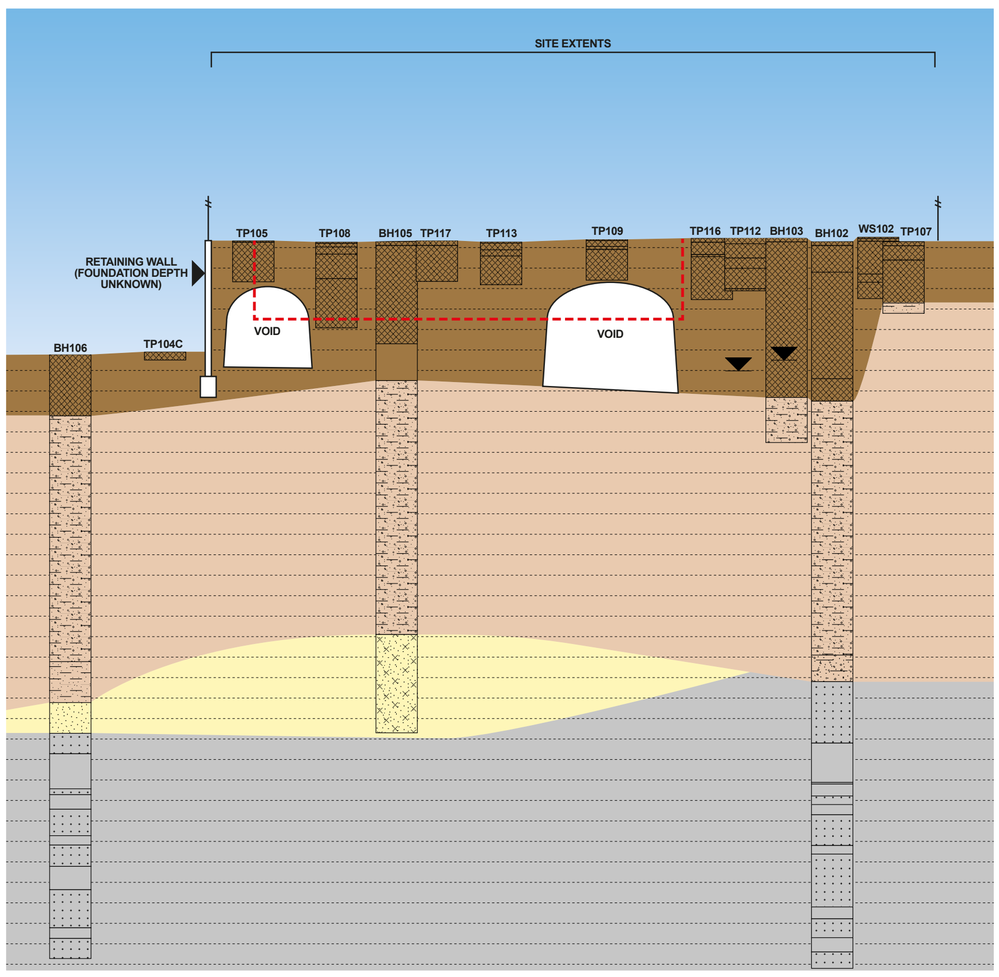
To demonstrate how the basement interacts with the recorded geology, we conducted a series of **geological cross sections** to demonstrate that the surface of boulder clay is of c. 12.6m – 19.2m thickness, with interbedded sand bands recorded at depth in one location (20m bgl) only.

The basement was overlaid onto these cross sections showing that the proposals do **not reduce the thickness of the underlying Boulder Clay**.

The team further assessed the permeability of Glacial Till (Boulder Clay) to establish additional evidence indicating the risk of potential vertical migration. The results of the Particle Size Distribution (PSD) were then used to assess the **hydraulic conductivity** using Hazen's Formula defined as:

$k = C \times (D_{10})^2$

Based on site specific data and a comparison with the literature values (as given in **Domenico & Schwartz (1997)**) the permeability of the clay is considered to be low. Together with the substantial thickness (a minimum of 12.6m), this indicated that the vertical migration of impacted perched water to the deep Sandstone Principal Aquifer will be **severely restricted**.



A successful outcome

Having submitted the additional information to the EA for review, they confirmed their satisfaction with the full discharge of a planning condition, allowing the development to go ahead.

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