CASE STUDY

Ground Investigation

Milford Mill, Derbyshire

Client

Environmental Consultant / Site Investigation Contractor

Project Background

The proposed £22m development at Milford Mill will comprise of 69 new homes to be delivered on the historic brownfield site, which is within the Derwent Valley Mills UNESCO World Heritage Site.

The site is located at national grid reference 435010, 345250 and its elevation ranges from 60m AOD (metres above ordnance datum) in the north rising to 65m AOD In the south. The site pre-demolition is shown in Figure 1 below.

Figure 1 – Site Pre-Demolition

The proposed development is shown in Figure 2 below.

Figure 2 - Proposed Development

[source - Construction Commences at Wavensmere's £22m Milford Mills Scheme in North Derbyshire | Wavensmere Homes]

The southern and central parts of the site are broadly rectangular and extend to approximately 0.9hectares. This part of the site had previously been occupied by mill buildings, which had been demolished ahead of these works. This part of the site was being redeveloped for a residential end use. This area sloped gradually down from the south to the north. An uncovered lade runs through this part of the site from north to south. This part of the site was surfaced with demolition rubble and Made Ground, with relict below ground structures visible in places.

The site post-demolition is shown in Figure 3 below.

Figure 3 – Site Post-Demolition

The northern part of the site is shown in Figure 4 below.

Figure 4 – Northern Part of the Site

Scope of Works

Envirotreat was appointed by Wavensmere Homes to complete a Supplementary Phase 2 Site Investigation in 2022.

The prime objective of this detailed supplementary investigation was to provide additional data on ground conditions.

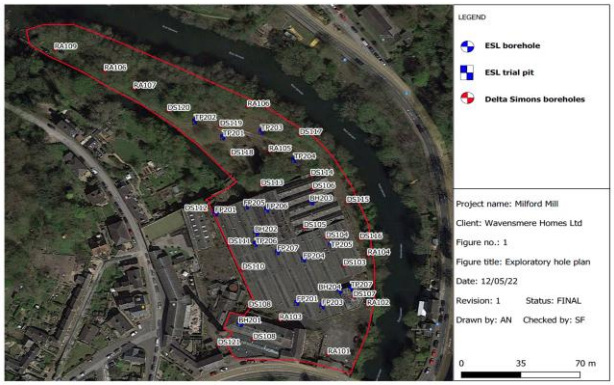
The site has been previously subjected to a Phase 1 and 2 Site Investigation by a third party. Their report made two recommendations in relation to further site investigation. Firstly, due to the presence of the former mill building, there was an identified data gap in this part of the site - it was therefore recommended that ground conditions were investigated in this area to ensure they were consistent with those identified elsewhere. Secondly, the report recommended that, if piled foundations were required, deeper boreholes would be needed to provide pile design parameters.

Envirotreat's scope of works therefore comprised of:

- Drilling 4 No. boreholes (BH201 to BH204) to a depth ranging from 12m to 17m bgl (metres below ground level) using percussive and rotary techniques
- CPTs (cone penetration tests) to be completed in granular soils and bedrock
- Excavation of 7 No. trial pits (FP201 to FP207) to inspect below ground structures
- Excavation of 7 No. trial pits (TP201 to TP207) to characterise ground conditions
- Collection of soil samples for geoenvironmental and geotechnical laboratory analysis
- Topographic surveying of exploratory holes

The ground investigation plan is shown in Figure 5 below.

Figure 5 - Ground Investigation Plan



A detailed assessment of the hydrogeological regime was excluded from the scope of Envirotreat's works (as controlled waters linkages were previously concluded to be low). However, a monitoring standpipe was installed to allow monitoring of groundwater rest levels.

Soils and rock were recovered from each exploratory position for logging and sampling. Each position was logged by an experienced geologist in general accordance with BS5930:20152. Field evidence of contamination was noted, with observations of contamination used to guide soil sample collection.

In-situ penetration tests, comprising of CPTs, were completed at regular intervals in each borehole in accordance with BS EN ISO 22476-3:20053, with uncorrected blow counts, expressed as 'N' values.

Field tests of rock strength were completed. These comprised of striking rock samples with a hammer until they broke.

Site Investigation Findings

Ground Conditions

Made Ground was noted to be present between 0.5m and 2.6m bgl and typically overlaid soft silty clay (interpreted as Alluvium). Alluvium was absent from borehole BH201, located in the west of the site, but noted elsewhere to between 2.35m and 5.3m bgl. Beneath the Alluvium (and directly beneath the Made Ground in borehole BH201), a coarse-grained granular material was encountered. This was previously described as weathered Ashover Grit Bedrock. However, further investigation by Envirotreat showed the material to be head deposits containing sandstone gravel with medium cobble and boulder content. This was noted to be present at depths ranging from 5.0m and 11.8m bgl, with depths increasing towards the east of the site and the River Derwent. Underlying bedrock comprised moderately strong thinly laminated sandstone and was proven to a maximum depth of 17m bgl.

Groundwater strikes were noted between 2.5m and 3.0m bgl, with rest levels measured at approximately 1m bgl.

Foundation inspection pits were excavated adjacent to a retaining wall along the western site boundary and the lade wall. The retaining wall was noted to have no footing and was constructed directly off weathered bedrock. The lade foundation pit is shown in Figure 6 below.

Figure 6 – Lade Foundation Pit

Trial pitting in the northern area is shown in Figure 7 below.

Figure 7 – Trial Pits (Northern Area)

Geoenvironmental Assessment

Made Ground was broadly consistent with the previous assessment. Geoenvironmental analysis of soils to be cut from the northern part of the site (for reuse to raise the development platform) were noted to be impacted with lead, PAH and asbestos. These soils were shown to be unsuitable for reuse or retention at shallow depths in areas of public open space [POS] and private gardens. A protective capping layer was therefore required in these areas to address potential risks to human health.

Geotechnical Assessment

Envirotreat concluded that piles would likely comprise of CFA or bored piles terminating in the upper part of the bedrock. Given the foundations are to be piled, suspended floor slabs will be required. Made Ground to be excavated from the northern part of the site (for reuse) was previously noted to be very loose to loose and very soft to soft. It is assumed that fill will be placed in layers and compacted.

Conclusion

Envirotreat recommended that the groundworks contractor prepare a Remediation Method Statement [RMS] detailing the works required to ensure safe development of the site.

Any reuse of site-won material will be completed in accordance with best practice as set out in CL:AIRE's DoW:CoP.