CASE STUDY
Ground Investigation

Former Rolling Mill, Wolverhampton

Client

WAVENSMERE HOMES

Environmental Consultant
Site Investigation Contractor

envirotreat®

Site Background & History

The site is located approximately 1 mile east of Wolverhampton City Centre and is broadly rectangular covering an area of around 7.2 hectares. It is split into three main areas - the former canal depot east of Qualcast Road, the rolling mill area west of Qualcast Road and the former Crane Foundry / Chemical Works area.

Earliest mapping (1884) had shown the site to be occupied by the Horseley Fields Ironworks and later by the Osier Bed Iron Works in 1902. Railway lines were present in the north with canal basins (now infilled) located to the east and west of the Foundry / Rolling Mills site. The Crane Foundry and Chemical Works occupied the western part of the site from 1886 until 2006.

The site has been purchased by Wavensmere Homes who are redeveloping the site for primarily residential end use with the construction of around 500 new residential units.

The site is shown in Figure 1 below. The proposed development is shown in Figure 2 below.

Figure 1 – Site Overview

Figure 2 – Proposed Development Layout

Following instruction from Wavensmere Homes, Envirotreat completed a site walkover / desk study investigation prior to the commencement of a Phase 2 intrusive investigation. The areas of the site are summarised below.

Rolling Mill Site East of Qualcast Road:

This area was vacant – this area of the site was largely wooded with heavy undergrowth vegetation. No above ground structures remained. This is shown in Figure 3 below.

Figure 3 – Rolling Mill Site East of Qualcast Road

Rolling Mill Site West of Qualcast Road:

The main central building (steel frame) occupies the centre of the site. All machinery and equipment had been removed. Numerous smaller (older) buildings were present comprising brick structure and asbestos cement sheet rooves. Three further buildings were located southwest of the main building, all of which were boarded up with no access and no discernible external features. Two underground storage tanks are known to be present adjacent to a building located to the west of the main rolling mill site which sits adjacent to the railway.

This is shown in Figure 4 below.

Figure 4 – Rolling Mill Site West of Qualcast Road

Former Foundry and Chemical Works:

The main access to this part of the site is through the rolling mill site west of Qualcast Road.

The railway viaduct runs directly through the site largely denoting the boundary between the former foundry and the rolling mill parts of the site.

No above ground structures were observed; the area was surfaced with concrete hardstanding and heavily vegetated in parts.

The former foundry and chemical works are shown in Figures 5 and 6 below.

Figure 5 – Former Foundry

Figure 6 – Former Chemical Works

Phase 2 Intrusive Investigation

The overall aims of the investigation / scope of works were as follows:

- To understand the contamination risks to human health and controlled waters associated with the historical use of the site
- To establish below ground conditions and their variability across the site

- To inform contamination potential, ground gas risk and geotechnical considerations for the future development, and
- To collect data on the geotechnical properties of the underlying soils

Envirotreat specified the following works to achieve the identified objectives:

- Installation of 5 No Cable Percussive and rotary follow-on boreholes across the former foundry area including in situ SPTs, including groundwater installations across natural strata
- Installation of 3 No cable percussive boreholes within the former rolling mill site to laterally delineate soil impacts, including groundwater and gas well installations
- Installation of 4 No rotary open hole boreholes within the rolling mill site to vertically delineate soil impacts
- Excavation of 35 No trial pits across the whole site including in-situ geotechnical testing
- Excavation of 2 No slit trenches in the former crane foundry / chemical works area to locate the historical canal wall associated with historical wharfs
- Collection of suitable soil and groundwater samples for appropriate geochemical and geotechnical testing
- Completion of DCP CBRs (dynamic cone penetration CBRs) adjacent to each borehole location
- 1 No round of groundwater / surface water sampling and 2 No rounds of ground gas monitoring level monitoring
- Topographical survey of newly installed and identifiable historical boreholes.

The respective borehole locations are shown in Figure 7 below.

Figure 7 – Intrusive Borehole Locations

Borehole Drilling

Borehole locations were broken out using a hydraulic breaker as required. A 1.2m deep service avoidance hand pit was advanced prior to drilling. The boreholes were supported with steel casing starting at 200mm diameter in made ground and reducing to 150mm in natural soils. SPTs were completed at 1m intervals to 5mbgl then at 1.5m intervals. These were alternated with UT100 sampling in suitable cohesive soils. On completion, the boreholes were either backfilled with arisings or a monitoring well. BHs 301 to 305 were left open for rotary rig follow on drilling.

Rotary drilling was commenced from ground level using open hole techniques and 150mm steel casing support used. The rotary follow-on drilling commenced over the previously completed cable percussive borehole and used rock coring techniques and air / mist. CPTs were completed at 3 m intervals.

This borehole drilling is shown in Figures 8 and 9 below.

Figure 8 – Cable Percussive Drilling

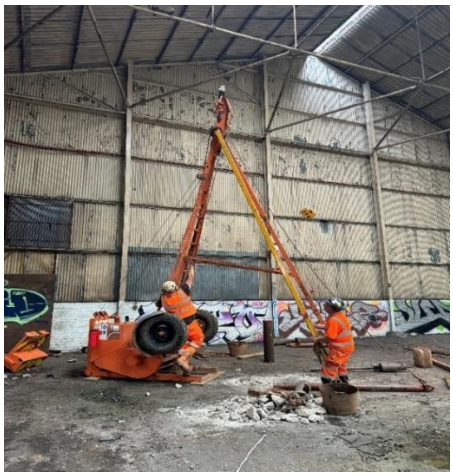

Figure 9 – Rotary Drilling

Trial Pit Excavations

A total of 35 trial pits were excavated across the site (to increase the coverage of the investigation across all three areas of the development site). Hardstanding was broken out using a hydraulic breaker and the trial pits were advanced using a tracked 13 tonne excavator to a maximum depth of around 4 m bgl. Following detailed logging and appropriate soil sampling, the arisings were replaced (in reverse order) and bladed flat.

The trial pit excavation works are shown in the Figures 10 and 11 below.

Figure 10 – Trial Pit Excavations

Figure 11 – Typical Trial Pit Arisings

Slit Trench Excavations

Two slit trenches were advanced within the former crane foundry / chemical works area of the site with the intention of locating the infilled wharfs relating to the canals shown on historical maps. Concrete hardstanding was removed using a hydraulic breaker attachment and were then excavated using a 13-tonne tracked excavator and advanced until the canal wall structure was exposed. Once exposed a comprehensive photographic record was produced and the co-ordinates logged.

The slit trench excavations are shown in Figures 12 – 15 below.

Figure 12 – Slit Trench Excavation in the Former Crane Foundry Area

Figure 13 – Slit Trench Excavation in the Former Crane Foundry Area

The canal wall can be seen in the centre of Figure 13 above

Figure 14 – Slit Trench Excavation in the Former Chemical Works Area

Figure 15 – Slit Trench Excavation in the Former Chemical Works Area

The canal wall can be seen in Figure 15 above.

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Site Investigation Findings

Ground Conditions

The ground investigation has confirmed the site to be underlain by extensive granular Made Ground, including ash, clinker and slag, over firm to very stiff cohesive Glacial Till and weathered mudstone and sandstone bedrock of the Clent and Enville Formation.

Laboratory Analyses

Soil and groundwater results were screened against appropriate GAC for future residential and commercial end users - this confirmed elevated concentrations of heavy metals, aliphatic hydrocarbons, chlorinated hydrocarbons and 1,2,4 – Trimethylbenzene above the respective thresholds. These were limited to a hotspot around BH205-RC located within the former rolling mill area of the site.

Ground Gas Monitoring

Two post installation rounds of ground gas monitoring were undertaken and confirmed characterisations of CS2 for the area east of Qualcast Road and CS1 for the remainder of the site.

Following the completion of the ground investigation several recommendations were proposed to the client regarding further work as the development progresses and the requirement for a robust and cost-effective remediation strategy.

Conclusions

Envirotreat has completed the ground investigation at the Canalside Site in Wolverhampton in accordance with BS10175. The findings and recommendations have ensured the client is in full possession of the ground condition information across the whole of the development area.

The conclusions and recommendations proposed by Envirotreat have enabled the development to be phased appropriately to maximise the logistical requirements for the development and to identify significant cost savings as the development progresses.

Envirotreat is providing ongoing support to Wavensmere on specific matters relating to site investigation and remediation.