



### **Site Background & History:**

Cavaghan and Gray is a food manufacturing business based in Carlisle – the company is now owned by 2 Sisters Food Group. Due to continued growth, they proposed to expand one of their existing facilities in Carlisle.

### **Project Outline:**

The client appointed Envirotreat to their design team and instructed us to prepare a combined Phase 1 and Phase 2 site investigation for the site. This report was to be completed to a very tight deadline to achieve an ambitious planning application programme. Envirotreat worked with the client's structural engineers, Baynham Meikle, to design and complete the geotechnical aspect of the work to facilitate geotechnical design.

The proposed development area is shown in Figure 1 below.

Figure 1 – Development Area



### **Site Investigation:**

#### Phase 1:

The Phase 1 risk assessment was produced based on the risks identified – this included a desk top study, a site reconnaissance and the provision of an outline conceptual site model [CSM].

Based on the findings of the Phase 1, a plan for an intrusive ground investigation was prepared to better understand the risks / linkages indicated.

#### Phase 2:

The Phase 2 intrusive scope of work comprised of windowless boreholes, cable percussion boreholes, trial pitting excavations and soil laboratory analysis.

The scope of work comprised of the following:

- 8 No. cable percussion / rotary boreholes with installations
- 6 No. windowless boreholes some with installations
- 7 No trial pit excavations to assess the nature of the made ground / natural soils
- 2 No. soakage tests

- A range of geotechnical and chemical laboratory testing
- Groundwater monitoring and ground gas assessment
- Provision of a factual report on completion

#### Rationale for Exploratory Holes:

Boreholes were generally positioned to provide even, non-targeted coverage of the site. Positions were agreed in advance with site staff so as to not impact on operations, which included frequent HGV traffic across the site. Trial pitting was confined to parts of the site without hardstanding away from the active site operations.

A single targeted exploratory hole was included within the scope of work. This was a trial pit targeted immediately adjacent to the diesel fueling infrastructure. There was insufficient access to excavate a borehole in this area. The diesel storage and infrastructure area is shown in Figure 2 below.

Figure 2 – Diesel Storage and Dispensing Area



#### Rationale for Ground Gas Monitoring:

Assessment of the gas risk at the site was based on characterisation of Made Ground conditions in line with CL:AIRE Research Bulletin 17. This allowed the report to be completed without the usual requirement for an extended gas monitoring programme.

Combined groundwater and ground gas monitoring wells were installed to facilitate future monitoring (if required).

#### Rationale for Soil Sampling:

Human health exposure pathways, whilst considered unlikely, were understood to be limited to shallow soils and thus soils were collected from shallow depths. The collection of soils for organic contaminants was determined based on visual and olfactory field evidence of contamination. Where none was noted, shallow soils were selected to provide non-targeted coverage, with the previously discussed exception of the trial pit in the vicinity of the diesel storage tanks.

#### Physical Works:

Trial pits were excavated using a JCB 3CX.

Windowless boreholes were advanced using a tracked windowless drilling rig. The boreholes were drilled at 101mm diameter. No water was added to the boreholes during drilling. The windowless drilling is shown in Figure 3 below.

Figure 3 – Windowless Drilling



Cable percussion boreholes were advanced using a cable percussion drilling rig at 150mm diameter. The cable percussion drilling is shown in Figure 4 below.

Figure 4 – Cable Percussion Drilling



In-situ penetration tests, comprising CPTs, were completed at 1m intervals in each borehole in accordance with BS EN ISO 22476-3:20059.

Hand shear vane tests were completed in suitable cohesive Made Ground and natural soils.

### Reporting:

A combined Phase 1 and 2 site investigation report was issued 4 weeks after commencement of site works. The report was submitted as part of the client's planning application and was accepted without comment by the Local Planning Authority.