

Excerpts from:

## Clancy Consulting Limited - Site Investigation Report Rotherham Crematorium & Cemetery, Ridgeway, S65 3NN

### Site History

To investigate the development history and previous land uses at the site and surrounding area, historical Ordnance Survey (OS) maps were examined. Table 1 below is not intended to provide a comprehensive review of all the changes which have occurred at the site and instead provides a summary of the most salient points. The most significant historical land uses are highlighted in bold text for ease of reference.

**Table 1 – Site History**

Date(s)	Site	Surrounding Land
1854	The current and proposed burial areas comprise <b>fields</b> .	The land surrounding the site is predominantly occupied by <b>fields</b> . A <b>stream</b> is shown approximately 260m to the southwest. A <b>sandstone quarry</b> is present 400m northeast and a <b>spring</b> is shown 500m northwest.
1892-1893	No significant changes.	Dalton Parva ( <b>village</b> ) is located from 650m north and several <b>houses</b> are shown as having <b>wells</b> .
1922-1923	No significant changes.	<b>Brecks Lane Farm</b> is located 150m east of the site. A large area of <b>marshland</b> is present from 400m to the east. A <b>windpump</b> is 100m south.
1934-1935	No significant changes.	<b>Residential housing</b> is present from 400m west of the site. <b>Chesterhill Quarry</b> is located 900m northeast. A <b>hydraulic ram</b> is shown 400m east.
1948	No significant changes.	<b>Residential expansion</b> of Rotherham now sees residential housing from 150m north of the site.
1955-1960	No significant changes.	The land directly north of the investigation area is now being utilised as part of the <b>Rotherham cemetery grounds</b> .
1977	No significant changes.	The cemetery has expanded and includes the <b>crematorium</b> to the west of the existing burial area.
1993	The aerial photography shows the northern section of the site (where there are currently burials) as <b>woodland</b> .	<b>Residential expansion</b> of Rotherham is ongoing. The wider <b>cemetery</b> area is now bordered to the north by residential housing.
2020	The existing burial area is now in use.	Several small ponds are shown 150m west of the burial area.

### Landfill Sites

There are no BGS recorded landfill sites, historical landfill sites or local authority recorded landfill sites identified within 500m of the site. There are no licenced waste management facilities identified within 500m of the site. There are also no records of potentially infilled land recorded within 500m of the site.

[Link to Envirocheck - Waste data \(page 101-102\)](#)

### Exploratory Fieldwork

Site investigation works were carried out on 21st and 22nd August 2020 and comprised:

- Five window sample boreholes (WS01 to WS05) drilled within the future burial area to a maximum depth of 2.33m bgl;
- Five window sample boreholes (WS06 to WS10) drilled within the existing burial area to a maximum depth of 3.10m bgl;
- In situ geotechnical testing throughout the depth of all boreholes;
- Installation of groundwater monitoring wells in six borehole locations;

- Four mechanically excavated trial pits (TP06 to TP09) excavated within the future burial area to a maximum depth of 2.40m bgl;
- Five mechanically excavated trial pits (TP01 to TP05) excavated within the existing burial area to a maximum depth of 2.30m bgl;
- Soil samples were collected at regular intervals from each exploratory hole for chemical laboratory analysis;
- Groundwater samples were recovered from a pre-dug grave which has water in the base for chemical laboratory analysis.

[Link to map of Window Sample Boreholes and Machine Excavated Trial Pits \(page 16\)](#)

### **Muslim Burial Area**

Ground conditions in the existing burial area generally comprised grass and sandy / silty topsoil overlying Made Ground, comprising sandy gravelly clay with gravel of brick, coal, sandstone, wood, metal and plastic (WS08, WS09, TP01 and TP02).

Topsoil / Made Ground was underlain in TP01, TP03, TP04, TP05, WS06, WS07, WS09 and WS10 by weathered siltstone, recovered as very stiff silt. Weathered siltstone was encountered from 0.50m bgl and proven to a maximum depth of 3.10m bgl.

Topsoil / Made Ground was underlain in WS08 by soft becoming stiff clay from 2.30m bgl and proven to a depth of 2.88m bgl.

The base of Made Ground was not proven in trial pit TP02. The pit was terminated at 2.15m bgl upon a concrete obstruction.

SPTs undertaken within the natural soils recorded 'N' values ranging from N = 9 to in excess of N = 50.

Groundwater was not encountered in any of the exploratory hole locations.

No significant visual or olfactory evidence of contamination was noted within Made Ground soils during the intrusive investigation works.

Groundwater:

Groundwater was not recorded in any of the exploratory hole locations at the time of the intrusive investigation.

Six boreholes were installed with groundwater monitoring wells and were monitoring on three occasions following the site works during a range of weather conditions. The results of the groundwater monitoring are presented below:

**Table 2 – Groundwater Monitoring Visits**

Date	Weather	Future Burial Area Groundwater Level (m bgl)				Existing Burial Area Groundwater Level (m bgl)			
		WS01	WS03	WS04	WS05	WS06	WS08	WS09	WS10
03/09/20	Overcast with wet ground	Dry	1.55	1.84	1.92	Dry	NR	1.80	2.88
14/09/20	Sunny with dry ground	Dry	Dry	2.22	1.95	NR	NR	1.85	2.93
08/10/20	Raining with wet ground	1.60	1.05	1.53	1.76	0.71	2.10	1.79	2.85

NR = Not recorded

It is noted that groundwater collected within the monitoring wells and was present at generally shallower depths during the visit following heavy rainfall, though given the cohesive nature of the natural soils at the site the groundwater measured is not thought to be representative of a consistent shallow groundwater body and is more likely to represent discontinuous perched groundwater.

### Tier 1 Contamination Analysis

Guidelines:

At Tier 1 stage the long-term human health toxicity of the soil has been assessed with reference to the LQM/CIEH S4ULs for Human Health Risk Assessment and DEFRA Category 4 Screening Levels (C4SLs).

No groundwater abstraction points are present within 1km of the site (including for potable water supply). However; given the presence of a bedrock Secondary A Aquifer beneath the site and the presence of the watercourse circa 260m southwest of the proposed and existing burial areas, the water analysis has been assessed with reference to the EQS for England and Wales which are included in The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Chemical testing results for soil samples have been compared to Site Screening Values (SSVs) for a public open space scenario as this is the most relevant criteria given that the site is / is proposed for a burial ground. Job No: 10/1468/001 Rev: 00 © Clancy Consulting 2020 Page 12 of 13 Six soil samples were collected from the shallow soils at the site and submitted to a UKAS/MCerts accredited laboratory for a broad suite of analyses which included some or all of the following:

Arsenic, beryllium, cadmium, chromium (VI), copper, lead, mercury, nickel, selenium, vanadium, zinc, asbestos screening, speciated PAHs, speciated TPH, BTEX, pH, nitrate, nitrite and formaldehyde.

In addition, one sample of groundwater was extracted from a pre-dug burial plot and submitted for analysis which included:

Arsenic, beryllium, cadmium, chromium (VI), copper, lead, mercury, nickel, selenium, vanadium, zinc, asbestos screening, speciated PAHs, speciated TPH, BTEX, pH, nitrate, nitrite, ammoniacal nitrogen and formaldehyde.

Inorganic Contamination:

Six soil samples were submitted for chemical testing for inorganic determinants (metals/metalloids).

Concentrations of inorganic contaminants were found to be below the limit of laboratory detection and / or below the SSVs for a public open space end use.

In addition, one sample collected from next to a pre dug grave was analysed for formaldehyde. Formaldehyde in this sample (TP03 at 2.10m bgl) was found to be below the laboratory limit of detection.

These soils are therefore not considered to be contaminated in respect of inorganic contamination.

#### Organic Contamination:

Six samples from the Made Ground were scheduled for speciated PAH analysis. In addition, one sample was also scheduled for speciated TPH analysis.

TOC testing was not undertaken on these samples and therefore an SOM of 1%, the most conservative SOM available, has been used for SSV comparison.

The results of the chemical analyses were found to be below the limit of laboratory detection and / or below the SSVs for a public open space end use.

These soils are therefore not considered to be contaminated in respect of organic contamination.

#### Asbestos:

Three samples of the shallow soils were sent to a UKAS/MCerts accredited laboratory to be screened for the presence of asbestos.

Asbestos was not identified within any of the samples screened.

[Link to WS06 data \(pages 123\)](#)

[Link to WS08 data \(page 125\)](#)

[Link to WS09 data \(page 126\)](#)

[Link to WS10 data \(page 127\)](#)

[Link to TP01 data \(page 128\)](#)

[Link to TP02 data \(page 129\)](#)

[Link to TP03 data \(page 130\)](#)

[Link to TP04 data \(page 131\)](#)

[Link to TP05 data \(page 132\)](#)

#### Groundwater Testing:

A sample of groundwater was obtained from a pre-dug burial plot located within the existing burial area where water was noted to have pooled within the excavation. The determinants tested are described in Section 4.1 and the results compared against EQS for freshwater.

The results of the chemical analysis were found to be below the limit of laboratory detection and / or below the EQS for freshwater with the exception of copper which recorded 4ug/l in the sample compared to an EQS of 1ug/l (bioavailable). This exceedance is considered to be relatively minor and whilst the EQS is for bioavailable copper only, it is unlikely that much of the dissolved copper

recorded in the groundwater sample is bioavailable and therefore the exceedance is considered likely to be less, or absent.

The sample was also tested for formaldehyde, the results of which were found to be below the limit of laboratory detection.

Based on the results of the chemical testing, the groundwater sample obtained indicates that groundwater at the site is not considered to present a risk to controlled waters (the underlying bedrock Secondary 'A' aquifer and / or the stream which passes the site circa 260m to the southwest).

[Link to Envirolab Chemical Testing Results \(pages 138-150\)](#)