



Figure 1 - Site Prior to Remediation

Client:	South Lanarkshire Council
Environmental Consultants:	Mason Evans Partnership
Proposed end use:	Commercial

Site Overview

The site, situated in Rutherglen, Glasgow occupies an area of approximately 50m by 50m. Historically the site has been used for various industrial purposes.

To the south and west of the site are residential developments. To the north and east are further industrial units. Flowing next to the western boundary of the site is a culverted burn [the Cityford Burn].

The site was found to consist of made ground ranging from 0.9m to 2.9m, with clays / silt encountered between 2.9 to 3.2m, becoming silt down to 4.3m where underlying bedrock was found to be present.

Site investigations indicated the presence of groundwater within the upper two metres of the site, and this was perceived to be perched in nature.

Chemical analysis shows hydrocarbon and metal contamination within the made ground and natural

deposits, located mainly in the western area of the site, as shown in Figure 2 below.

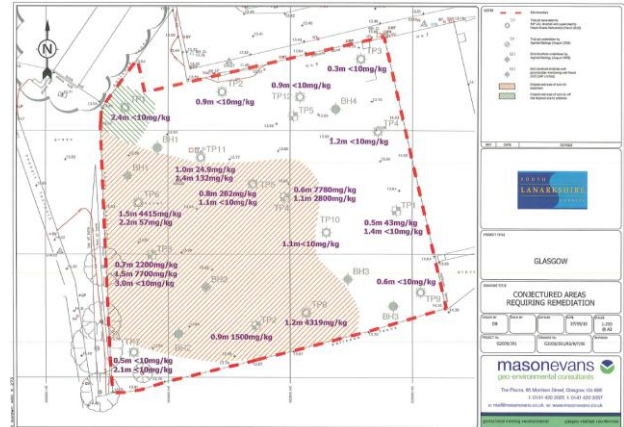


Figure 2 – Plan showing conjectured area of contamination [source Mason Evans Partnership].

Objectives

The remediation strategy proposed by Mason Evans was accepted by the South Lanarkshire Council Contaminated Land Team, on the basis that it addressed the requirements of the SEPA Land Remediation and Waste Management Guidelines - Section 4.

The proposed strategy was designed to protect the identified receptors as summarised below:

- **Human health:** - the potential pathway would be removed by isolating the receptors from the contamination source on the basis that the site would be completely covered by hardstanding / car parking areas and as a consequence risks to human health were considered to be manageable.
- **Groundwater and offsite receptors:** - in this case the objective was to treat the source by chemically stabilising the hydrocarbon contaminated soils with the aim of significantly reducing leachability and thereby decreasing hydrocarbon concentrations in the shallow groundwater. This would protect the ultimate receptor [the burn] from the risk of ongoing contamination.

Mason Evans proposed that the soils be “treated by an E-Clay remedial solution which would be designed to reduce leachability potential of hydrocarbons”. A target leachate level of 500ug/L for total petroleum hydrocarbons was determined as acceptable by all parties and agreed with SEPA. Envirotreat carried out treatability trials on contaminated soils taken from the site to demonstrate compliance with this target criterion.

It was also a requirement to monitor groundwater quality on the site for an ongoing six month period and accordingly three to five boreholes are to be installed for monitoring purposes.

Methodology

SEPA approval was obtained to undertaken the works.

The proposed strategy was *ex-situ* E-Clay remediation [chemical stabilisation] of circa 2,000m³ of hydrocarbon contaminated soils. These soils were classified as hazardous prior to treatment.

The contaminated areas previously identified by Mason Evans were excavated by Envirotreat and stockpiled; the sides and bases of all excavations were validated by Mason Evans.

During the excavation process considerable volumes of contaminated groundwater were encountered. This groundwater was collected during the treatment stage of the project and utilised within the treatment process.

Treatment reagents comprised of E-Clays produced on site in slurry form and dry cementitious materials. The reagents were mixed with contaminated soils in 10m³ batches. Following treatment the soils were stockpiled and allowed to fully cure. Validation samples were submitted for leachable contaminant analysis.

The remediation works were undertaken and completed within the agreed timeframe of six weeks.



Figure 3 – Mixing contaminated soils with treatment reagents.

Results

The treatment operation was designed to reduce the leachable concentrations of TPH through E-Clay stabilisation. The results clearly demonstrated compliance with the proposed end-use target criterion for the site as a whole.

Table 1 Validation Results.

	Val 1	Val 2	Val 3	Val 4	Val 5	Val 6	Val 7	Val 8
Aliphatic								
TPH (C8-C10)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH (C10-C12)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH (C12-C16)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH (C16-C21)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH (C21-C35)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH (C8-C10)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatic								
TPH (C8-C10)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH (C10-C12)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH (C12-C16)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH (C16-C21)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH (C21-C35)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH (C8-C10)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH (C8-C35)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

All results are leachate (BS12457-4) expressed as mg/L

The contaminated soils were also WAC tested on the basis that excess soils would need to be removed from site. The results confirmed that the treatment process had rendered the soils inert for offsite disposal purposes.