# Appendix 8.1 Sampling Strategy

**Summary of Sampling Strategy**

**Investigation Objectives**

To assist the preparation of the Generic Quantitative Risk Assessment (GQRA) the findings of the Preliminary Risk Assessment were reviewed. From this review the following were identified as potential sources of contamination:

- Soil / Overburden / Made Ground
- Groundwater
- Ground borne gases

A semi targeted sampling strategy was devised based on the guidance contained within the following:

- British Standard (BS) 10175:2011 – Investigation of potentially contaminated sites – code of practice
- Defra – CLR 4: Sampling Strategies and Contaminated Land

Target sample areas included locations within the existing fuel storage areas, asphalt batching plant, existing electricity substation, areas of made ground, existing retention ponds and other locations throughout the quarry site that are proposed for development. A drawing of all sample locations is included as Figure 8.6 and includes the following:

- 7 rotary boreholes for groundwater and gas monitoring
- 1 surface water sample
- 1 tap sample (existing groundwater source)
- 18 Grab Samples for soil / overburden made ground monitoring

**Intrusive Investigations**
A geotechnical investigation was undertaken during February and March 2011. This investigation included for seven rotary boreholes, each to a maximum depth of 15.0m. 50mm HDPE slotted pipes and gas bungs were installed within the boreholes to facilitate groundwater and gas monitoring.

**Water Monitoring**
Water monitoring to facilitate the GQRA was undertaken on 15th January 2013 and carried out in accordance with BS 5667-11:2009 – Water quality, Sampling. Various sections of the BS relate to ground and surface water sampling along with the preservation of samples.

Groundwater sampling was carried out utilising an electric powered pump. The volume purged during sampling was at least three times the volume of the water in the borehole.

All water samples were stored in the appropriate sample containers as provided by the UKAS accredited laboratory and samples were placed in a cool box once taken. Samples were delivered to the laboratory on the day of sampling.

The follow is a record sheet replicated from the sampling conducted on 15th January 2013:

**Borehole Sampling– 15th January 2013**
**Weather:** Dry, frosty, bright

| | |
|---|---|
| **RP01** | **Dip Meter Level:** 7.32m<br>**Sample Method:** Pump<br>**Purge Start Time:** 09:43<br>**Sample Time:** 10:00<br>**Sample Description:** Water running clear from start.<br>BH purged well – Good yield. All sample bottles clear. |

| | |
|---|---|
| | |
| **RP02** | **Dip Meter Level:** 2.20m<br>**Sample Method:** Pump<br>**Purge Start Time:** 10:05<br>**Sample Time:** 10:47<br>**Sample Description:** Sample running clear from start. BH purged well – Good yield. All sample bottles clear. |
| **RP03** | **Dip Meter Level**: 2.48m<br>**Sample Method:** N/A<br>**Purge Start Time:** N/A<br>**Sample Time:** N/A<br>**Sample Description:** Sample unable to be taken – kink in pipe (noted from last sampling run) |
| **RP04** | **Dip Meter Level:** 2.83m<br>**Sample Method:** Pump<br>**Purge Start Time:** 11:02<br>**Sample Time:** 11:27<br>**Sample Description:** Blasting evident in vicinity of BH, shot holes for explosives located over entire shelf / bench. Closest shot holes located approx 10m NE and 10m S of BH04. BH pumped dry and re-purged. Samples taken slightly silty. |
| **RP05** | **Dip Meter Level:** 5.39m<br>**Sample Method:** Pump<br>**Purge Start Time:** 10:51<br>**Sample Time:** 12:35<br>**Sample Description:** Good quality, clear running water. BH purged dry. BH recharged and samples taken. Clear samples. |
| **RP06** | **Dip Meter Level:** 1.94m<br>**Sample Method:** Pump<br>**Purge Start Time:** 11:32<br>**Sample Time:** 11:54<br>**Sample Description:** Water purged was silty to begin, ran clear before BH dry. BH re-purged and samples taken were clear. |
| **RP07** | **Dip Meter Level:** 2.50m<br>**Sample Method:** Pump<br>**Purge Start Time:** 10:17<br>**Sample Time:** 10:37<br>**Sample Description:** Water running clear from start. BH purged well – Good yield. |
| **Ground Water Sample** | **Dip Meter Level:** N/A<br>**Sample Method:** Tap<br>**Purge Start Time:** 11:55<br>**Sample Time:** 12:21<br>**Sample Description:** Water taken from tap in office - clear water. |

| | |
|---|---|
| **Surface water Sample** | **Dip Meter Level:** N/A<br>**Sample Method:** Grab<br>**Purge Start Time:** N/A<br>**Sample Time:** 12:05<br>**Sample Description:** Water clear. |
| **RP09** | **Blanks** |

**Ground Gas Monitoring**

Ground gas monitoring was undertaken from the location of the seven boreholes on four occasions throughout the month of May 2013. Monitoring took place on the following dates:

- 8th May 2013
- 15th May 2013
- 21st May 2013
- 30th May 2013

The gas monitoring was undertaken using a GA2000 Portable Gas Analyser. Gas monitoring was carried out in accordance with:

- BS8485:2007 – Code of Practice for characterization and remediation from ground gas in affected developments
- CIRIA C665 – Assessing risks posed by hazardous ground gases to buildings

**Soil / Overburden / Made Ground**

Eighteen Grab samples were taken from the site on 7th of January 2013 with the assistance of a 20 tonne tracking machine. The samples were taken following the protocols noted in:

- BS 10175:2011 – Code of Practice for the investigation of Potentially Contaminated sites.

All samples were stored in the appropriate sample containers as provided by the UKAS accredited laboratory and samples were placed in a cool box once taken. Samples were delivered to the laboratory on the day of sampling.

The field sheet used art each sample location is replicated as follows:

**Hightown Soil Sampling Field Sheet**

| | |
|---|---|
| Trial Pit No. | TP01 |
| Services in Vicinity Checked / Verified? | |
| Description of Location | |
| Excavation Method | |

| | |
|---|---|
| Trial Pit Depth (m) | |
| Trial Pit Description (including material, colour, odour, water) | |
| Sample Depth (m) | |
| Photographic Record (Insert Photo Numbers) | |
| Weather | |
| Sampler | |
| Date | |

**Additional Notes:**