HARWORTH ESTATES LTD

NORTH GAWBER COLLIERY SITE, BARNSLEY

SUPPLEMENTARY GROUND INVESTIGATION REPORT

June 2009

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Issue Status	**Final**		
Purpose of Report	**For Design**		

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1. INTRODUCTION

1.1. Preamble

Scott Doherty Associates Ltd. (SDA) was appointed by Harworth Estates Ltd., part of UK Coal Mining Ltd., to carry out a supplementary ground investigation at the former North Gawber Colliery site at Mapplewell near Barnsley.

A regional location plan is included as **Figure 1**.

The investigation forms the third phase of work carried out at the site by SDA. Initial investigations undertaken on behalf of UK Coal Mining Ltd. were then followed some years later by a further phase of investigation on behalf of Gladedale (South Yorkshire) Ltd., the latter to assess the possibility of re-developing the site for housing.

The investigation described in this report, which forms the third phase of work, was designed to supplement the information from the two previous phases of investigation and to establish in detail the nature and extent of the chemical contamination at the site and the measures required to safeguard the development and end-users.

With respect to the latter, this report was written on the assumption that the site will be re-developed for housing with private gardens.

1.2. Previous Investigations

A desk study for a proposed surface mine at the site was carried out by the former British Coal Opencast Executive (BCOE) in December 1990 (Ref. 1). This was supplemented by an extensive drilling programme.

A geo-environmental investigation was carried out by SDA for UK Coal Mining Ltd. in 2005 (Ref. 2), the purpose of which was to assist in the design of the surface mine and in particular to establish the nature and extent of contamination as a result of the previous activities carried out at the site.

The investigations undertaken by SDA for Gladedale (South Yorkshire) Ltd. in 2008 (Ref. 3) were designed to provide further information on the ground conditions at the site and to assess in detail the geotechnical, geological and environmental risks. This investigation is referred to in this report as the main ground investigation.

It is recommended that all previous reports are read in conjunction with this report. However, only a summary of the main ground investigation is provided in this report.

1.3. Limitations and Usage

The recommendations provided in this report are based on the findings of the exploratory holes and laboratory analysis. However, it should be pointed out that there may be conditions

at the site which have not been revealed by the exploratory holes or which occur between them.

As advised previously, it is recommended that a 'watching brief' is adopted during the re-development works and advice sought if conditions which have not been revealed by the investigations come to light.

This report is written for Harworth Estates Ltd. and UK Coal Mining Ltd. It should not be relied upon by any third party, and no responsibility is undertaken to any third party, without the prior written consent of SDA.

2. MAIN GROUND INVESTIGATION

2.1. Preamble

The following provides a summary of the works undertaken and principal recommendations of the main ground investigation report.

2.2. Outline of Work

The ground investigation initially comprised a detailed desk study followed by a site inspection, the latter prior to commencing the intrusive works. The findings of the desk study were used to plan the follow-on intrusive investigations and laboratory analysis.

The fieldwork comprised the excavation of trial pits and the drilling of boreholes with the installation of standpipes for the monitoring of gases and groundwater levels. Samples were analysed for geotechnical and chemical parameters.

A detailed assessment of the findings of the laboratory analysis was undertaken based on which engineering recommendations were made.

For the purpose of the report, the site was split into five areas (designated Areas 1 to 5) as shown on **Figure 2**. These area designations have been adopted for this report and have been used as 'averaging areas' for the purpose of statistical analysis.

2.3. Published Information

The British Geological Survey (BGS) maps of the site show Middle Coal Measures strata at or close to the surface. The maps also show the Kent's Thick coal seam sub-cropping within the site and several other coal seams located at depth, the majority of which are understood to have been worked.

The findings of the main ground investigation confirmed the published geology and proved the presence of substantial thicknesses of made ground across the site including areas of remnant foundations and sub-structures.

The Coal Authority records indicate the presence of workings at shallow depth and the presence of eight mine entries within or adjacent to the site including several possible gas vents into deep mine workings. The shallowest recorded worked coal seam is the Kent's Thick which has been worked by both underground and opencast methods.

The historical maps and photographs confirm that prior to the latter part of the 19th Century the site comprised fields. After this date, re-development of the site took place with the construction of the former North Gawber Colliery with its associated coke works, railway lines and sidings. The colliery was closed in 1988 after which the colliery buildings were demolished and the site partially reclaimed.

The environmental searches confirmed no significant constraints to the proposed re-development of the site for housing, subject to the findings of a detailed ground investigation. However, the searches indicated the presence of potentially combustible soils (i.e. colliery discards) and the need for basic radon gas protection.

2.4. Previous Studies

2.4.1. Desk Study

The desk study carried out by the former BCOE in 1990 confirmed that in addition to coal mining, the site has also been used for coke and gas production with the by-products from the process used at a nearby chemical works.

The site was extensively drilled to investigate the Kent's Thick coal seam. The findings of the drilling program were used in the geological interpretations which formed part of the main ground investigation.

2.4.2. Investigation for UK Coal Mining Ltd.

The exploratory holes identified the presence of made ground up to 13.8m thick across the site. These deposits were underlain by a thin mantle of glacial till with Coal Measures bedrock at 3.6 to 13.8m below ground level (bgl). Shallow perched water tables were identified in the superficial deposits but groundwater was mostly absent from the exploratory holes.

Gas monitoring confirmed the presence of elevated levels of carbon dioxide in the made ground deposits.

Analysis of the made ground identified elevated concentrations of heavy metals, inorganic and organic compounds and also low pH values (i.e. acidic conditions). Analysis of groundwater samples identified the presence of elevated levels of inorganic compounds and hydrocarbons.

2.5. Intrusive Investigation

In order to confirm the findings of the desk study and previous investigations, intrusive investigations were undertaken supported by detailed laboratory testing. Monitoring of standpipes installed in boreholes was also undertaken to establish the gas regime at the site.

2.6. Ground Conditions

The exploratory holes indicated broadly similar ground conditions comprising thick and often variable deposits of made ground overlying thin deposits of glacial till (sometimes absent) and Coal Measures bedrock.

Remnant foundations comprising brick and concrete, the latter possibly reinforced, were identified in the made ground deposits within Areas 2, 4 and 5. Similar thicknesses of made

ground and glacial till to those in the previous investigations were identified in the exploratory holes.

The exploratory holes identified no clear visual and/or olfactory evidence of contamination with the exception of one trial pit located in Area 5 which contained hydrocarbon odours.

2.6.1. Soils

The made ground was found to comprise four principal stratum types including burnt and un-burnt coarse colliery discard, fine colliery discard and demolition arisings. The glacial till deposits (where present) were found to consist of firm and stiff CLAY with cobbles.

2.6.2. Bedrock

The Coal Measures bedrock comprise a sequence of sandstones, mudstones, siltstones and coal, the latter including the Kent's Thick coal seam which averages 1m thick and underlies the northern part of the site.

The exploratory holes confirmed workings in the Kent's Thick coal seam in the north of the site within influencing distance of the surface.

2.6.3. Groundwater

Groundwater was encountered in the exploratory holes at or close to the interface between the made ground and glacial till deposits.

2.6.4. Gases

Monitoring of the standpipes between December 2007 and November 2008 confirmed negligible levels of methane and low flows. However, elevated levels of carbon dioxide up to 11.8% by volume were identified in some of the standpipes.

A gas risk assessment advised gas protection measures consisting of a gas-proof barrier and a ventilated sub-floor void. It should be noted that these measures are in addition to those required for radon gas protection as advised previously.

2.6.5. Geotechnical Parameters

Geotechnical analysis of samples from the exploratory holes confirmed the variable nature of the made ground deposits and the largely competent nature of the in-situ glacial clays.

2.7. Chemical Contamination

Chemical analysis confirmed widespread arsenic, sulphates and low pH values in the made ground deposits and localised areas of elevated copper, zinc and petroleum hydrocarbons. Leaching tests confirmed generally low solubility.

Analysis of groundwater samples indicated elevated levels of cadmium, nickel, selenium, boron and sulphates in Area 5, but otherwise elevated levels of sulphates across most of the site with elevated nickel and hydrocarbons in Areas 3, 4 and 5.

Visual assessment of the colliery discards confirmed the presence of appreciable amounts of coal and other carbonaceous materials. Tests confirmed that these deposits are potentially combustible.

2.8. Development Considerations

The following development issues were discussed in the report.

2.8.1. Foundations and Sub-structures

Extensive brick and concrete foundations and sub-structures were found in Areas 2 and 5. The report advised that all obstructions should be removed and re-processed on site to produce secondary aggregate for re-use in the works as granular fill and for backfilling the excavations.

2.8.2. Mine Workings

The investigation confirmed the presence of shallow mine workings in the Kent's Thick coal seam beneath the northern half of the site.

Stabilisation of the workings was advised consisting of drilling and grouting. The stabilisation area was estimated at about 4.3 hectares based on a seam thickness to rock cover ratio of 1:10.

2.8.3. Mine Entries

The mine shafts and adits located within the development area will require stabilising in advance of foundation construction.

The report advised drilling and grouting of the shafts followed by the construction of a concrete cap at rockhead or, if too deep, on competent glacial till. In the case of the adits, the report advised sealing the entrance with brick or concrete followed by drilling and grouting.

2.8.4. Sterile Zones

The report advised sterile zones above the treated mine shafts and adits within which no building development should take place.

2.8.5. Contamination

Chemical analysis confirmed the potentially combustible nature of the made ground and in particular the predominant colliery discards.

The report advised the provision of a 1m thick soil cap across the site to safeguard against accidental ignition of the colliery discards and to protect the end-users from the contamination in the made ground deposits.

No major issues were identified in respect of leaching of contaminants out of the made ground deposits and groundwater quality in the Coal Measures strata.

2.8.6. Gases

The gas risk assessment advised a gas-proof barrier in the floor slab and the inclusion of ventilated sub-floor void (i.e. suspended floor slabs). The report advised that the gas-proof barrier should also be radon proof.

2.8.7. Foundations

The report advised a range of possible foundation types including strip and trench fill footings, rafts, stone columns and driven steel piles.

The report advised that the final decision of what foundations to adopt should be based on the earthworks design and the findings of any post-earthworks investigations.

2.8.8. Earthworks

The ground investigation predicted few problems with the earthworks assuming that the bulk of the fill comprised the predominant coarse colliery discards.

2.8.9. Roads

Tests on the predominant coarse colliery discards indicated high California Bearing Ratio (CBR) values. However, much lower values were reported for the glacial till deposits and fine discards.

2.8.10. Concrete

Based on the findings of the chemical analysis, the report advised a concrete grade of DC-4 and the additional requirement of a 1200 gauge polythene sheet or the equivalent proprietary protective coating.

3. INTRUSIVE INVESTIGATIONS

3.1. Preamble

As already mentioned, the works described in this report represent the third phase of ground investigation.

The main emphasis in the design of the investigation was to obtain as much information as possible on the chemical contamination at the site in order to determine the risks and hence the nature and scope of any remedial measures.

The principal aims of this investigation can be summarised as follows:

- To establish the extent of the contamination 'hot spots' identified in the main ground investigation.
- To determine the full thickness of the made ground deposits in areas where it was not possible to do so in the main ground investigation.
- To provide further chemical data to allow a revised contamination assessment to be carried out.

Although not a main objective of the investigation, a small number of samples were analysed for geotechnical parameters to supplement those available from the main ground investigation.

The investigation comprised the excavation of an additional sixty trial pits at selected locations within the site and at centres varying between 25 and 40m. The trial pits were designated TPs 101, 102 etc. In addition, four trial pits (designated Asbestos 1 to 4) were excavated in an area where cement-bound asbestos was found.

The positions of the trial pits are shown on the revised site and exploratory hole location plan included as **Figure 3**. Also shown on the plan are the exploratory holes from the previous investigations.

3.2. Fieldwork

The fieldwork comprised the excavation of sixty trial pits, the majority within Area 5. The trial pit logs are included in **Appendix A**.

The trial pits were excavated to a maximum depth of 6.6m bgl using a Komatsu PC290 and CAT 432D hydraulic excavator. Samples were taken comprising small disturbed samples (designated ES) for chemical analysis and bulk disturbed samples (designated B) for geotechnical analysis.

The samples for chemical analysis were placed in borosilicate glass jars with screw lids and stored in cool boxes. The samples for geotechnical analysis were placed in plastic bags and secured with heavy duty plastic ties.

Hand shear vane tests were carried out in some of the trial pits to provide an approximate assessment of undrained shear strength. The test results (peak results) are included on the trial pit logs.

All the trial pits were backfilled with compacted arisings following completion of logging and sampling.

3.3. Laboratory Analysis

3.3.1. Preamble

Selected samples from the trial pits were analysed in the laboratory for geotechnical and chemical parameters as described below.

3.3.2. Geotechnical

Bulk samples were analysed for the following:

- Natural moisture content, Atterberg limits, dry density/moisture content relationship (using 2.5kg rammer), CBR and moisture condition value.

The testing was undertaken by Professional Soils Laboratory Ltd. (PSL) of Doncaster in accordance with BS 1377 (Ref. 4). The laboratory test reports are included in **Appendix B**.

3.3.3. Chemical

Small disturbed samples were analysed for the following:

- Arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, pH, acid soluble sulphate, sulphide, cyanide, toluene extractable matter (TEM), phenols, PAHs and soil organic matter.

In addition to the above, selected samples were analysed by polarised light microscopy for asbestos.

Further analyses were carried out on those samples exceeding the designated screening values as follows:

- Sulphur, water soluble sulphate and water soluble magnesium on samples with acid soluble sulphate levels exceeding 5000 mg/kg.

- Speciated petroleum hydrocarbons (aliphatic/aromatic carbon banding) on those samples with TEM levels exceeding 500 mg/kg. Similar analyses were carried out on

samples with TEM levels between 250 and 500 mg/kg to verify the validity of the TEM test as a screening tool for hydrocarbon contamination.

- Speciated PAHs on those samples with total PAHs above 15 mg/kg which represents the SDA generic soil screening value for a 1% SOM soil.

Leachability tests were carried out on those samples with the highest levels of contamination as determined from the above analyses.

Leachate, surface and groundwater samples, the latter from standpipes installed as part of the main ground investigation, were analysed for the following:

- Arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, pH, sulphate, sulphide, cyanide, phenols, PAHs and total petroleum hydrocarbons (TPHs).

The testing was undertaken by Chemtech Environmental Ltd. (CE) of Consett. The analytical test reports are included in **Appendix C**.

4. GROUND CONDITIONS

4.1. Preamble

As already described in Section 2.6, the main ground investigation identified variable thicknesses of made ground overlying thin deposits of glacial till, which in turn were underlain by Coal Measures bedrock.

The made ground deposits comprise four principal stratum types namely, burnt and un-burnt coarse colliery discards, fine colliery discard (former settlement lagoon deposits) and demolition arisings. The underlying glacial till deposits comprise mostly firm and stiff CLAY with cobbles. Detailed strata descriptions are provided on the exploratory hole logs included in the main ground investigation report.

The general distribution of soil types present at the site is shown on the revised geological cross sections included as **Figures 4** to **7**. In compiling the cross sections, use has been made of the exploratory holes from the previous ground investigations.

It should be noted that the ground conditions between the exploratory holes are approximate only and significant variations in material types can occur over relatively short distances. The groundwater conditions shown on the sections are those identified at the time of the investigation and during the subsequent monitoring.

The following discussion relates to the ground conditions identified in the trial pits. Detailed strata descriptions can be found on the trial pit logs included in **Appendix A**.

4.2. Topsoil

Topsoil was mostly absent from the trial pits but where present it was found to be of poor quality and 0.2m thick or less.

4.3. Made Ground

4.3.1. Preamble

Made ground was encountered in all the trial pits. The deposits are very similar to those described in the main ground investigation report, comprising burnt and un-burnt, coarse colliery discards, fine colliery discards (former lagoon deposits), reworked clays and demolition arisings.

Typical soil descriptions are provided below with detailed descriptions provided on the trial pit logs:

- Burnt, coarse colliery discards – typically red and brown, sandy GRAVEL with cobbles and boulders.

- Un-burnt, coarse colliery discards – mostly grey and black, clayey, sandy GRAVEL or sandy, gravelly CLAY with cobbles and boulders.

- Fine colliery discards – mostly soft and firm, black, sandy SILT/CLAY.

- Reworked clay – typically firm and stiff, reworked glacial till with variable amounts of coarse colliery discard (burnt and un-burnt).

A summary applicable to each of the designated averaging areas (Areas 1 to 5) is provided below (refer also to **Figure 2**).

4.3.2. Area 1

This area comprises the land presently occupied by the football pitch and mostly comprises colliery spoil.

The trial pits indicate the thickness of the made ground to be in the range 2.2 to >6.5m. The made ground comprises mostly coarse colliery discards (burnt and un-burnt) and reworked clays.

The full thickness of the made ground was not determined in TPs 101, 106 and 115 which were located on the uppermost terrace adjacent to the football pitch in the north-west corner of the site. Previous exploratory holes suggest that the made ground deposits could be as much as 14m thick but may be thicker in places.

No remnant foundations were found in the trial pits but reference should be made to the comments provided in the main ground investigation report.

4.3.3. Area 2

This area comprises the relatively flat lying ground which was previously occupied by the railway lines and sidings. Several areas of remnant foundations and sub-structures are present within this part of the site.

The trial pits indicate recorded thicknesses in the range 1.3 to >6.4m. The thickest deposits were identified in the northern/central part of the area along the former railway corridor where the main ground investigation identified up to 7m of fill, but possibly thicker, along the shoulders of the embankments.

The made ground present within this part of the site comprises mostly coarse colliery discards (burnt and un-burnt) with some reworked clays and a localised area of fine colliery discard in TP 109.

Remnant foundations were identified at shallow depth in TPs 119 and 126 (i.e. upper 1.3m) within the same areas as those identified in the main ground investigation.

4.3.4. Area 3

This area comprises gently sloping ground, the eastern part of which includes several remnant foundations. A drainage ditch traverses this part of the site in a north-west to south-east direction.

The trial pits indicate recorded thicknesses in the range 1.3 to >4.2m. The made ground present within this area of the site comprises mostly coarse colliery discards (burnt and un-burnt) with localised areas of reworked clays.

In the south of the area (TP 143), a 1.3m thick band of fine colliery discard was recorded sitting directly above the glacial till deposits. Similar deposits were identified in the main ground investigation.

4.3.5. Area 4

This area comprises the southern portion of the site within the area formerly occupied by the lagoons.

The trial pits indicate recorded thicknesses in the range 1 to >5m. The made ground is thickest in the southern/central and south-eastern parts of the site where the main ground investigation identified up to 8.5m of made ground. Several of the trial pits within this part of the site exhibited repeated collapses within the made ground deposits. In addition, remnant foundations were identified in TP 146.

The made ground comprises coarse colliery discards (burnt and un-burnt) with some localised areas of reworked clays. However, fine colliery discards were encountered within and adjacent to the former lagoons in TPs 148, 152, 154 and 155.

4.3.6. Area 5

This area comprises the former colliery and associated works.

The trial pits indicate recorded thicknesses in the range 1.2 to >6.6m and the made ground comprises mostly coarse colliery discards (burnt and un-burnt) and demolition arisings. The main ground investigation indicates that the made ground deposits are up to 10m thick in places.

Remnant foundations and sub-structures were encountered in TPs 103 and 121 and also in a large number of the main ground investigation exploratory holes.

Although several of the previous exploratory holes identified olfactory evidence of contamination, nothing was found in the supplementary ground investigation trial pits other than an isolated occurrence of cement-bound asbestos in TP 102 as already discussed.

4.4. Glacial Till

Where present, the glacial till comprises mostly firm and stiff CLAY with cobbles. Recorded thicknesses lie in the range >0.4 to >1.5m.

4.5. Bedrock

Bedrock was encountered in a number of the exploratory holes as detailed below (the figures in parenthesis refer to the depth ranges reported in the main ground investigation).

- Area 1 – 4 to 4.1m bgl (4.6 to 13.8m bgl)
- Area 2 – (2.8 to 8.2m bgl)
- Area 3 – (3.5 to 4.9m bgl)
- Area 4 – (2.5 to 9.1m bgl)
- Area 5 – 1.2 to 5.8m bgl (1.4 to 10.1m bgl)

A plan showing the revised rockhead contours is provided as **Figure 8**.

4.6. Groundwater

Groundwater was encountered in some of the exploratory holes as shallow perched water tables within the made ground deposits.

Monitoring of the standpipes installed for the main ground investigation indicates groundwater levels in the range 0.1 to 7.2m bgl.

4.7. Geotechnical Parameters

4.7.1. Preamble

In order to supplement the information obtained from the main ground investigation, additional geotechnical analysis was undertaken on selected samples of made ground and glacial till as described in Section 3.3.2.

4.7.2. Made Ground

Tests on the predominant coarse colliery discards and reworked clays indicate the following:

- Natural moisture content – 17 to 43% with a mean of 23%.
- Liquid limit – 48 to 54% with a mean of 62%
- Plastic limit – 22 to 32% with a mean of 27%
- Maximum dry density – 1.18 to 1.71 Mg/m^3 with a mean of 1.5 Mg/m^3
- Optimum moisture contents – 14 to 17% with a mean of 16%
- CBR – 4.2% (one result only)
- Moisture condition value – 6 to 16.1 with a mean of 11

In general, these results are similar to those reported previously for the fine and coarse colliery discards.

4.7.3. Glacial Till

Only a small number of samples from the glacial till deposits were selected for laboratory analysis.

Natural moisture contents range between 20 and 24% with liquid and plastic limits of 49 and 20% respectively. A single CBR test and two moisture condition value tests indicate results of 3% and 5.5 to 9.5 respectively.

In general, these results are similar to those reported previously.

5. REVISED CONTAMINATION ASSESSMENT

5.1. Preamble

The results of chemical analyses undertaken on soil and water samples collected during this investigation are included in **Appendix C** and a series of summary tables are presented in **Appendix D**.

Reference should be made to the previous ground investigation reports for details of all the earlier chemical test results.

In total, three hundred and twenty seven soil samples were selected for chemical analysis comprising two hundred and seventy three from the made ground and fifty four from the underlying glacial till deposits. In addition, thirty two samples of made ground were analysed for leaching. Twelve groundwater samples and four surface water samples were also analysed.

The site has been assessed based on the five averaging areas previously described. The results applicable to each area (Areas 1 to 5) are discussed separately below.

5.2. Soils Methodology

5.2.1. Preamble

The Contaminated Land Exposure Assessment (CLEA) model developed by the Environment Agency (EA) and Defra provides a methodology for assessing risks to human health from contamination in soil. The technical framework for applying a risk management process for dealing with land affected by contamination is provided in CLR 11 (Ref. 5).

In the past, the CLEA model has been used to derive Soil Guideline Values (SGVs) which are scientifically based generic assessment criteria for evaluating the long-term risks to human health from chemical contamination. However, recent changes to the CLEA guidance have led to the withdrawal of the SGV reports, some of which have not yet been replaced.

In the absence of new SGV reports and for the purpose of this contamination assessment, screening of the chemical test results has been undertaken by comparing them with the previously accepted SGVs and assessment criteria as described in the main ground investigation report. These are based on residential land after-use with private gardens (i.e. the most stringent type of land use).

5.2.2. CLEA SGVs

The SGVs derived by the CLEA model became widely adopted as a screening tool for use in the assessment of land affected by chemical contamination. As such they were designed to be protective of human health based on a range of land after-use options including residential with and without plant up-take, allotment and public open spaces and commercial/industrial.

Until new SGV reports are published, the former SGVs are still considered suitable for carrying out generic assessments. The SGVs represent conservative 'trigger' values which, if exceeded, provide an indication of where there might be an unacceptable risk to human health and that further investigation and/or remediation may be required.

5.2.3. SDA Soil Screening Values

SGVs were only issued for a small range of contaminants. In the absence of SGVs for many commonly occurring contaminants, SDA in association with Environmental Simulations International Ltd. (ESI) of Shrewsbury derived their own set of generic soil screening values (GSSVs) for initial contaminated land assessment.

The algorithms provided in CLR 10 and its associated Briefing Notes 1 to 4 and *errata* (which have since been withdrawn but are largely carried through in new guidance) were coded by SDA/ESI into a human health risk assessment model. In that approach, probability density functions (PDFs) were required to allow probabilistic modelling of a number of input and output parameters. The Monte Carlo simulation package 'Crystal Ball' was therefore incorporated within a spreadsheet model to provide this facility. The model was developed and thoroughly tested using contaminants for which official SGVs and EA toxicological reports already existed.

The CLEA guidance emphasises the importance of developing a conceptual model to provide a qualitative definition of the physical structure of the site, the types of contamination present and the pathways by which contamination can reach the potential receptors. The conceptual model is defined in terms of source, pathway and receptor as described below.

Source

The host material for the source can be specified as one of several standard soil types, or alternatively a user-defined soil type based on site-specific data. The GSSVs provided in the report are based on the standard CLEA sandy soil with organic matter contents (SOMs) of 1%, 2.5% and 5%, and also on the standard CLEA clay soil with an SOM of 5%.

Pathway

The CLEA methodology gives four options for land-use. All four of these are incorporated into the model and can be modified if required to represent alternative land-uses. The standard land-uses were used to define the GSSVs provided in this report.

There are five potential contaminant pathways resulting from these land-uses, all of which are represented in the modelling tool. These are summarised as follows:

1. Ingestion of soil and household dust.
2. Ingestion of contaminated vegetables and of soil attached to vegetables.
3. Dermal contact with soil and household dust.
4. Inhalation of fugitive dust (indoor and outdoor).
5. Inhalation of vapours (indoor and outdoor).

Receptors

All of the age categories defined in the CLEA documentation are available. These include individual yearly classes between the ages of 0 and 16 years, followed by the 'working life' class spanning from 16 to 59 years, and the post work age class of 60 to 70 years. The defaults for the standard land-uses are 0 to 6 years for residential and allotments, and 16 to 59 for commercial/industrial.

5.2.4. Range of GSSVs

To date, the model has been used to derive GSSVs for boron, copper, zinc, cyanide, phenol (also available as CLEA model SGV), benzene, xylene, MTBE, PAH and TPH.

5.2.5. SDA GSSVs Model and Report

A full copy of the model and the associated report is available on request from SDA.

5.3. Analysis of Soil Data

5.3.1. Preamble

Assessing the risk of contaminants posing a hazard to human health is based on a two-tier approach. The first level screening assessment helps identify those contaminants which exhibit concentrations above the screening values. These contaminants are then subjected to a more detailed second level assessment involving a statistical analysis in accordance with CIEH/CL:AIRE guidance (Ref. 6).

The statistical analysis is based on two fundamental tests for comparing soil contamination levels with screening values as set out in CLR 7 (Ref. 7). These are the mean and maximum value tests.

In the mean value test, the aim is to determine the 95% confidence limits of the measured mean of a sample population and then compare the upper 95th percentile value (US_{95} value) with the screening value for that particular contaminant. On the assumption that the site is considered to be contaminated, the purpose of the analysis is to judge whether there is sufficient statistical evidence to show that the true mean concentration of the contaminant is less than the critical concentration (i.e. screening value).

The maximum value test is used to determine if the maximum value of a set of results is a 'hot spot' or outlier or whether it is part of the anticipated range for the site as a whole.

In these analyses, it is recognised that sample data may follow different types of distribution, many of which can be approximated to normal or log normal but different algorithms exist for calculating the mean of the population and identifying potential outliers depending on the underlying distribution. For this revised contamination assessment, the statistical analyses were carried out using the ESI Contaminated Land Statistics Calculator (Version 1.2) which has been developed in accordance with the CIEH/CL:AIRE guidance.

Summaries of the assumptions made and findings of all the statistical analyses are provided in **Appendix E**. It should be noted that non-detects were generally set to half the detection limit, although where a high proportion of non-detects existed in the sample population, these were sometimes treated as a separate data set.

The following screening assessment is based on the test results from all three phases of ground investigation. The results applicable to the made ground and glacial till deposits are tabulated in **Appendix D** and discussed below for each of the five separate averaging areas (Areas 1 to 5).

5.3.2. Made Ground

Area 1

A total of twenty one made ground samples were analysed comprising seven samples from each of the three phases of investigation.

Metals

The first level screening assessment (see Table 1) indicates marginally elevated levels of arsenic in five samples and marginally elevated levels of cadmium in one sample. No other elevated results were recorded.

The results of the statistical analysis on the arsenic and cadmium results are provided below:

- Arsenic – calculated US_{95} value of 18.4 mg/kg which is less than the screening value. The analysis indicates no outliers.

- Cadmium – calculated US_{95} value of 0.61 mg/kg which is less than the screening value. The analysis indicates one marginally elevated outlier in BH 8 (2005) at 4.0m depth.

Inorganic Compounds

The first level screening assessment (see Table 2) indicates no results above the screening values although several samples recorded pH values less than 5.5, thus indicating acidic conditions.

Organic Compounds

The first level screening assessment (see Table 3) indicates elevated TEMs in two samples, both of which also recorded elevated PAHs.

The results of the statistical analysis on the TEM results are provided below:

- TEM – calculated US_{95} value of 317 mg/kg which is less than the screening value. The analysis indicates one outlier which when removed from the data set reduces the

US_{95} value to 279 mg/kg. Speciated PAH and petroleum hydrocarbon analysis on the outlier confirms no significant contamination (see Tables 3A and 3B).

Area 2

A total of forty two made ground samples were analysed comprising ten, fifteen and seventeen samples from the 2005, 2008 and 2009 investigations respectively.

Metals

The first level screening assessment (see Table 4) indicates elevated levels of arsenic in twenty eight samples and marginally elevated levels of cadmium (two samples), nickel (one sample) and copper (one sample).

The results of the statistical analysis on the arsenic, cadmium, nickel and copper results are provided below:

- Arsenic – calculated US_{95} value of 30.1 mg/kg which is above the screening value. The analysis indicates no outliers, thus suggesting that the contamination is widespread.

- Cadmium – calculated US_{95} value of 0.6 mg/kg which is less than the screening value. The analysis indicates no outliers.

- Nickel – calculated US_{95} value of 26.1 mg/kg which is less than the screening value. The analysis indicates no outliers.

- Copper – calculated US_{95} value of 57 mg/kg which is less than the screening value. The analysis indicates no outliers.

Inorganic Compounds

The first level screening assessment (see Table 5) indicates nine samples with elevated sulphate, seven of which also have elevated sulphur. Seventeen samples also recorded pH values less than 5.5, thus indicating acidic conditions.

The results of the statistical analysis on the sulphate results are provided below:

- Sulphate – calculated US_{95} value of 4,066 mg/kg which is less than the screening value. The analysis indicates no outliers.

Organic Compounds

The first level screening assessment (see Table 6) indicates elevated TEMs in fourteen samples, two of which also recorded elevated PAHs.

The results of the statistical analysis on the TEM and PAH results are provided below:

- TEM – calculated US_{95} value of 964 mg/kg which is above the screening value. The analysis indicates three outliers which when removed from the data set reduces the US_{95} value to 552 mg/kg which is only marginally above the screening value. The three outliers are significantly above the screening value and are present in TPs 5, 7 and 9 (2008). Speciated PAH and petroleum hydrocarbon analysis on these outliers (see Tables 6A and B) indicates no significant contamination albeit marginally elevated benzo(a)pyrene in one sample (TP 5).

- PAH – calculated US_{95} value of 8.5 mg/kg which is less than the screening value. The analysis indicates no outliers. Speciated analysis confirms that the principal elevated PAH compound is benzo(a)pyrene which is marginally elevated in both samples.

Based on a statistical analysis of the speciated TPH results on all fourteen elevated TEM samples, one marginally elevated aromatic C_{5-7} outlier was identified in TP 135 (2009).

Area 3

A total of forty one made ground samples were analysed comprising seven, twenty and fourteen samples from the 2005, 2008 and 2009 ground investigations respectively.

Metals

The first level screening assessment (see Table 7) indicates elevated levels of arsenic in twenty six samples and marginally elevated levels of cadmium (four samples) and nickel (one sample).

The results of the statistical analysis on the arsenic, cadmium and nickel results are provided below:

- Arsenic – calculated US_{95} value of 40.5 mg/kg which is above the screening value. The analysis indicates no outliers, thus suggesting that the contamination is widespread.

- Cadmium – calculated US_{95} value of 0.53 mg/kg which is less than the screening value. The analysis indicates no outliers.

- Nickel – calculated US_{95} value of 27.7 mg/kg which is less than the screening value. The analysis indicates no outliers.

Inorganic Compounds

The first level screening assessment (see Table 8) indicates twenty two samples with elevated sulphate, eighteen of which also recorded elevated sulphur. Twenty five samples also recorded pH values less than 5.5, thus indicating acidic conditions.

The results of the statistical analysis on the sulphate results are provided below:

- Sulphate – calculated US_{95} value of 17,167 mg/kg which is above the screening value. The analysis indicates no outliers, thus suggesting that the contamination is widespread.

Organic Compounds

The first level screening assessment (see Table 9) indicates no results above the screening values, thus indicating no significant organic contamination.

Area 4

A total of fifty eight made ground samples were analysed comprising seventeen, twenty five and sixteen samples from the 2005, 2008 and 2009 investigations respectively.

Metals

The first level screening assessment (see Table 10) indicates elevated levels of arsenic in thirty samples.

The results of the statistical analysis on the arsenic results are provided below:

- Arsenic – calculated US_{95} value of 26.2 mg/kg which is above the screening value. The analysis indicates no outliers, thus suggesting that the contamination is widespread.

Inorganic Compounds

The first level screening assessment (see Table 11) indicates thirteen samples with elevated sulphate, twelve of which also recorded elevated sulphur. A total of sixteen samples recorded pH values less than 5.5, thus indicating acidic ground conditions.

The results of the statistical analysis on the sulphate results are provided below:

- Sulphate – calculated US_{95} value of 4,982 mg/kg which is less than the screening value. The analysis indicates no outliers.

Organic Compounds

The first level screening assessment (see Table 12) indicates elevated TEMs in three samples, two of which also recorded elevated PAHs.

The results of a statistical analysis on the TEM and PAH results are provided below:

- TEM – calculated US_{95} value of 698 mg/kg which is above the screening value. The analysis indicates three outliers which when removed from the data set reduces the US_{95} value to 172 mg/kg which is less than the screening value. The three outliers are above the screening value, two of which are significantly above. The outliers are

present in TPs 36 and 45 (2008) and TP 139 (2009). Speciated PAH and petroleum hydrocarbon analysis on these outliers (see Tables 12A and 12B) indicates no significant contamination albeit two marginally elevated benzo(a)pyrene results in TPs 36 and 45 (2008) and one marginally elevated dibenz(ah)anthracene result in TP 36 (2008).

- PAH – calculated US_{95} value of 6 mg/kg which is less than the screening value. The analysis indicates three outliers as described above, two of which are above the screening value.

A statistical analysis of the speciated petroleum hydrocarbon results for the three elevated TEM samples indicates no elevated results.

Area 5

A total of one hundred and eleven made ground samples were analysed comprising thirty four, thirty eight and thirty nine samples from the 2005, 2008 and 2009 investigations respectively.

Metals

The first level screening assessment (see Table 13) indicates elevated levels of arsenic in sixty samples and numerous much smaller exceedances of cadmium, chromium, copper, nickel and zinc.

The results of the statistical analysis on these results are provided below:

- Arsenic – calculated US_{95} value of 27.2 mg/kg which is above the screening value. The analysis indicates no outliers, thus suggesting that the contamination is widespread.

- Cadmium – calculated US_{95} value of 0.8 mg/kg which is less than the screening value. The analysis indicates two outliers which when removed from the data set reduces the US_{95} value to 0.72 mg/kg. The two outliers are above the screening value and are present in TP 20 (2005) and TP 121 (2009).

- Chromium – calculated US_{95} value of 20.1 mg/kg which is less than the screening value. The analysis indicates one outlier which when removed from the data set reduces the US_{95} value to 19.4 mg/kg. The outlier is present in TP 104 (2009) and is only marginally above the screening value.

- Copper – calculated US_{95} value of 45.2 mg/kg which is less than the screening value. The analysis indicates no outliers.

- Nickel – calculated US_{95} value of 30 mg/kg which is less than the screening value. The analysis indicates three outliers which when removed from the data set reduces

the US_{95} value to 24.7 mg/kg. The three outliers are present in TPs 58, 69 and 73 (2008) and are only marginally above the screening value.

- Zinc – calculated US_{95} value of 91.5 mg/kg which is less than the screening value. The analysis indicates one outlier which when removed from the data set reduces the US_{95} value to 86.6 mg/kg. The outlier is present in TP 58 (2008) and is above the screening value.

Inorganic Compounds

The first level screening assessment (see Table 14) indicates thirty four samples with elevated sulphate, twenty nine of which also recorded elevated total sulphur. Four samples also exceeded the screening value for sulphide. A total of thirty two samples recorded pH values less than 5.5, thus indicating acidic ground conditions.

The results of the statistical analysis on the sulphate and sulphide results are provided below:

- Sulphate – calculated US_{95} value of 7,087 mg/kg which is less than the screening value. The analysis indicates no outliers.

- Sulphide – calculated US_{95} value of 19.6 mg/kg which is less than the screening value. The analysis indicates no outliers.

Organic Compounds

The first level screening assessment (see Table 15) indicates elevated TEMs in thirty one samples, twenty of which also recorded elevated PAHs, all of which were analysed for speciated PAHs and petroleum hydrocarbons.

The results of a statistical analysis on the TEM, PAH (total and speciated) and speciated petroleum hydrocarbon results (see Tables 5A and B) are provided below:

- TEM – calculated US_{95} value of 478 mg/kg which is less than the screening value. The analysis indicates no outliers.

- PAH (total) – calculated US_{95} value of 36.5 mg/kg which is above the site screening value. The analysis indicates no outliers, thus suggesting that the contamination is widespread.

- Naphthalene – calculated US_{95} value of 18.3 mg/kg which is marginally above the screening value. The analysis indicates two outliers which when removed from the data set reduces the US_{95} value to 3.8 mg/kg which is less than the screening value. The outlier in TP 72 (2008) is above the screening value.

- Benzo(a)anthracene – calculated US_{95} value of 47.9 mg/kg which is above the screening value. The analysis indicates one outlier which when removed from the data set gives a reduced US_{95} value of 12.4 mg/kg which is marginally above the

screening value. The outlier is present in TP 72 (2008) and is above the screening value.

- Benzo(b)fluoranthene – calculated US_{95} value of 46.0 mg/kg which is above the screening value. The analysis indicates one outlier which when removed from the data set gives a reduced US_{95} value of 15.2 mg/kg which is also above the screening value. The outlier is present in TP 72 (2008).

- Benzo(k)fluoranthene – calculated US_{95} value of 27.6 mg/kg which is below the screening value. The analysis indicates one outlier which when removed from the data set gives a reduced US_{95} value of 12.3 mg/kg which is also less than the screening value. The outlier is present in TP 72 (2008).

- Benzo(a)pyrene – calculated US_{95} value of 14.5 mg/kg which is above the screening value. The analysis indicates no outliers, thus suggesting that the contamination is widespread.

- Dibenz(ah)anthracene – calculated US_{95} value of 2.8 mg/kg which is above the screening value. The analysis indicates no outliers.

- Aromatic C_5-C_7 – calculated US_{95} value of 0.04 mg/kg which is less than the screening value. The analysis indicates one outlier which when removed from the data set gives a reduced US_{95} value of 0.03 mg/kg. The outlier is present in TP 66 (2008) and is only marginally elevated.

- Aliphatic C_{10}-C_{12} – calculated US_{95} value of 38 mg/kg which is less than the screening value. The analysis indicates no outliers.

Combustibility

As described in the main ground investigation report, samples of made ground with elevated loss on ignition (LOI) values (i.e. >25% by weight) were analysed for calorific value (CV).

A summary of the results for each of the five designated areas is provided below:

- Area 1 – LOI values in the range 7.8 to 40.4% by weight with one sample out of seven exceeding 25% by weight. A CV test on the same sample recorded a result of 5,235 kJ/kg.

- Area 2 – LOI values in the range 5.6 to 52.5% be weight with five samples out of fifteen exceeding 25% by weight. CV tests on all five samples indicate results in the range 1,901 to 7,277 kJ/kg.

- Area 3 – LOI values in the range 1 to 46.5% by weight with five samples out of nineteen exceeding 25% by weight. CV tests on all five samples indicate results in the range 5,142 to 11,488 kJ/kg.

- Area 4 – LOI values in the range 3.5 to 65.7% by weight with two samples out of twenty five exceeding 25% by weight. CV tests on the two samples indicate results of 7,875 and 13,389 kJ/kg.

- Area 5 – LOI values in the range 1 to 32.4% by weight with two samples out of thirty eight exceeding 25% by weight. CV tests on the two samples indicate results of 6160 and 7,411 kJ/kg.

The LOI tests confirm that fifteen samples from the made ground exceeded the site screening value of 25% by weight, thus confirming that the samples are potentially combustible due to the presence of residual coal. Tests carried out on the same fifteen samples indicate CVs generally above 5,000 kJ/kg up to a maximum recorded value of 13,389 kJ/kg.

It is generally agreed that samples with a CV of 10,000 kJ/kg or above are combustible, whilst those between 7,000 kJ/kg and 10,000 kJ/kg are considered to be at risk of smouldering. Under laboratory conditions smouldering can occur in samples with CVs less than 7,000 kJ/kg, but under 2,000 kJ/kg it is unlikely that a sample will burn at all.

Asbestos

Cement-bound asbestos was found in TP 102A (2009). Four trial pits (designated Asbestos 1 to 4) were excavated in the vicinity of TP 102A but no other asbestos was found.

Twenty nine samples of made ground from various other locations across the site were tested and found to contain no asbestos. However, in view of the history of the site the possible presence of asbestos cannot be ruled out and as such a 'watching brief' is recommended during the works.

Tests Applicable to Concrete Design

As previously mentioned, total sulphur, water soluble sulphate and water soluble magnesium tests were carried out on those samples with total sulphate levels exceeding 5,000 mg/kg.

A summary of the results applicable to Areas 1 to 5 is provided below:

- Area 1 – total sulphate levels in the range 200 to 8,800 mg/kg. Total sulphur, water soluble sulphate and magnesium levels of 2,815 to 3,998 mg/kg, 715 to 1,750 mg/l and 35 to 78 mg/l respectively.

- Area 2 – total sulphate levels in the range 74 to 45,992 mg/kg. Total sulphur, water soluble sulphate and magnesium levels of 2,750 to 17,073 mg/kg, 251 to 3,303 mg/l and 18 to 105 mg/l respectively.

- Area 3 – total sulphate levels in the range 634 to 60,100 mg/kg. Total sulphur, water soluble sulphate and magnesium levels of 2,231 to 27,260 mg/kg, 38 to 25,406 mg/l and 5.8 to 221 mg/l respectively.

- Area 4 – total sulphate levels in the range 500 to 36,254 mg/kg. Total sulphur, water soluble sulphate and magnesium levels of 1,998 to 19,980 mg/kg, 107 to 3,192 mg/l and 16 to 322 mg/l respectively.

- Area 5 – total sulphate levels in the range <100 to 66,589 mg/kg. Total sulphur, water soluble sulphate and magnesium levels of 1,969 to 23,120 mg/kg, 30 to 2,229 mg/l and 1.5 to 141 mg/l respectively.

5.3.3. Summary of Results – Made Ground

In total, two hundred and seventy three samples of made ground were analysed as discussed above.

- Area 1 – the analyses indicate no significant metal, inorganic or organic contamination although acidic conditions prevail (pH less than 5.5).

- Area 2 – the analyses indicate widespread contamination by arsenic and acidic conditions (pH less than 5.5). However, no significant inorganic or organic contamination was found, although some minor TPH and PAH exceedances are highlighted by the analyses.

- Area 3 – the analyses indicate widespread contamination by arsenic and sulphates. However, no significant organic contamination was found although acidic conditions prevail (pH less than 5.5).

- Area 4 – the analyses indicate widespread contamination by arsenic and also the presence of acidic conditions (pH less than 5.5). No significant hydrocarbon contamination was found although some minor PAH exceedances are highlighted by the analyses.

- Area 5 – the analyses indicate widespread contamination by arsenic and only a small number of other mostly minor exceedances including cadmium, chromium, nickel and zinc, with acidic conditions prevailing. There are indications of widespread PAH contamination, in particular of benzo(b)fluoranthene, benzo(a)pyrene, dibenz(ah)anthracene. The analyses indicate no significant contamination by petroleum hydrocarbons.

With respect to the PAH contamination identified in Area 5, it is noted that the samples form a grouping in an area where there was no visual and/or olfactory evidence of hydrocarbons (see **Figure 9**). However, the trial pits identified the presence of variable amounts of bituminous materials in the made ground deposits (i.e. tarmacadam), and in one location the presence of an old chemical drum. By removing from the data set the elevated cluster of results highlighted on **Figure 9**, a recalculation of the US_{95} values for the three main PAH contaminants indicates no significant PAH contamination in Area 5, thus confirming the localised nature of the contamination.

Of particular significance is that no evidence of significant contamination associated with the former coke ovens was found. However, in view of the history of the site, it is possible that presently undiscovered areas of contamination may exist at the site. Allowance should therefore be made for supervision of the earthworks by an experienced environmental scientist/engineer.

Although no asbestos was identified in the samples the possibility cannot be ruled out that it may be present and in particular within the made ground deposits and in and surrounding remnant foundations and sub-structures.

In addition to the normal chemical tests, further speciated TPH analyses were conducted on samples of made ground from all areas with 250 mg/kg < TEM < 500 mg/kg. Results from all of these analyses indicated no significant concentrations of aromatic/aliphatic petroleum hydrocarbons above the site screening values, thus confirming the validity of using TEM as a screening tool for hydrocarbons.

5.3.4. Glacial Till

Area 1

Two samples were analysed.

Metals

The first level screening assessment (see Table 16) indicates one marginally elevated level of nickel.

Inorganic and Organic Compounds

The first level screening assessments (see Table 17 and 18) indicate no elevated results.

Area 2

Eleven samples were analysed.

Metals

The first level screening assessment (see Table 19) indicates one marginally elevated level of cadmium. The results of a statistical analysis on the cadmium results are provided below:

- Cadmium – calculated US_{95} value of 0.82 mg/kg which is less than the screening value. The analysis indicates no outliers.

Inorganic Compounds

The first level screening assessment (see Table 20) indicates two samples with pH values less than 5.5, thus indicating acidic conditions.

Organic Compounds

The first level screening assessment (see Table 21) indicates two elevated TEM results. The results of a statistical analysis on the TEM results are provided below:

- TEM – calculated US_{95} value of 216 mg/kg which is less than the screening value. The analysis indicates no outliers. Speciated PAH and petroleum hydrocarbon analyses on the samples indicate no significant contamination.

Area 3

Nine samples were analysed.

Metals

The first level screening assessment (see Table 22) indicates two elevated arsenic results. The results of a statistical analysis on the arsenic results are provided below:

- Arsenic – calculated US_{95} value of 30.9 mg/kg which is more than the screening value. The analysis indicates no outliers, thus indicating widespread contamination.

Inorganic Compounds

The first level screening assessment (see Table 23) indicates two samples with pH values less than 5.5, thus indicating acidic conditions.

Organic Compounds

The first level screening assessment (see Table 24) indicates one elevated TEM result. The results of a statistical analysis on the TEM results (see Tables 24A and B) are provided below:

- TEM – calculated US_{95} value of 247 mg/kg which is less than the screening value. The analysis indicates no outliers. A PAH analysis on the same sample indicates a result of 50 mg/kg which is above the screening value. Speciated analysis confirms marginally elevated benzo(a)pyrene and no significant petroleum hydrocarbons.

Area 4

Seventeen samples were analysed.

Metals

The first level screening assessment (see Table 25) indicates one elevated level of arsenic. The results of a statistical analysis on the arsenic results are provided below:

- Arsenic – calculated US_{95} value of 10.1 mg/kg which is less than the screening value. The analysis indicates no outliers.

Inorganic and Organic Compounds

The first level screening assessments (see Tables 26 and 27) indicate no elevated results.

Area 5

Seven samples were analysed. The first level screening assessment (see Tables 28 to 30) indicate no elevated results other than five samples with pH values less than 5.5, thus indicating acidic conditions.

5.3.5. Summary of Results – Glacial Till

A total of fifty five samples were analysed. The analyses indicate that in general the glacial till deposits are uncontaminated.

However, elevated arsenic, cadmium, nickel and PAHs were identified in a small number of samples from Areas 1 to 4 which may suggest localised leaching of contaminants out of the made ground deposits.

In addition, several samples from Areas 3 and 5 recorded pH values less than 5.5, thus suggesting acidic conditions.

5.4. Analysis of Leachates

A total of thirty two made ground samples were submitted for leachate analysis based on the 2008 and 2009 ground investigations (only limited testing was carried out in the 2005 ground investigation).

The results of the leachate tests are summarised in Table 31 in **Appendix D** where they are compared principally with the EQS Freshwater Standards (Ref. 8).

Where there are no screening values in the EQS list, the results were compared to the UK Drinking Water Standards (Ref. 9) although it should be recognised that the latter are often more stringent.

The results indicate slightly elevated levels of selenium in one sample from Area 1 (compared to the UK Drinking Water Standards) and slightly elevated concentrations of sulphates in three samples from Area 3 and one from Area 5.

Elevated total PAHs were recorded in one sample from Area 4 and two from Area 5 (compared to the UK Drinking Water Standards), while elevated TPHs were found in ten samples from across all areas (also compared to the UK Drinking Water Standards).

The results of the leachate tests suggest that there are soluble and hence potentially mobile concentrations of TPHs and, to a lesser extent, PAHs and sulphates, in the made ground deposits.

5.5. Analysis of Groundwater

A total of twelve groundwater samples were analysed as described in Section 3.3.3.

The results are presented in Table 32 in **Appendix D** and the standpipe locations are indicated with the letter 'P' on **Figure 3**.

The results indicate marginally elevated levels of cadmium and elevated levels of selenium and nickel in one sample from Area 5. In addition, elevated sulphates were recorded in samples from across the site and low pH values were recorded in samples from Areas 4 and 5.

Elevated PAHs were recorded in samples from the 2005 ground investigation in Areas 4 and 5 but not in any samples taken in 2008 and 2009. Elevated TPHs were identified in six samples from Areas 3, 4 and 5.

On the basis of the above analyses and in particular the results from the 2005 ground investigation, hydrocarbon impacted groundwater is present in Areas 4 and 5 but not elsewhere within the site and not in samples taken in 2008 and 2009.

Elevated sulphates are present in the groundwater across the site with elevated levels of nickel and selenium in one sample from Area 5.

5.6. Analysis of Surface Waters

Surface waters were taken from the site at the locations shown on **Figure 3**. In total, four samples were taken and analysed as described in Section 3.3.3. The results are summarised in Table 33 in **Appendix D**.

The analyses indicate elevated sulphates in one sample taken from Area 4 (Sample A).

5.7. Revised Conceptual Model

5.7.1. Preamble

The following qualitative risk assessment was undertaken to determine the risk to both humans and the environmental receptors posed by the site. The assessment presents risks based on the information contained in this report and draws on the information provided above.

5.7.2. Concept

The risk assessment is a qualitative source-pathway-receptor assessment. It is proposed to demonstrate whether or not contamination is likely to come into contact with the receptors

(people, structures, controlled waters, etc.), and whether that contact is likely to be potentially harmful.

Risk is defined as the combination of the consequences of a harmful effect and the probability of its occurrence. The existence of a pollutant linkage is heavily dependent on the site use as well as the environmental conditions.

The ground investigation has established that the north-east part of the site has been occupied in the past by a colliery and coke ovens with railway lines and sidings and associated mine structures. Much of the site was also covered in colliery spoil heaps and slurry lagoons. The site is undermined and parts have also been opencasted.

The former uses of the site would be considered to pose a high risk of causing significant ground contamination.

5.7.3. Sources of Contamination

The ground investigation confirms the presence of elevated levels of arsenic in the made ground deposits across the site. Localised outliers of cadmium, chromium, copper, nickel and zinc have also been recorded in the northern part of the site, but these tend to be only marginally elevated.

Elevated levels of sulphates were identified in the made ground deposits in Areas 2 to 5 and tests confirm generally acidic conditions over much of the site. Tests also indicate that the made ground deposits, which comprise largely colliery discards, are potentially combustible.

Localised areas of hydrocarbon contamination were identified in Areas 2 and 4 and in particular Area 5. A grouping of samples in Area 5 with elevated levels of PAHs can be attributed to the presence of bituminous materials in the made ground deposits. It should be noted that no evidence of significant contamination was found anywhere on the site which would relate to typical waste products from the former coke works.

The underlying glacial till deposits do not contain any significant contamination. However, isolated, elevated metals and hydrocarbons were identified in a small number of samples from Areas 1 to 4 which may suggest some localised leaching of contaminants out of the made ground.

Groundwater across the site contains elevated sulphates. In addition, localised areas of low pH and elevated metals are indicated by the analyses. The groundwater present in Areas 4 and 5 in particular is impacted by hydrocarbons based on the findings of the 2005 ground investigation. However, samples taken from the same standpipes in 2008 and 2009 recorded much lower levels of hydrocarbons. No significant contamination is present within surface waters.

5.7.4. Receptors

The receptor is the potential recipient of the pollution to which significant harm or deterioration in quality may be caused.

The receptors under consideration include the following:

- Human site users – site workers and the residents of the houses which will ultimately occupy the site.
- Groundwater in the underlying aquifer.
- Surface water courses – drainage ditches, ponds etc.
- Vegetation – landscaping following re-development of the site.
- Adjacent land and properties.
- Buildings on the site – services and foundation concrete.

5.7.5. Pathways

Migration pathways are the routes by which contamination may move towards the target. The pathways for exposure of human targets include dermal contact, ingestion and inhalation. Humans may also come into contact with gases which can build up in confined spaces within and below the houses.

The pathway for exposure of plants is by direct contact with the root system, or root up-take of phytotoxic contaminants dissolved in the soil or water.

The pathways for exposure of adjacent land and properties, groundwater or surface water are either from direct surface water run-off carrying contaminants in suspension or dissolved in the water, or by downward seepage of waters leaching contaminants in combination with lateral movement towards neighbouring properties via the groundwater.

The principal pathways by which targets might become exposed to contamination include:

- Direct human contact with contaminated soil or water.
- Surface run-off of contamination.
- Leaching of contamination into the groundwater and migration of groundwater.
- Gas migration into buildings or confined spaces.
- Plant uptake.
- Contaminated soil or groundwater coming into contact with buildings, foundations or buried structures.

5.7.6. The Model

A representation of the revised conceptual model based on the findings of this report is presented as **Figure 10**.

6. DEVELOPMENT CONSIDERATIONS

6.1. Preamble

For the purpose of the following discussion, use is made of the same section headings as those in the main ground investigation report.

It should be stressed that the advice and recommendations presented in Section 8 of the above report are still largely valid.

Where little or no change is indicated by the findings of this report, only a summary of the findings of the previous report is provided.

6.2. General Issues of Development

The previous report referred to phased development of the site which is still likely, as is the need for an extensive earthworks operation. A preliminary ground model for the earthworks has been prepared by SDA using the McCarthy Taylor Land Survey Software (LSS).

The materials used in the earthworks will comprise mostly coarse colliery discards which, for the most part, should be suitable for re-use in the works as engineered fill. In addition to the colliery discards, an appreciable volume of secondary aggregates may also be available from re-processing of remnant brick and concrete foundations and sub-structures.

It is assumed that the site will be re-developed for housing with private gardens and in the most part the structural loads will be light to moderate. Infrastructure will be required consisting of roads and drainage, the latter of which could be deep.

6.3. Obstructions in the Ground

The previous report refers to the presence of surface hardstanding and remnant brick and concrete foundations and sub-structures, the majority left over from the demolition of the former colliery buildings.

The remnant foundations and sub-structures are for the most part substantial and deep. The concrete is likely to be heavily reinforced, thus requiring the use of heavy duty plant and machinery. In order to avoid the creation of 'hard spots' below the development platform, all obstructions of the type described above should be removed and the resulting excavations backfilled with engineered fill.

It is recommended that the removal of remnant foundations and sub-structures is supervised on a full-time basis. The individual appointed to carry out this task will be responsible for identifying any areas of contamination and for ensuring that the works are undertaken in accordance with the remedial method statement.

6.4. Mine Workings

The Kent's Thick coal seam underlies most of the northern half of the proposed re-development area.

The seam has been worked at shallow depth and is present within influencing distance of the surface. Remedial works are required consisting of drilling and grouting to fill the void spaces and to strengthen the ground in advance of construction. It is recommended that these works are carried out following the preparatory earthworks.

With respect to the shafts and adits, the remedial works will involve drilling and grouting and in the case of the shafts, the construction of a reinforced concrete cap. The remedial works to the adits will typically comprise sealing the entrance with brick or concrete followed by infilling with grout via boreholes drilled into the roof.

A 'no-build' zone will be required above and adjacent to the mine entries as discussed in the previous report.

6.5. Opencast Workings

The Kent's Thick coal seam has been worked by opencast methods in the eastern half of the site close to its sub-crop. The workings are very shallow and of limited extent when compared to the overall site area.

6.6. Contamination Issues

6.6.1. Preamble

The revised contamination assessment provided in Section 5 of this report supersedes that provided in the previous report.

In general, the assessment confirms widespread contamination by arsenic and sulphates and acidic conditions across the site and principally within the colliery discards.

Several other exceedances are indicated by the analyses but these tend to be localised and therefore of minor importance.

With respect to organic contaminants, the only issue appears to be PAHs within Area 5 but not petroleum hydrocarbons.

6.6.2. Combustibility

Visual assessment of the colliery discards confirms the presence of large amounts of coal and other carbonaceous materials.

Tests confirm that these materials are potentially combustible. The standard technique to safeguard against heating by surface fires is the placement of a 1m thick soil cap over the potentially combustible soils as advised in the previous report.

6.6.3. Remediation

At this stage it is considered that the provision of a 1m thick soil cap across the site should be sufficient to protect the end-users from the contamination in the made ground deposits.

These materials can be re-used in the earthworks operations without limitation provided they are isolated below the soil cap. The exception to this rule is within the area highlighted on **Figure 9** where the assessment indicates a grouping of elevated PAH results.

It is recommended that this area is treated separately by excavating out the made ground deposits, followed by screening to remove over-sized materials and placing in temporary stockpiles for sampling and confirmatory chemical analysis.

Subject to the findings of the analyses, it may be possible to re-introduce the materials back into the site or alternatively carry out remediation to reduce the PAH concentrations to an acceptable level for human health subject to the capping described above.

Leaching tests confirm soluble and hence potentially mobile concentrations of TPHs and, to a lesser extent, PAHs and sulphates in the made ground deposits. Groundwater contains elevated levels of sulphates and occasionally low pH values. The 2005 investigation indicates hydrocarbon impacted groundwater in Areas 4 and 5 but samples taken in 2008 and 2009 indicate much lower levels, thus suggesting either an improvement in water quality in the intervening period or very variable conditions.

The contamination in the groundwater is typical of former colliery sites and groundwater quality generally within the Coal Measures strata. It should be noted that there is no evidence at present to suggest that the activities carried out at the site have significantly impacted groundwater quality.

This last statement is supported to a degree by the lack of significant contamination in the surface waters which also points to relatively low levels of leaching due to surface water infiltration and run-off from the site.

6.7. Gas Emissions

A detailed gas risk assessment confirms the need for gas protection measures consisting of a gas–proof barrier in the floor slab and a ventilated sub-floor void. The barrier should also be radon proof.

6.8. Foundation Design and Construction

The advice and recommendations provided in the previous report are still largely valid and reference should therefore be made to the report for a discussion on foundation options.

Following confirmation of the final earthworks design and layout, it is recommended that these recommendations are re-assessed and if necessary, an addendum report issued. Notwithstanding the above, it is likely that the development will comprise a range of different foundation types which will be dictated by the post-earthworks made ground profile.

It is likely that in the northern half of the site, reinforced strip or trench fill footings founded in the in-situ soil and/or rock strata should be suitable.

In the southern half of the site and in particular within areas of deep fill (i.e. >2.5m thick), more extensive foundations may be required consisting of rafts or piles, the latter end-bearing in rock.

6.9. Earthworks

The earthworks operations should prove relatively straightforward although heavy duty plant may be required to remove remnant foundations, sub-structures and competent bedrock.

The predominant colliery discards should be relatively easy to excavate with conventional hydraulic plant as proved the case in the ground investigations.

Unstable ground conditions and groundwater may be encountered within the fine colliery discards (former lagoon deposits) present within the southern half of the site as shown on Figure 6 in the previous report.

6.10. Pavement Design

The coarse colliery discards (burnt and un-burnt) should provide a satisfactory sub-grade for the development roads, drives, parking areas etc.

High CBR values are likely assuming adequate placement and compaction although soft spots should be treated by digging out and replacing with engineered fill.

The reworked clays and in-situ glacial tills offer generally lower CBR values and both materials will be susceptible to water softening upon exposure. A capping layer will be required.

6.11. Concrete Design

An assessment of the results of all chemical testing carried out during the 2005, 2008 and 2009 ground investigations indicates the following characteristic values for the made ground deposits:

- Water soluble sulphate – 3,514 mg/litre SO_4
- Water soluble magnesium – 153 mg/litre Mg
- Total potential sulphate – 5.17% SO_4
- pH – 3.8

Referring to the design guidance contained in BRE Special Digest No. 1 (Ref. 10), the a Design Sulphate Class of DS-5 and ACEC rating of AC-5 apply for a brownfield site with static groundwater conditions. Referring to table D1 in the same publication, a concrete grade of DC-4 is indicated, but with the requirement for an additional protection measure (APM) consisting of a coating or water resistant membrane, the requirement for which is similar to those for coatings.

With respect to membranes, it is recommended that a 1200 gauge polythene sheet or an equivalent coating is used to line excavations for strip or trench fill footings or to line a site prior to casting a raft foundation.

The analyses carried out as part of this investigation confirm the classification that was previously arrived at.

6.12. Existing Drainage

The investigations and checks advised in the previous report with respect to the underground sewer in the southern half of the site are still advised.

6.13. Additional Works

The following additional works are recommended following completion of the preparatory earthworks:

- Investigations to locate the mine shafts and adits. This could be undertaken at the same time as the drilling and grouting of the Kent's Thick coal seam and adits.
- Investigations to determine the made ground profile following completion of the preparatory earthworks.
- The installation and monitoring of surface settlement points in areas of deep fill to check on post-earthwork settlements.

7. REFERENCES

1. British Coal (1990), 'Desk Top Study of a Possible Opencast Site at Gawber'.
2. Scott Doherty Associates (2005), 'Proposed North Gawber Mining Scheme', Geo-environmental Assessment.
3. Scott Doherty Associates (2008) 'North Gawber Colliery Site, Mapplewell, Barnsley' Ground Investigation Report.
4. British Standards Institute BS 1377 (1990), 'British Standards Methods of Tests for Soils for Civil Engineering Purposes'.
5. Environment Agency (2004), Model Procedures for the Management of Land Contamination'.
6. CIEH/CL:AIRE (2008), 'Comparing Soil Contamination with a Critical Concentration'.
7. Environment Agency (2002) CLR 7 'Assessment of risks to Human Health from land contamination)
8. EQS Freshwater Standards
9. UK Drinking Water Standards (2000).
10. Building Research Establishment (BRE) Special Digest No. 1 (2005), 'Concrete in Aggressive Ground'.

FIGURES

Client		Drawing Title	
HARWORTH ESTATES LTD		REGIONAL LOCATION PLAN FIGURE 1	
Project	NORTH GAWBER COLLIERY SITE, BARNSLEY SUPPLEMENTARY GROUND INVESTIGATION REPORT	Drawing No.	SDA/09022/01
		Scales	1 : 50,000
		Status	FINAL

Drawn	Date	Checked	Passed
JCF	JUNE 09	DJL	MJD

Derwentside Business Centre
Consett Business Park
Consett, Co. Durham
DH8 6BP

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REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH PERMISSION OF THE CONTROLLER OF H.M. STATIONERY OFFICE, © CROWN COPYRIGHT
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Client: HARWORTH ESTATES LTD			Drawing Title: PLAN SHOWING AREA OF SUB-DIVISIONS FIGURE 2
Project: NORTH GAWBER COLLIERY SITE, BARNSLEY SUPPLEMENTARY GROUND INVESTIGATION REPORT			Drawing No.: SDA/09022/02
			Scales: 1 : 2500
			Status: FINAL
Drawn: JCF	Date: JUNE 09	Checked: DJL	Passed: MJD

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AREA 1

AREA 2

AREA 3

AREA 4

AREA 5

LEGEND

APPROXIMATE SITE BOUNDARY

Client				Drawing Title	
HARWORTH ESTATES LTD				PLAN SHOWING ROCKHEAD CONTOURS FIGURE 8	
Project	NORTH GAWBER COLLIERY SITE, BARNSLEY SUPPLEMENTARY GROUND INVESTIGATION REPORT			Drawing No.	SDA/09022/08
				Scales	1 : 2500
				Status	FINAL
Drawn	Date	Checked	Passed	Derwentside Business Centre, Consett Business Park, Consett, Co. Durham DH8 6BP	Geotechnical and Environmental Consultants
JCF	JUNE 09	DJL	MJD		

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NOTE

Contours are relative to Ordnance Datum (OD)

LEGEND

APPROXIMATE SITE BOUNDARY

Client				Drawing Title	
HARWORTH ESTATES LTD				AREA OF PAH CONTAMINATION IN AREA 5 FIGURE 9	
Project	NORTH GAWBER COLLIERY SITE, BARNSLEY SUPPLEMENTARY GROUND INVESTIGATION REPORT			Drawing No.	SDA/09022/09
				Scales	1 : 2500
				Status	FINAL
Drawn	Date	Checked	Passed	Denewstside Business Centre Consett Business Park Consett, Co. Durham DH8 6BP	Geotechnical and Environmental Consultants
JCF	JUNE 09	DJL	MJD		

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LEGEND

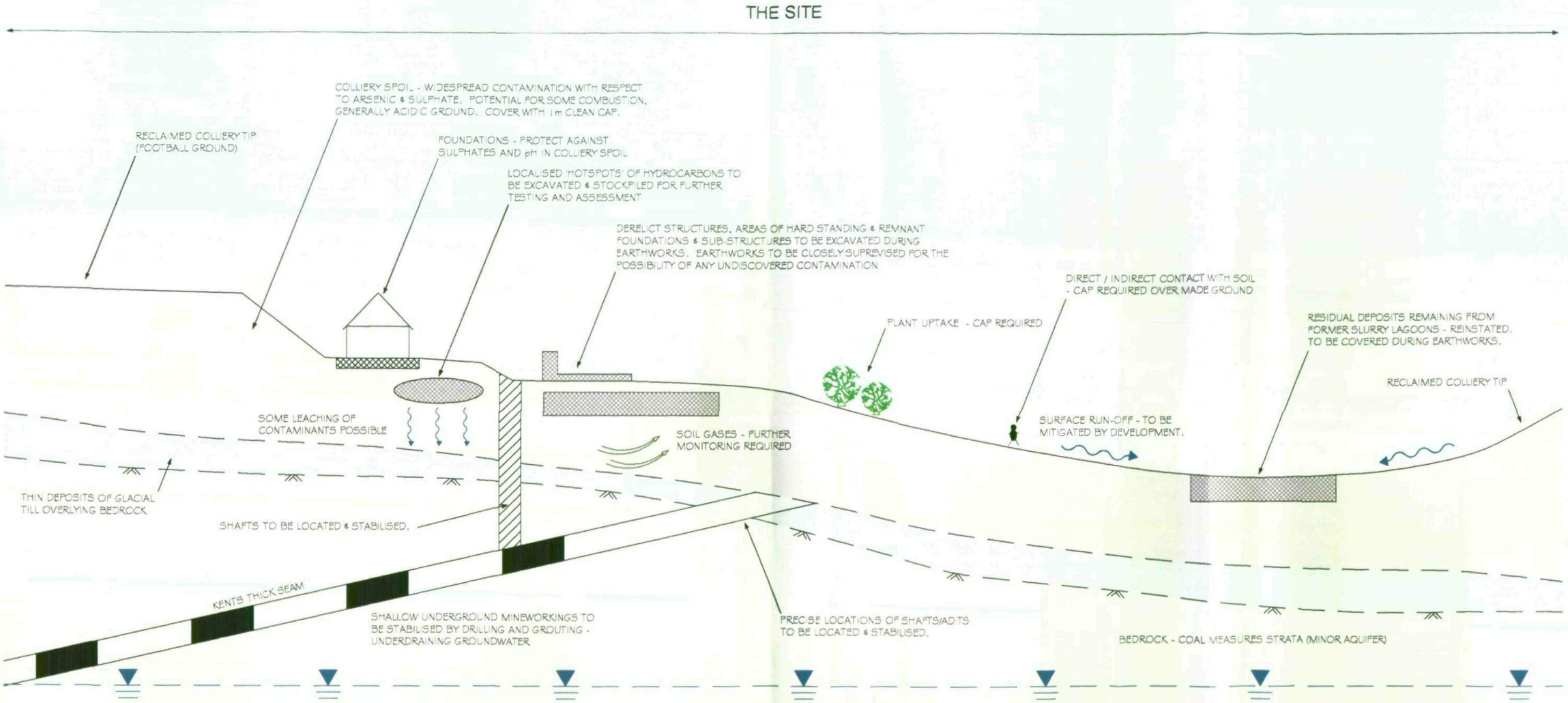
APPROXIMATE SITE BOUNDARY

AREA OF PAH CONTAMINATION

Client		Drawing Title	
HARWORTH ESTATES LTD		REVISED CONCEPTUAL SITE MODEL FIGURE 10	
Project	NORTH GAWBER COLLIERY SITE, BARNSLEY SUPPLEMENTARY GROUND INVESTIGATION REPORT	Drawing No.	SDA/09022/10
		Scales	NTS
		Status	FINAL

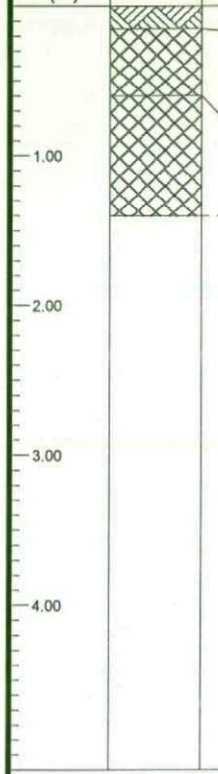
Drawn	Date	Checked	Passed
JCF	JUNE 09	DJL	MJD

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APPENDIX A
Exploratory Hole Logs

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL.	0.15	90.95	0.10	ES			
		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of subangular mudstone).	(0.45) 0.60	90.50	0.40	ES			
1.00		MADE GROUND (Colliery discard consisting of red fine to coarse gravel of angular and subangular burnt shale).	(0.80) 1.40	89.70	1.00	ES			
		End of Trial Pit at 1.40 m							
2.00									
3.00									
4.00									

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 91.1
Coordinates: 433116E - 409794N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: ASBESTOS 1

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

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Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of black fine to coarse gravel of angular and subangular ash, coal and mudstone. Rubber machine belt present also).	(1.20)		0.60	ES			
1.00			1.20	90.00					
		MADE GROUND (Colliery discard consisting of red fine to coarse sandy gravel of angular and subangular burnt shale. Many cobbles of burnt shale and some metal bars present also).	(0.80)		1.40	ES			
2.00			2.00	89.20					
		End of Trial Pit at 2.00 m							
3.00									
4.00									

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 91.2
Coordinates: 433123E - 409801N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit:
ASBESTOS 2

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

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Photograph:

Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
		MADE GROUND (Colliery discard consisting of dark grey fine to coarse gravel of subangular mudstone and some burnt shale. Some cobbles of burnt shale and mudstone and many cobbles and boulders of concrete present also along with occasional steel bars).	(1.70)	
1.00				
			1.70	89.50
		End of Trial Pit at 1.70 m		
2.00				
3.00				
4.00				

Samples

Depth (m)	Type
0.30	ES
1.00	ES

Tests

Depth (m)	MEXE	Shear Vane (Peak/Res)

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 91.2
Coordinates: 433109E - 409801N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit:
ASBESTOS 3

TRIAL PIT RECORD

North Gawber Colliery

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Photograph:

Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
		TOPSOIL.	0.15	89.95
		MADE GROUND (Firm dark grey sandy gravelly clay with pockets of silt. Gravel is fine to coarse angular and subangular mudstone, coal and burnt shale. Metal plates and steel cable noted).	(1.25)	
1.00			1.40	88.70
		End of Trial Pit at 1.40 m		
2.00				
3.00				
4.00				

Samples

Depth (m)	Type
0.10	ES
0.50	ES

Tests

Depth (m)	MEXE	Shear Vane (Peak/Res)

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 90.1
Coordinates: *433116E - 409807N*

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit:
ASBESTOS 4

TRIAL PIT RECORD

North Gawber Colliery

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Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of grey, locally claybound, fine to coarse gravel of angular and subangular mudstone and some coal. Many cobbles of mudstone present also).			0.60	ES			
1.00									
					1.90	ES			
2.00			(5.00)						
3.00									
					3.50	ES			
4.00									
					4.60	ES			
		End of Trial Pit at 5.00 m	5.00	91.10					

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 96.1
Coordinates: 432993E - 409837N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP101

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

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Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL.	0.15	91.25	0.10	ES			
		MADE GROUND (Colliery discard consisting of reddish orange and brownish grey fine to coarse gravel of subangular mudstone weathered to clay in places).	(0.95)		0.60	ES			
1.00			1.10	90.30					
		MADE GROUND (Colliery discard consisting of grey fine to coarse gravel of subangular mudstone. Some cobbles and boulders of sandstone present below 3.5m).			1.50 1.60	B ES			
2.00			(2.70)						
3.00					3.00	ES B			
			3.80	87.60					
4.00		*Firm brown sandy slightly gravelly CLAY. Gravel is fine to coarse angular and subangular coal and sandstone.*	(0.50)		4.00	ES B	4.00		55 / 12 kPa
			4.30	87.10					
		End of Trial Pit at 4.30 m							

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 91.4
Coordinates: 433106E - 409795N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP102

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

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Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Dark grey clayey fine to coarse sandy gravel of ash, shale, mudstone, brick and concrete. Some cobbles of brick and pieces of cement bound asbestos sheeting present also).	(0.40) 0.40	90.80					
1.00		End of Trial Pit at 0.40 m							
2.00									
3.00									
4.00									

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: Ben Johnson
Ground Level: 91.2
Coordinates: 433116E - 409801N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Cement bound asbestos sheeting found at 0.1 to 0.3m bgl therefore trial pit terminated at shallow depth.

Trial Pit: TP102A

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

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Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of dark grey fine to coarse gravel of angular and subangular coal, clinker and some brick. Cobbles of whole and broken brick and metal bar present also).	(1.30)		0.20	ES			
1.00			1.30	89.70					
		Firm friable grey and brown sandy gravelly CLAY. Gravel is fine and medium subangular sandstone and mudstone.	(0.60)		1.50	ES B			
			1.90	89.10					
2.00		Moderately weak becoming moderately strong yellowish brown medium grained SANDSTONE weathered to clay in places.	(0.90)		2.00	ES			
			2.80	88.20					
3.00		End of Trial Pit at 2.80 m							
4.00									

Date of Excavation: 20/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 91.0
Coordinates: 433166E - 409784N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Concrete foundations present from 0.2 to 0.6m bgl adjacent to trial pit.

Trial Pit: TP103

TRIAL PIT RECORD

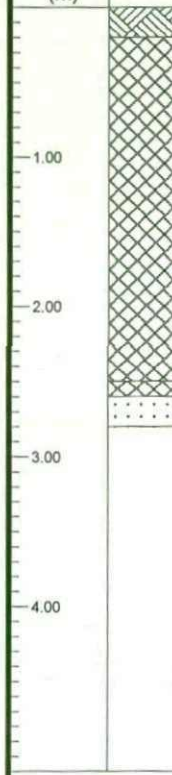
North Gawber Colliery

Revision: Final

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Photograph:



Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
		TOPSOIL (Poor quaility with much gravel of sandstone and some bitumen bound hardstanding).	0.20	89.70
		MADE GROUND (Colliery discard consisting of dark grey fine to coarse gravel of angular and subangular clinker, sandstone and bitumen bound hardstanding. Some cobbles of concrete and brick present also).	(2.30)	
			2.50	87.40
		MADE GROUND (Firm grey and brown mottled orangish brown sandy gravelly reworked clay. Gravel is fine to coarse angular to subrounded sandstone, coal, mudstone and brick).	2.60	87.30
		Strong yellowish brown coarse grained very thinly bedded SANDSTONE.	2.80	87.10
		End of Trial Pit at 2.80 m		

Samples

Depth (m)	Type
0.10	ES
0.60	ES
1.80	ES
2.55	ES
2.70	ES

Tests

Depth (m)	MEXE	Shear Vane (Peak/Res)

Date of Excavation: 20/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 89.9
Coordinates: 433240E - 409740N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP104

TRIAL PIT RECORD

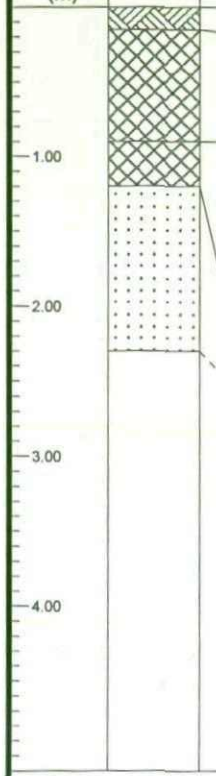
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL (Poor quality).	0.15	88.55	0.10	ES			
		MADE GROUND (Cobbles of sandstone and brick with some dark grey fine to coarse claybound gravel of angular clinker and coal).	(0.75) 0.90	87.80	0.40	ES			
1.00		MADE GROUND (Stiff reddish brown sandy to very sandy gravelly possibly reworked clay. Sand is fine to coarse. Gravel is fine to coarse angular and subangular sandstone and coal).	(0.30) 1.20	87.50	1.10	ES			
2.00		Strong yellowish brown medium grained SANDSTONE. Recovered as a coarse angular gravel.	(1.10) 2.30	86.40	2.00	ES			
		End of Trial Pit at 2.30 m							
3.00									
4.00									

Date of Excavation: 20/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 88.7
Coordinates: 433255E - 409727N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP105

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

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Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of grey fine to coarse gravel of subangular mudstone and occasional sandstone. Rare cobbles of sandstone present also).			0.50	ES			
1.00					1.00	B			
			(2.80)		1.50	ES			
2.00									
			2.80	92.30					
3.00		MADE GROUND (Firm grey and brown sandy gravelly reworked clay. Gravel is fine to coarse angular and subangular mudstone, sandstone and coal with rare burnt shale).			3.00	ES B	3.00		61 / 7 kPa
4.00			(2.60)		4.20	ES			
		Continued next sheet					5.00		68 / 32 kPa

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 95.1
Coordinates: 432951E - 409795N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP106

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

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Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Firm grey and *brown sandy gravelly* reworked clay. Gravel is fine to coarse angular and subangular mudstone, sandstone and coal with rare burnt shale).	5.40	89.70					
6.00		End of Trial Pit at 5.40 m							
7.00									
8.00									
9.00									

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 95.1
Coordinates: 432951E - 409795N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP106

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of subangular mudstone. Pockets of soft and firm brown clay present also).	(1.20)	
1.00			1.20	89.10
		MADE GROUND (Colliery discard consisting of reddish orange fine to coarse gravel of subangular burnt shale. Pockets of reddish brown silt present after 3.0m bgl. Occasional cobbles of mudstone present throughout stratum).	(2.80)	
3.00				
4.00			4.00	86.30
		Very weak becoming weak yellowish brown medium grained SANDSTONE weathered to clay in places. Recovered as a course angular gravel and cobbles.	(0.40)	
			4.40	85.90
		End of Trial Pit at 4.40 m		

Samples

Depth (m)	Type
0.70	ES
1.60	ES B
3.40	ES
4.20	ES

Tests

Depth (m)	MEXE	Shear Vane (Peak/Res)

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 90.3
Coordinates: 432998E - 409796N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP107

TRIAL PIT RECORD

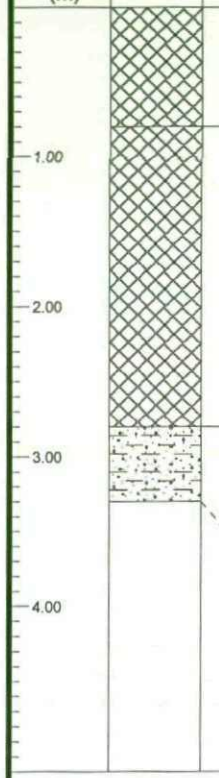
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of very dark grey fine to coarse gravel of angular coal and clinker).	(0.80) 0.80	87.70	0.50	ES			
1.00		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of angular and subangular mudstone, coal and clinker).	(2.00) 2.80	85.70	1.90	ES			
2.00									
3.00		Stiff grey and orangish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular and subangular coal and mudstone.	(0.50) 3.30	85.20					
4.00		End of Trial Pit at 3.30 m							

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 88.5
Coordinates: 432990E - 409773N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP108

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of reddish orange gravel of burnt shale and mudstone, weathered to clay in places).	(1.20)		0.60	ES			
1.00			1.20	88.80					
		MADE GROUND (Colliery discard consisting of grey fine to coarse gravel of subangular mudstone with some clinker, ash and coal).			1.50	ES			
2.00									
					2.80	ES			
3.00			(4.00)						
					3.50	ES			
4.00									
					4.60	ES			
		Continued next sheet							

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 90.0
Coordinates: 433052E - 409792N

Groundwater:
Moderate seepage at 5.2m bgl.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP109

TRIAL PIT RECORD

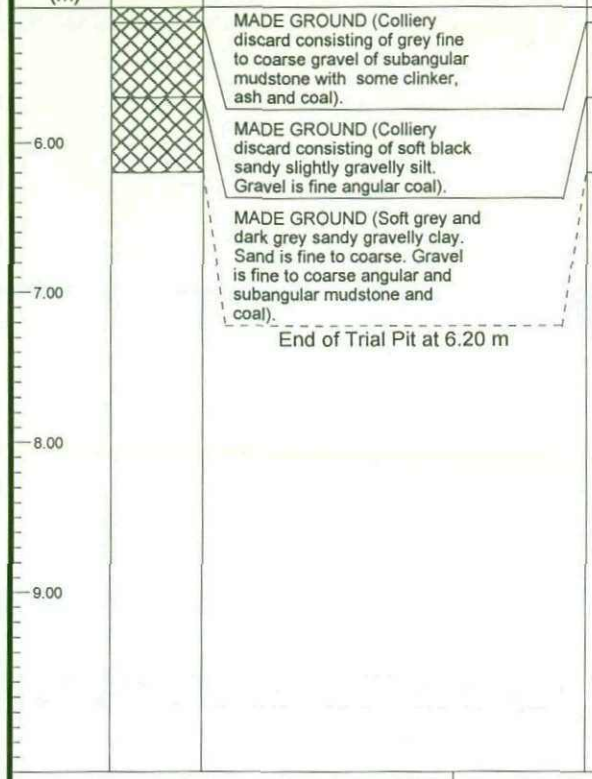
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of grey fine to coarse gravel of subangular mudstone with some clinker, ash and coal).	5.20	84.80	5.30	ES			
			(0.50)						
			5.70	84.30					
6.00		MADE GROUND (Colliery discard consisting of soft black sandy slightly gravelly silt. Gravel is fine angular coal).	(0.50)		6.00	ES			
			6.20	83.80					
7.00		MADE GROUND (Soft grey and dark grey sandy gravelly clay. Sand is fine to coarse. Gravel is fine to coarse angular and subangular mudstone and coal).							
		End of Trial Pit at 6.20 m							
8.00									
9.00									

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: *B Johnson*
Ground Level: 90.0
Coordinates: 433052E - 409792N

Groundwater:
Moderate seepage at 5.2m bgl.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP109

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Yellowish brown coarse gravel and cobbles of dolomite).	(0.30) 0.30	90.80					
		MADE GROUND (Demolition arisings consisting of fine to coarse gravel and cobbles of angular and subangular brick and concrete with some mudstone also).	(0.40) 0.70	90.40	0.50	ES			
1.00		MADE GROUND (Colliery discard consisting of grey fine to coarse gravel of subangular mudstone with many cobbles of mudstone and some cobbles of limestone also).	(3.30)		1.40	ES			
2.00									
3.00									
4.00		MADE GROUND (Firm brown and grey sandy very gravelly reworked clay. Gravel is fine to coarse subangular mudstone and occasional brick).	4.00	87.10					
			(1.00)		4.80	ES	4.80		62 / 21 kPa
		Continued next sheet	5.00	86.10					

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 91.1
Coordinates: 433093E - 409784N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP110

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		Firm grey mottled orangish brown sandy gravelly CLAY. Gravel is fine and medium angular to subrounded coal and sandstone.	(1.30)		6.00	ES	6.00		58 / 18 kPa
6.00			6.30	84.80					
		End of Trial Pit at 6.30 m							
7.00									
8.00									
9.00									

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 91.1
Coordinates: 433093E - 409784N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP110

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
		MADE GROUND (Demolition arisings consisting of fine to coarse gravel of angular and subangular concrete, coal, brick and bitumenised hardstanding. Cobbles of concrete and pieces of timber present also. Occasional cobbles of sandstone and boulders of concrete present after 2.5m bgl with rubber hoses and steel reinforcement bars also).	(4.50)	
1.00				
2.00				
3.00				
4.00			4.50	86.30
		MADE GROUND (Firm grey and orangish brown sandy gravelly reworked clay. Gravel is fine to	(0.40) 4.90	85.90
		Continued next sheet		

Samples		Tests		
Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
0.50	ES			
2.00	ES			
3.20	ES			
4.70	ES	4.70		64 / 17 kPa
5.00	ES	5.00		140 / 67 kPa

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 90.8
Coordinates: 433191E - 409745N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Limited collapse of excavation from 1.0-4.5m bgl.

Trial Pit: TP111

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
			(0.50)	
		4.50m - 4.90m : coarse angular to subrounded sandstone, coal and brick).	5.40	85.40
6.00		4.90m - 5.40m : Stiff grey, mottled orangeish brown in places, sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine and medium subangular sandstone and some coal.		
		End of Trial Pit at 5.40 m		
7.00				
8.00				
9.00				

Samples

Depth (m)	Type

Tests

Depth (m)	MEXE	Shear Vane (Peak/Res)

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 90.8
Coordinates: 433191E - 409745N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Limited collapse of excavation from 1.0-4.5m bgl.

Trial Pit: TP111

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL.	(0.25) 0.25	90.15	0.20	ES			
		MADE GROUND (Demolition arisings consisting of fine to coarse gravel of angular and subangular concrete, bituminised hardstanding and coal. Some cobbles and boulders of concrete and pieces of metal present also. Pockets of fine to coarse gravel of mudstone, ash and coal present after 2.0m bgl).			0.60	ES			
1.00									
2.00			(3.45)		2.10	ES			
3.00									
			3.70	86.70					
4.00		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of angular and subangular mudstone and coal. Pockets of firm grey and brown reworked clay present also).	(0.60)		3.90	ES			
			4.30	86.10					
		MADE GROUND (Reddish			4.60	ES			
		Continued next sheet	(1.50)						

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 90.4
Coordinates: 433207E - 409730N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP112

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
		brown claybound fine to coarse gravel of subangular weathered sandstone with many iron nodules).	5.80	84.60
6.00		Weak and very weak grey weathered orangish brown MUDSTONE.	(0.30) 6.10	84.30
		End of Trial Pit at 6.10 m		
7.00				
8.00				
9.00				

Samples

Depth (m)	Type
6.00	ES

Tests

Depth (m)	MEXE	Shear Vane (Peak/Res)

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 90.4
Coordinates: 433207E - 409730N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP112

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of grey fine to coarse gravel of subangular mudstone. Claybound in places. Pockets of red fine and medium burnt shale present in upper 1.0m of stratum and at 2.2m bgl. Concrete foundations present at 2.1-2.2m bgl).			0.60	ES			
1.00					1.20	B			
			(3.20)						
2.00					2.00	ES B			
3.00			3.20	84.10					
		MADE GROUND (Soft brown sandy gravelly possibly reworked clay. Gravel is fine and medium subangular sandstone).	(0.30) 3.50	83.80	3.30	ES			
			(0.40) 3.90	83.40					
4.00		Moderately weak becoming moderately strong with depth yellowish brown medium grained SANDSTONE. Weathered to clay in places in upper 0.2m of stratum.							
		End of Trial Pit at 3.90 m							

Date of Excavation: 15/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 87.3
Coordinates: 433191E - 409715N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP113

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Demolition arisings consisting of fine to coarse gravel of brick and concrete with cobbles and *boulders of concrete and* pieces of metal present also).	(1.60)						
1.00			1.60	87.50					
		MADE GROUND (Colliery discard consisting of dark grey fine to coarse gravel of angular and subangular clinker, ash and coal).			1.80	ES			
2.00			(1.60)						
3.00			3.20	85.90	3.00	ES			
		Moderately strong and strong yellowish brown medium grained SANDSTONE.	(0.50)		3.50	ES			
			3.70	85.40					
		End of Trial Pit at 3.70 m							
4.00									

Date of Excavation: 16/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 89.1
Coordinates: 433225E - 409716N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP114

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of dark grey and brown claybound fine to coarse gravel of angular and subangular mudstone, coal and rare sandstone with pockets of very sandy very gravelly clay. Some red fine to coarse gravel of burnt shale present below 2.0m Pieces of timber present throughout stratum and steel cable present at 2.6m bgl).			0.60	ES			
1.00					1.50	B			
			(3.30)						
2.00					2.00	ES			
3.00					3.00	B			
			3.30	90.00	3.20	ES			
		MADE GROUND (Stiff brown and grey, sometimes mottled orange, sandy gravelly to very gravelly clay. Gravel is fine to coarse angular to subrounded mudstone, burnt shale, coal and sandstone).			3.60	B ES	3.60		140 / 57 kPa
4.00									
			(3.20)						
		Continued next sheet							

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 93.3
Coordinates: 433270E - 409809N

Groundwater:
Minor seepage at 4.4m bgl.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP115

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Stiff brown and grey, sometimes mottled orange, sandy gravelly to very gravelly clay. Gravel is fine to coarse angular to subrounded mudstone, burnt shale, coal and sandstone).			5.20	B ES	5.20		140 / 43 kPa
6.00					6.30	ES			
			6.50	86.80					
		End of Trial Pit at 6.50 m							
7.00									
8.00									
9.00									

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 93.3
Coordinates: 433270E - 409809N

Groundwater:
Minor seepage at 4.4m bgl.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP115

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL (Poor quality).	0.20	87.00	0.10	ES			
		MADE GROUND (Colliery discard consisting of dark grey and brown claybound fine to coarse gravel of angular and subangular mudstone, ash, burnt shale and coal).	(3.20)		0.40	ES			
1.00									
2.00					1.80	ES			
3.00					3.00	ES			
			3.40	83.80					
		MADE GROUND (Firm dark grey sandy gravelly clay. Gravel is fine to coarse angular and subangular mudstone, burnt shale and ash).	(0.70)		3.60	ES	3.50		85 / 39 kPa
4.00			4.10	83.10					
		Very weak becoming weak grey MUDSTONE weathered to clay in places.	(0.70)		4.30	ES			
			4.80	82.40					
		Continued next sheet							

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 87.2
Coordinates: 432902E - 409767N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP116

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		End of Trial Pit at 6.50 m							
6.00									
7.00									
8.00									
9.00									

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 87.2
Coordinates: 432902E - 409767N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP116

TRIAL PIT RECORD

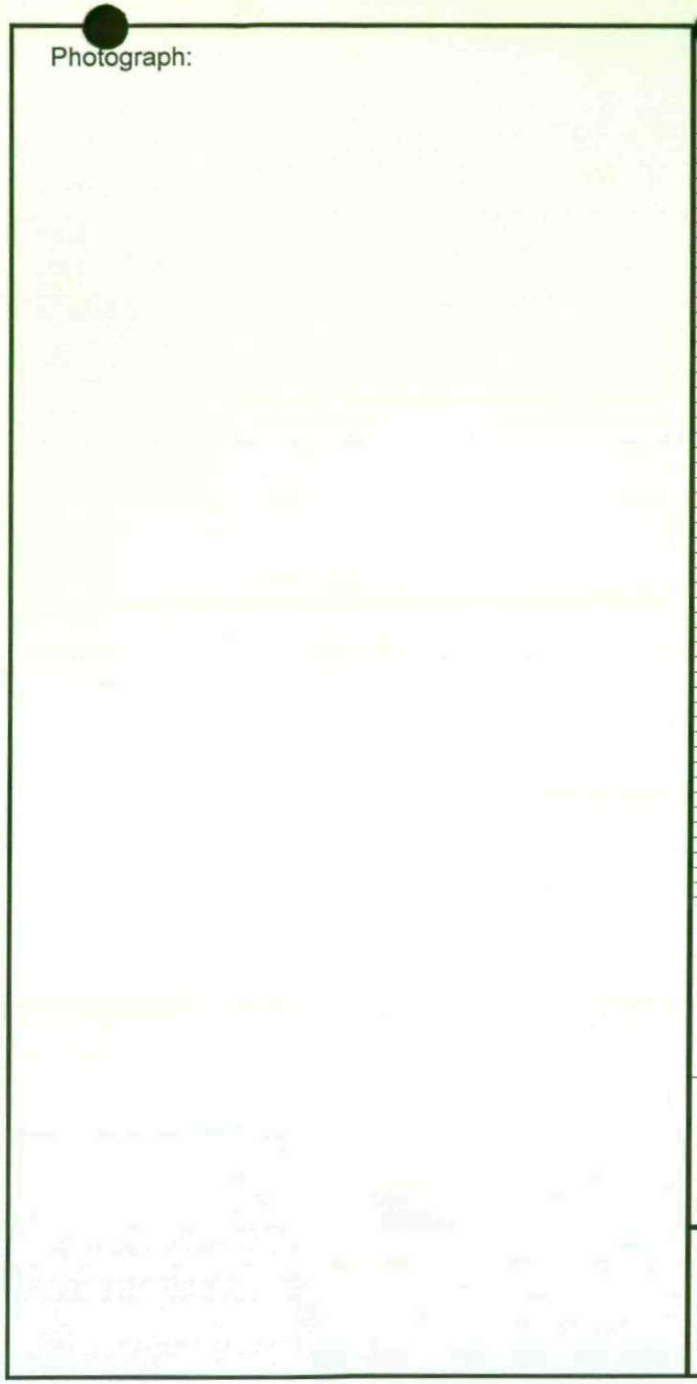
North Gawber Colliery

Revision: Final

Project No. 09002

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SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of very dark grey fine to coarse gravel of angular coal, clinker and some ash).	(1.00)		0.30	ES			
1.00			1.00	83.90					
		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of angular and subangular mudstone, coal and clinker).	(0.90)		1.20	ES			
			1.90	83.00					
2.00		Stiff grey and orangish brown sandy gravelly CLAY. Gravel is fine to coarse angular and subangular coal and mudstone.	(0.90)		2.20	ES	2.20		140 / 53 kPa
			2.80	82.10					
3.00		End of Trial Pit at 2.80 m							
4.00									

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 84.9
Coordinates: 432978E - 409739N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP117

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of black fine to coarse gravel of angular clinker and ash).			0.50	ES			
1.00			(2.10)						
					1.50	ES B			
2.00			2.10	83.00					
		MADE GROUND (Stiff blueish grey and brown, occasionally reddish orange, sandy gravelly reworked clay. Gravel is fine to coarse subangular mudstone and some coal).			2.30	ES			
3.00			(2.10)		3.00	B			
							3.50		92 / 22 kPa
					3.80	ES			
4.00			4.20	80.90					
		MADE GROUND (Colliery discard consisting of dark grey gravel of fine to coarse subangular mudstone, weathered to clay in places.							
		Continued next sheet			5.00	ES			

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 85.1
Coordinates: 433019E - 409727N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP118

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		Occasional cobbles of mudstone present also).	(2.20)			B			
6.00			6.40	78.70	6.40	ES			
		End of Trial Pit at 6.40 m							
7.00									
8.00									
9.00									

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 85.1
Coordinates: 433019E - 409727N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP118

TRIAL PIT RECORD

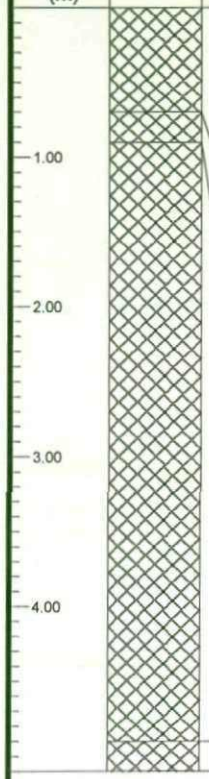
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
		MADE GROUND (Colliery discard consisting of dark grey and greyish brown, with greenish grey mottling, fine to coarse gravel of subangular mudstone and coal, weathered to clay in places. Some cobbles of mudstone present also).	(0.70)	
			0.70	85.20
		MADE GROUND (Colliery discard consisting of red fine to coarse gravel of subangular burnt shale. Many cobbles of burnt shale present also).	0.90	85.00
1.00				
2.00		MADE GROUND (Colliery discard consisting of dark grey and greyish brown, with greenish grey mottling, fine to coarse gravel of subangular mudstone and coal, weathered to clay in places. Some red fine to coarse gravel of burnt shale and cobbles of mudstone present also).	(4.00)	
3.00				
4.00				
			4.90	81.00
		Continued next sheet		

Samples

Depth (m)	Type
0.50	ES
0.80	ES
1.50	ES
4.00	ES

Tests

Depth (m)	MEXE	Shear Vane (Peak/Res)

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 85.9
Coordinates: 433067E - 409710N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Concrete foundations present at 0.3 to 1.0m bgl immediately adjacent to trial pit.

Trial Pit: TP119

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Stiff grey and reddish orange sandy gravelly possibly reworked clay. Sand is fine to coarse. Gravel is fine and medium angular and subangular coal and mudstone).	(1.40)		5.50	ES B			
6.00			6.30	79.60					
		End of Trial Pit at 6.30 m							
7.00									
8.00									
9.00									

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 85.9
Coordinates: 433067E - 409710N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Concrete foundations present at 0.3 to 1.0m bgl immediately adjacent to trial pit.

Trial Pit: TP119

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of black fine to coarse gravel of angular and subangular coal, ash, clinker and mudstone).	(1.30)		0.60	ES			
1.00			1.30	85.40					
		MADE GROUND (Cobbles of whole and broken brick).	1.40	85.30					
		MADE GROUND (Colliery discard consisting of reddish orange and dark grey fine to coarse gravel of angular and subangular burnt shale, coal and mudstone. Weathered to clay in places. Occasional cobbles and boulders of sandstone and pieces of timber present also).			1.80	ES			
2.00					2.50	B			
3.00					3.00	ES			
			(5.00)						
4.00					4.30	ES			
		Continued next sheet							

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 86.7
Coordinates: 433102E - 409696N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP120

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of reddish orange and dark grey fine to coarse gravel of angular and subangular burnt shale, coal and mudstone. Weathered to clay in places. Occasional cobbles and boulders of sandstone and pieces of timber present also).	6.40	80.30	6.00	ES			
6.00		MADE GROUND (Cobbles of sandstone).	6.50	80.20					
		End of Trial Pit at 6.50 m							
7.00									
8.00									
9.00									

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 86.7
Coordinates: 433102E - 409696N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP120

TRIAL PIT RECORD

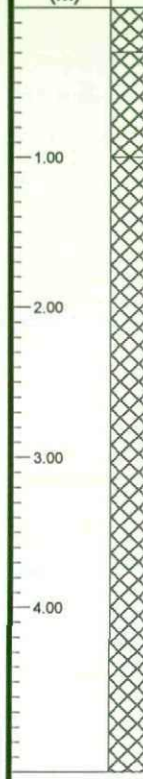
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Concrete and brick foundations).	(0.30) 0.30	86.30					
		MADE GROUND (Colliery discard consisting of very dark grey claybound fine to coarse gravel of angular and subangular mudstone and coal. Rubber machine belts present also).	(0.70) 1.00	85.60	0.50 0.80	ES B			
1.00		MADE GROUND (Colliery discard consisting of black and greyish brown weathered greenish grey fine to coarse gravel of subangular coal and mudstone. Weathered to clay in places).			1.50	B ES			
2.00									
3.00					3.00	ES			
			(5.30)						
4.00					4.50	ES			
		Continued next sheet							

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 86.6
Coordinates: 433125E - 409710N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP121

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of black and greyish brown weathered greenish grey fine to coarse gravel of subangular coal and mudstone. Weathered to clay in places).			5.80	ES			
6.00			6.30	80.30					
		End of Trial Pit at 6.30 m							
7.00									
8.00									
9.00									

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 86.6
Coordinates: 433125E - 409710N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP121

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of angular and subangular mudstone and coal with some brick. Pieces of metal, steel cable and rubber machine belts present also).	(1.50)	
1.00			1.50	86.10
		MADE GROUND (Cobbles of whole and broken brick).	1.70	85.90
		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of angular and subangular mudstone and coal with some brick. Pieces of metal and cobbles and boulders of brick and concrete present also).	(0.70)	
2.00			2.40	85.20
		MADE GROUND (Cobbles and boulders of concrete and brick with steel cables and timber beams also).	(1.50)	
3.00			3.90	83.70
		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of angular and subangular mudstone and coal with rare brick. Iron girders present also).		
4.00		Continued next sheet		

Samples

Depth (m)	Type
0.50	ES
1.40	ES
3.00	ES
4.10	ES
5.00	ES

Tests

Depth (m)	MEXE	Shear Vane (Peak/Res)

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 87.6
Coordinates: 433153E - 409688N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP122

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of angular and subangular mudstone and coal with rare brick. Iron girders present also).	(2.50)						
6.00			6.40	81.20					
		End of Trial Pit at 6.40 m							
7.00									
8.00									
9.00									

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 87.6
Coordinates: 433153E - 409688N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP122

TRIAL PIT RECORD

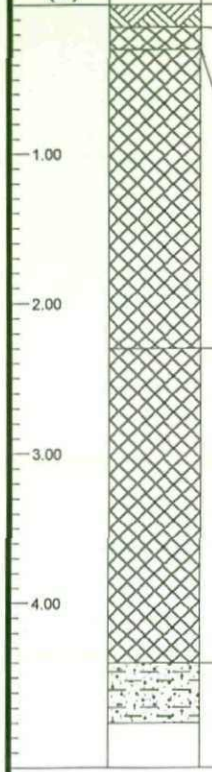
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Samples Depth (m)	Samples Type	Tests Depth (m)	Tests MEXE	Tests Shear Vane (Peak/Res)
		TOPSOIL (poor quality).	0.15	85.85	0.10	ES			
		MADE GROUND (Demolition arisings consisting of fine to coarse gravel and cobbles of brick and concrete).	0.30	85.70	0.60	ES			
1.00		MADE GROUND (Colliery discard consisting of black fine to coarse, but predominantly fine, very clayey gravel of clinker, ash, mudstone and coal. Claybound in places. Rubber hoses, pieces of metal, timber, fabric, steel cables and cobbles of brick and concrete present also).	(2.00)		2.00	ES			
2.00			2.30	83.70					
		MADE GROUND (Colliery discard consisting of grey claybound fine to coarse gravel of subangular mudstone and coal. Remnant concrete foundations present at 3.0-3.3 m bgl.).	(2.10)		2.60	ES			
3.00									
4.00			4.40	81.60					
		Stiff orangish brown sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded sandstone and	(0.40)		4.70	ES			
			4.80	81.20					

Continued next sheet

Date of Excavation: 15/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 86.0
Coordinates: 433209E - 409688N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B *Bulk Disturbed Sample*
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP123

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		coal.							
		End of Trial Pit at 4.80 m							
6.00									
7.00									
8.00									
9.00									

Date of Excavation: 15/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 86.0
Coordinates: 433209E - 409688N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP123

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
		MADE GROUND (*Colliery discard consisting of grey*, claybound in places, fine to coarse gravel of subangular mudstone and, after 1.5m bgl, burnt shale. Occasional cobbles of brick and pieces of metal, fabric and steel cables present also).	(2.60)	
2.60				82.00
		MADE GROUND (Fine to coarse red gravel and cobbles of subangular brick and burnt shale with pockets of firm reworked clay present also).	(0.70)	
3.30				81.30
		Stiff grey and brown, mottled orange brown in upper 0.2m of stratum, sandy gravelly CLAY. Gravel is fine to coarse angular and subangular coal and sandstone.	(0.60)	
3.90		End of Trial Pit at 3.90 m		80.70

Samples

Depth (m)	Type
0.50	ES
1.00	B
1.70	ES
2.80	ES
3.50	ES B

Tests

Depth (m)	MEXE	Shear Vane (Peak/Res)

Date of Excavation: 20/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 84.6
Coordinates: 433246E - 409662N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP124

TRIAL PIT RECORD

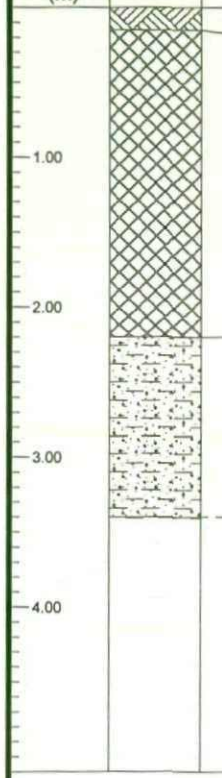
North Gawber Colliery

Revision: *Final*

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL (Poor quality).	0.15	85.25	0.10	ES			
		MADE GROUND (Stiff friable brown and grey sandy very gravelly clay. Sand is fine to coarse .Gravel is fine to coarse angular to subrounded mudstone, coal, sandstone and some burnt shale. Occasional cobbles of mudstone present also).	(2.05)		0.40	ES			
1.00									
					1.80	ES	1.80		87 / 11 kPa
2.00			2.20	83.20					
		Stiff grey and orangish brown slightly sandy gravelly CLAY. Gravel is fine and medium angular and subangular mudstone and coal.	(1.20)		2.50	ES	2.50		132 / 41 kPa
3.00									
			3.40	82.00					
		End of Trial Pit at 3.40 m							
4.00									

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 85.4
Coordinates: 432829E - 409772N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP125

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL (Poor quality).	(0.25) 0.25	84.95	0.20	ES			
		MADE GROUND (Cobbles and boulders of concrete and pieces of timber and metal in a matrix of dark grey fine to coarse gravel of clinker and mudstone, the latter claybound in places).	(1.05)		0.60	ES			
1.00			1.30	83.90					
		End of Trial Pit at 1.30 m							
2.00									
3.00									
4.00									

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 85.2
Coordinates: 432886E - 409751N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Trial pit terminated at 1.3m bgl due to repeated refusal upon concrete foundations.

Trial Pit: TP126

TRIAL PIT RECORD

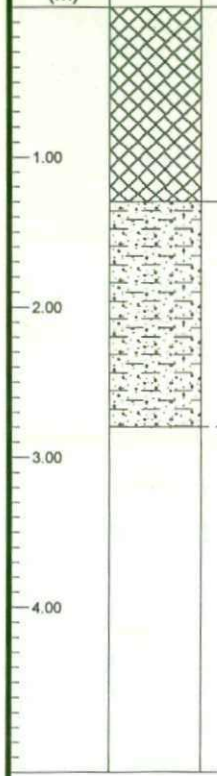
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of black fine to coarse gravel of angular coal and some clinker).	(1.30)		0.50	ES			
			1.30	83.90					
		Stiff grey and brown sandy gravelly CLAY. Gravel is fine to coarse angular and subangular coal and mudstone.	(1.50)		1.70	ES	1.70		107 / 35 kPa
			2.80	82.40					
		End of Trial Pit at 2.80 m							

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 85.2
Coordinates: 432866E - 409751N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP126B

TRIAL PIT RECORD

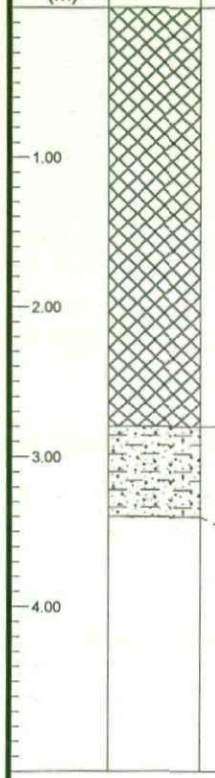
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Samples Depth (m)	Samples Type	Tests Depth (m)	Tests MEXE	Tests Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of grey claybound fine to coarse gravel of angular and subangular mudstone with some coal and rare clinker. Some cobbles of mudstone and rare brick present also).			0.50	ES			
1.00									
			(2.80)						
					1.80	ES B			
2.00									
			2.80	81.30					
3.00		Firm grey and brown, mottled orange in upper 0.3m of stratum, sandy gravelly CLAY. Gravel is fine subangular and subrounded mudstone.	(0.60)		3.00	B ES	3.00		72 / 22 kPa
			3.40	80.70					
		End of Trial Pit at 3.40 m							
4.00									

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 84.1
Coordinates: 432930E - 409727N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP127

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of very dark grey fine to coarse gravel of angular and subangular mudstone, coal and some clinker).	(0.70)		0.50	ES			
			0.70	84.40					
1.00		MADE GROUND (Colliery discard consisting of red fine to coarse gravel of angular and subangular burnt shale with some mudstone and coal. Many cobbles and occasional boulders of burnt shale present below 3.0m).			1.20	ES			
2.00									
					2.60	ES			
3.00									
			(5.90)						
					3.80	ES			
4.00									
		Continued next sheet							

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 85.1
Coordinates: 433022E - 409698N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP128

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of red fine to coarse gravel of angular and subangular burnt shale with some mudstone and coal. Many cobbles and occasional boulders of burnt shale present below 3.0m).			5.10	ES			
6.00			6.60	78.50	6.50	ES			
		End of Trial Pit at 6.60 m							
7.00									
8.00									
9.00									

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 85.1
Coordinates: 433022E - 409698N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP128

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
1.00		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of angular and subangular mudstone and coal with some burnt shale. Occasional pieces of timber present also).	(2.20)		1.00	ES			
2.00			2.20	83.90					
3.00		MADE GROUND (Colliery discard consisting of reddish brown and grey fine to coarse gravel of subangular mudstone, coal and rare sandstone weathered to clay. Becomes predominantly grey with reddish brown pockets below 3.0m).			2.50	ES			
					3.00	B			
					3.80	ES			
4.00			(4.20)						
		Continued next sheet							

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 86.1
Coordinates: 433048E - 409685N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP129

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of reddish brown and grey fine to coarse gravel of subangular mudstone, coal and rare sandstone weathered to clay. Becomes predominantly grey with reddish brown pockets below 3.0m).			5.20	ES			
6.00			6.40	79.70	6.40	ES			
		End of Trial Pit at 6.40 m							
7.00									
8.00									
9.00									

Date of Excavation: 17/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 86.1
Coordinates: 433048E - 409685N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP129

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of black fine to coarse angular gravel of clinker and ash. Occasional cobbles of whole and broken brick present also).			0.50	ES			
1.00					1.70	ES			
2.00									
3.00			(6.30)		3.00	ES			
4.00					4.40	ES			
		Continued next sheet							

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 85.4
Coordinates: 433103E - 409670N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Trial pit excavated upon a moderate slope.

Trial Pit: TP130

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of black fine to coarse angular gravel of clinker and ash. Occasional cobbles of whole and broken brick present also).			5.50	ES			
6.00			6.30	79.10	6.30	ES			
		End of Trial Pit at 6.30 m							
7.00									
8.00									
9.00									

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 85.4
Coordinates: 433103E - 409670N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Trial pit excavated upon a moderate slope.

Trial Pit: TP130

TRIAL PIT RECORD

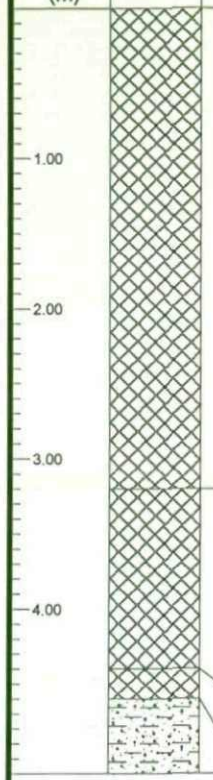
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of grey and brown claybound gravel of fine to coarse angular and subangular mudstone and coal).			0.40	ES			
1.00									
			(3.20)		1.60	ES			
2.00									
					2.50	ES			
3.00			3.20	82.20					
		MADE GROUND (Colliery discard consisting of red fine to coarse sandy gravel of angular and subangular burnt shale with some coal and mudstone. Pockets of claybound fine to coarse gravel of mudstone present below 3.7m. Rare sandstone boulders present also).	(1.20)		3.60	ES			
4.00			4.40	81.00					
			4.60	80.80					
		MADE GROUND (Firm brown sandy slightly gravelly possibly	(0.50)		4.80	ES	4.80		127 / 22 kPa
		Continued next sheet	5.10	80.30					

Date of Excavation: 15/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 85.4
Coordinates: 433177E - 409666N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP131

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		4.40m - 4.60m : reworked clay. Gravel is fine and medium angular to subrounded coal and mudstone). 4.60m - 5.10m : Stiff grey and orangish brown sandy gravelly CLAY. Gravel is fine to coarse angular and subangular coal and sandstone.Some cobbles of sandstone present also. End of Trial Pit at 5.10 m							
6.00									
7.00									
8.00									
9.00									

Date of Excavation: 15/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 85.4
Coordinates: 433177E - 409666N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP131

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of grey claybound fine to coarse gravel of angular and subangular mudstone, coal and some burnt shale. Pieces of fabric, machine belts, rubber hoses and occasional pieces of timber present also).	(1.20)		0.60	B ES			
1.00			1.20	81.60					
		MADE GROUND (Colliery discard consisting of grey fine to coarse gravel of angular to subrounded mudstone, coal and some sandstone. Occasional cobbles of brick present also).	(1.40)		1.50	B ES			
2.00			2.60	80.20					
		Stiff grey and orangeish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular coal and sandstone. Rare cobbles of sandstone present also.	(0.80)		2.80	B ES			
3.00			3.40	79.40					
		End of Trial Pit at 3.40 m							
4.00									

Date of Excavation: 15/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 82.8
Coordinates: 433199E - 409657N

Groundwater:
Slight seepage at 3.3m bgl.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP132

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of dark grey clayey fine to coarse gravel of subangular mudstone).	(1.30)		0.40	ES			
1.00			1.30	81.70					
		MADE GROUND (Colliery discard consisting of red fine to coarse gravel of angular and subangular burnt shale).	(0.50)		1.50	ES			
			1.80	81.20					
2.00		MADE GROUND (Colliery discard consisting of grey fine to coarse gravel of subangular mudstone with lenses of fine and medium gravel of angular coal, clinker and coal dust).	(1.00)		2.20	ES			
			2.80	80.20					
3.00		MADE GROUND (Stiff blueish grey mottled black sandy gravelly reworked clay. Sand is fine. Gravel is fine angular coal).	(0.60)		3.00	ES	3.00		87 / 47 kPa
			3.40	79.60					
		Stiff grey and orangeish brown, with grey veining, sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular and subangular sandstone, mudstone and coal.	(0.70)						
4.00			4.10	78.90	4.10	ES	4.10		123 / 38 kPa
		End of Trial Pit at 4.10 m							

Date of Excavation: 15/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 83.0
Coordinates: 433247E - 409632N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP133

TRIAL PIT RECORD

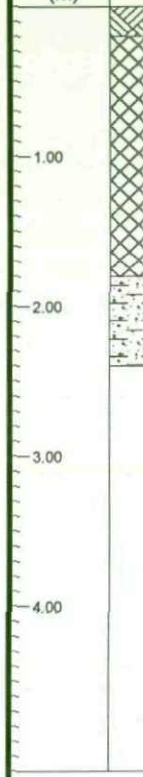
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL (Poor quality).	0.20	81.60					
		MADE GROUND (Colliery discard consisting of very dark grey fine to coarse gravel of angular and subangular clinker with some coal and mudstone).	(1.60)		0.40	B			
1.00			1.80	80.00					
		Stiff grey and brown mottled orangish brown sandy to very sandy gravelly CLAY. Gravel is fine to coarse subangular sandstone with occasional cobbles of sandstone.	(0.60)				2.00		97 / 30 kPa
2.00			2.40	79.40					
		End of Trial Pit at 2.40 m							
3.00									
4.00									

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 81.8
Coordinates: 432798E - 409736N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP134

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of dark grey claybound gravel of fine to coarse angular and subangular coal and mudstone).	(0.60) 0.60	81.50	0.40	ES			
		MADE GROUND (Colliery discard consisting of fine to coarse reddish brown gravel of angular and subangular burnt shale and mudstone).	0.80	81.30	0.70	ES			
1.00		MADE GROUND (Colliery discard consisting of very dark grey sandy gravelly silt. Sand is fine to coarse. Gravel is fine to coarse angular coal and rare brick. Pieces of metal present also).	(1.30) 2.10	80.00	1.20	ES B			
2.00		MADE GROUND (Colliery discard consisting of firm yellow, grey and reddish orange burnt clay).	(0.60) 2.70	79.40	2.50	ES B			
3.00		MADE GROUND (Colliery discard consisting of soft very dark grey sandy silt with pockets of firm brownish grey very sandy very gravelly clay).	(1.00) 3.70	78.40	3.00	ES B			
4.00		Stiff greyish brown sandy gravelly CLAY. Gravel is fine to coarse angular and subangular coal and sandstone.	(0.50) 4.20	77.90	3.80	B ES			
		End of Trial Pit at 4.20 m							

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 82.1
Coordinates: 432845E - 409703N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP135

TRIAL PIT RECORD

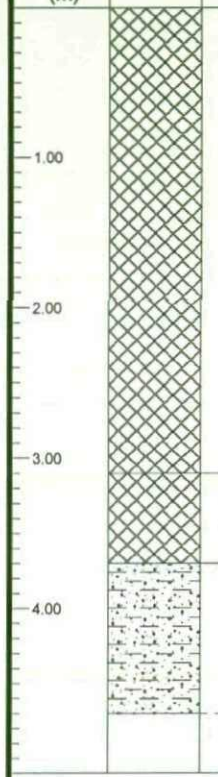
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of red fine to coarse gravel of subangular burnt shale with many cobbles of burnt shale and rare boulders of sandstone also).			0.80	ES			
1.00			(3.10)						
					2.00	ES			
2.00									
3.00			3.10	76.20					
		MADE GROUND (Colliery discard consisting of damp, black fine and medium gravel of angular ash and clinker).	(0.60)		3.40	ES			
			3.70	75.60					
4.00		Stiff blueish grey and brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine angular and subangular mudstone and coal .	(1.00)		4.00	ES			
			4.70	74.60					
		End of Trial Pit at 4.70 m							

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 79.3
Coordinates: 433082E - 409632N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP136

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Stiff friable grey and brown sandy to very sandy gravelly to very gravelly clay. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded mudstone, sandstone, coal and some burnt shale).	(1.60)		0.50	ES			
1.00			1.60	78.80	1.60	ES			
		MADE GROUND (Colliery discard consisting of black and red fine to coarse gravel of angular clinker and burnt shale. Some cobbles of burnt shale present also).			1.80	ES			
2.00									
			(2.60)		3.00	ES			
3.00									
4.00			4.20	76.20					
		Stiff grey and orangish brown sandy gravelly CLAY. Gravel is fine and medium angular and subangular coal and mudstone.	(0.50)		4.50	ES	4.50		131 / 29 kPa
			4.70	75.70					
		End of Trial Pit at 4.70 m							

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 80.4
Coordinates: 433146E - 409614N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP137

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL (Poor quality).	0.20	79.80	0.10	ES			
		MADE GROUND (Colliery discard consisting of red fine to coarse gravel of angular and subangular burnt shale. Some cobbles of burnt shale present also).	(0.60) 0.80	79.20	0.60	ES			
1.00		MADE GROUND (Colliery discard consisting of grey fine to coarse gravel of subangular mudstone. Some cobbles and occasional boulders of mudstone present also. Pockets of clinker present below 2.5m).	(2.00)		1.00	ES			
2.00					2.40	ES			
			2.80	77.20					
3.00		Firm brown and orangish brown sandy gravelly CLAY. Gravel is fine to coarse subangular mudstone with flecks of coal.	(0.60)		3.00	ES	3.00		64 / 17 kPa
			3.40	76.60					
4.00		End of Trial Pit at 3.40 m							

Date of Excavation: 20/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 80.0
Coordinates: 433209E - 409614N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP138

TRIAL PIT RECORD

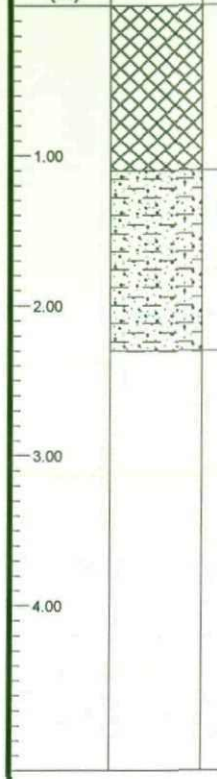
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of dark grey and reddish brown fine to coarse gravel of angular clinker and burnt shale with some coal).	(1.10)		0.60	ES			
1.00			1.10	79.00					
		Stiff friable grey and brown sandy to very sandy gravelly CLAY. Gravel is fine and medium subangular mudstone.	(1.20)		1.30	ES			
2.00					2.00	ES			
			2.30	77.80					
		End of Trial Pit at 2.40 m							
3.00									
4.00									

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 80.1
Coordinates: 432795E - 409705N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit:
TP139

TRIAL PIT RECORD

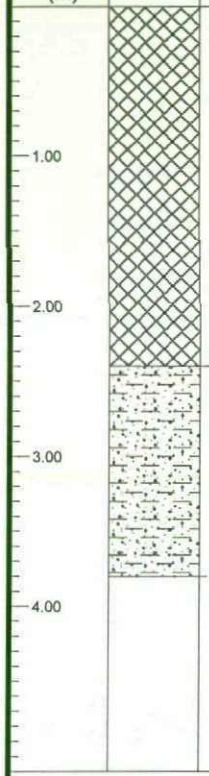
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of red and dark grey fine to coarse gravel of burnt shale and some clinker. Occasional cobbles of burnt shale present also).	(2.40)		0.50	ES			
1.00					1.70	ES			
2.00			2.40	76.50					
		Stiff blueish grey mottled brown sandy gravelly CLAY. Gravel is fine subangular mudstone.	(1.40)		3.50	ES			
3.00			3.80	75.10					
		End of Trial Pit at 3.80 m							
4.00									

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 78.9
Coordinates: 432877E - 409665N

Groundwater:
Slight seepage at 2.05m bgl.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP140

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of dark grey and reddish brown very clayey fine to coarse gravel of angular and subangular coal, clinker, ash and burnt shale. Gravel is claybound in places. Some cobbles and occasional boulders of mudstone and some cobbles of burnt shale present also).			0.50	ES			
1.00					1.00	B			
2.00			(3.90)		2.00	ES			
3.00									
					3.40	ES			
			3.90	76.10	3.70	B			
4.00		Stiff blueish grey and brown sandy slightly gravelly CLAY. Gravel is fine angular and subangular coal and mudstone.	(1.10)		4.30	B ES	4.30		140 / 61 kPa
			5.00	75.00	5.00	ES			
		End of Trial Pit at 5.00 m							

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 80.0
Coordinates: 432930E - 409650N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP141

TRIAL PIT RECORD

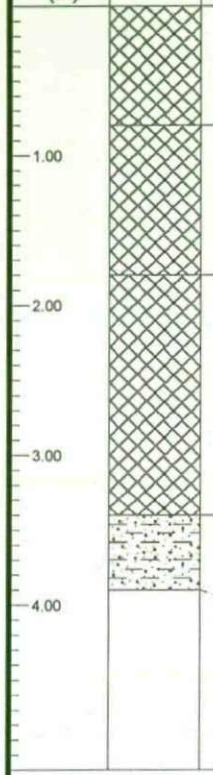
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of dark grey fine to coarse gravel of subangular mudstone and some coal).	(0.80)		0.30	ES			
			0.80	76.80					
1.00		MADE GROUND (Colliery discard consisting of red fine to coarse gravel of angular burnt shale).	(1.00)		1.00	ES			
			1.80	75.80					
2.00		MADE GROUND (Colliery discard consisting of grey, mostly claybound, fine to coarse gravel of angular and subangular mudstone, burnt shale and occasional coal and clinker. Rare cobbles of burnt shale present also).	(1.60)		2.20	B ES			
3.00					3.00	B ES			
			3.40	74.20					
		Stiff greyish brown sandy gravelly CLAY. Gravel is fine angular and subangular mudstone and coal.	(0.50)		3.50	B ES	3.50		113 / 40 kPa
			3.90	73.70					
4.00		End of Trial Pit at 3.90 m							

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: Ben Johnson
Ground Level: 77.6
Coordinates: 432970E - 409622N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP142

TRIAL PIT RECORD

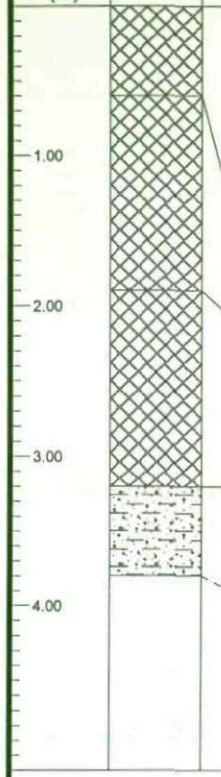
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Stiff friable grey and brown sandy gravelly to very gravelly reworked clay. Gravel is fine to coarse angular and subangular coal, mudstone, some burnt shale and rare sandstone. Some cobbles of mudstone present also).	(0.60) 0.60	74.90	0.40	ES			
1.00		MADE GROUND (Colliery discard consisting of dark grey and brown claybound fine to coarse gravel of angular and subangular mudstone, ash and some burnt shale).	(1.30) 1.90	73.60	1.00	ES			
2.00		MADE GROUND (Colliery discard consisting of soft wet dark grey silt with organic debris).	(1.30) 3.20	72.30	2.10	ES			
3.00		Stiff grey mottled orangish brown sandy gravelly CLAY. Gravel is fine angular to subrounded coal and mudstone.	(0.60) 3.80	71.70	3.40	ES			
4.00		End of Trial Pit at 3.80 m							

Date of Excavation: 21/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 75.5
Coordinates: 433013E - 409587N

Groundwater:
Heavy seepage at 1.9m bgl.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP143

TRIAL PIT RECORD

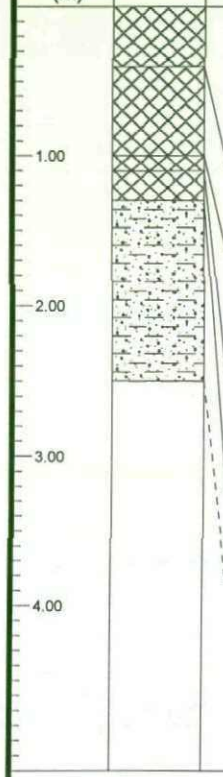
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of dark grey *claybound fine to coarse gravel* of angular to subrounded mudstone, coal and sandstone. Pockets of sandy gravelly clay and some cobbles of brick present also).	(0.40)		0.20	ES			
			0.40	*75.20*					
		MADE GROUND (Yellowish brown fine to coarse gravel and cobbles of subangular dolomite).	(0.60)		0.90	ES			
1.00			1.00	74.60					
			1.10	74.50					
		MADE GROUND (Colliery discard consisting of brown and reddish brown fine to coarse gravel of angular and subangular burnt shale, clinker and ash).	1.30	74.30	1.20	ES			
					1.60	ES	1.60		140 / 57 kPa
2.00			(1.20)						
		MADE GROUND (Stiff grey and brown sandy gravelly reworked clay with narrow lenses of black silt. Gravel is fine subangular mudstone).	2.50	73.10					
3.00		Stiff grey and orangish brown sandy slightly gravelly CLAY. Gravel is fine subangular mudstone.							
4.00		End of Trial Pit at 2.50 m							

Date of Excavation: 20/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 75.6
Coordinates: 433055E - 409592N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B *Bulk Disturbed Sample*
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP144

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of red and brown fine to coarse, but predominantly coarse, gravel of angular and subangular burnt shale *and mudstone*. Occasional cobbles of burnt shale and brick present also).	(1.00)		0.40	ES			
1.00			1.00	77.70					
		MADE GROUND (Colliery discard consisting of dark brown and grey fine to coarse gravel of angular clinker and ash with some burnt shale, coal and brick).			1.50	ES			
2.00									
			(3.20)		2.80	ES			
3.00									
					3.80	ES			
4.00			4.20	74.50					
		End of Trial Pit at 4.20 m							

Date of Excavation: 20/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 78.7
Coordinates: 433119E - 409592N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP145

TRIAL PIT RECORD

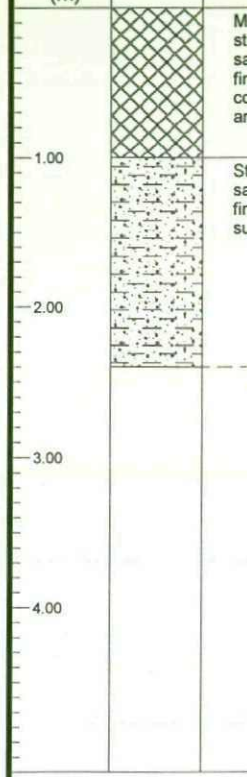
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Predominantly stiff, but firm in places, grey sandy gravelly clay. Sand is fine to coarse. Gravel is fine to coarse subangular mudstone and occasional sandstone).	(1.00)		0.50	B ES			
1.00			1.00	77.00					
		Stiff grey and orangish brown sandy gravelly CLAY. Gravel is fine subangular and subrounded mudstone.					1.40		131 / 31 kPa
			(1.40)		1.60	B ES			
2.00			2.40	75.60					
		End of Trial Pit at 2.40 m							
3.00									
4.00									

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 78.0
Coordinates: 432784E - 409680N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Concrete foundations present from 0.2 to 0.6m bgl adjacent to trial pit.

Trial Pit: TP146

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL (Poor quality).	0.20	73.40	0.10	ES			
		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of angular and subangular mudstone, burnt shale and coal. Pockets of sandy very gravelly clay noted. Rubber hose present at 2.6m bgl).			0.40	ES			
1.00					1.00	B			
			(2.60)						
					1.80	ES			
2.00									
			2.80	70.80					
		Stiff grey and brown mottled orangish brown sandy to very sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded mudstone and coal.	(0.70)		3.00	ES	3.00		140 / 49 kPa
3.00			3.50	70.10					
		End of Trial Pit at 3.50 m							
4.00									

Date of Excavation: 21/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 73.6
Coordinates: 432955E - 409562N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP147

TRIAL PIT RECORD

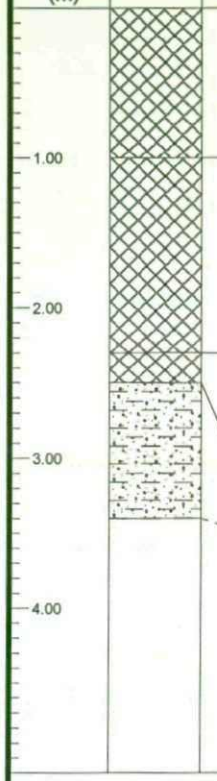
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Firm friable sandy gravelly to very gravelly reworked clay. Sand is fine to coarse. Gravel is fine to coarse angular and subangular mudstone, coal and sandstone).	(1.00)		0.50	ES			
1.00			1.00	71.70					
		MADE GROUND (Colliery discard consisting of soft wet dark grey sandy silt with ash and pockets of clay).	(1.30)		1.60	ES B			
2.00			2.30	70.40					
		MADE GROUND (Demolition arisings consisting of fine to coarse gravel and cobbles of concrete and brick).	2.50	70.20					
		Stiff grey and brown sandy gravelly CLAY. Gravel is fine to coarse angular and subangular coal and mudstone.	(0.90)		2.80	ES	2.80		140 / 39 kPa
3.00			3.40	69.30					
		End of Trial Pit at 3.40 m							
4.00									

Date of Excavation: 21/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 72.7
Coordinates: 433031E - 409536N

Groundwater:
Moderate seepage at 2.3m bgl.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP148

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of grey claybound fine to coarse gravel of subangular mudstone with some brick, coal and rare sandstone. Pockets of reddish brown burnt shale present after 2.5m bgl. Occasional cobbles of sandstone present also).			0.50	ES			
1.00									
			(3.60)		1.70	ES			
2.00									
3.00									
			3.60	68.80	3.40	ES			
		Stiff grey and brown mottled orange slightly sandy gravelly CLAY. Gravel is fine angular and subangular coal and mudstone.	(0.80)				3.90		110 / 28 kPa
4.00			4.40	68.00					
		End of Trial Pit at 4.40 m							

Date of Excavation: 15/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 72.4
Coordinates: 433130E - 409493N

Groundwater:
Slight seepage at 1.5m bgl.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Repeated collapse after 1.0m bgl.

Trial Pit: TP149

TRIAL PIT RECORD

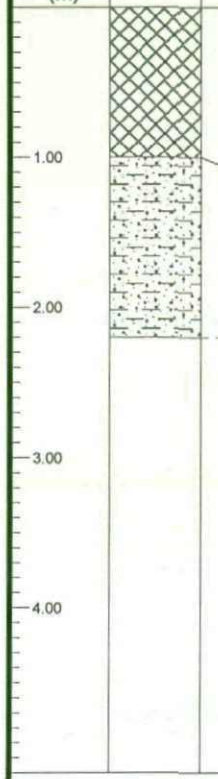
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Stiff grey and brown sandy gravelly reworked clay. Gravel is fine and medium subangular and subrounded mudstone and sandstone. Pockets of red fine to coarse gravel of burnt shale present also).	(1.00)		0.50	ES B			
			1.00	73.20					
		Stiff grey mottled orangish brown sandy gravelly CLAY. Gravel is fine and medium angular and subangular coal and mudstone.	(1.20)		1.50	ES B	1.40		127 / 45 kPa
			2.20	72.00					
		End of Trial Pit at 2.20 m							

Date of Excavation: 20/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 74.2
Coordinates: 433160E - 409530N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP150

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Stiff friable grey sandy gravelly clay. Gravel is fine and medium subangular mudstone. Occasional iron bars present also).			0.20	ES			
1.00			(1.60)		0.80	B ES	0.80		87 / 23 kPa
			1.60	73.80					
		Stiff brown, grey and orange sandy gravelly CLAY. Gravel is fine to coarse subangular and subrounded sandstone and mudstone.	(0.60)		2.00	B ES	2.00		140 / 66 kPa
2.00			2.20	73.20					
		End of Trial Pit at 2.20 m							
3.00									
4.00									

Date of Excavation: 22/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 75.4
Coordinates: 432751E - 409630N

Groundwater:
Moderate seepage at 1.6m bgl.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP151

TRIAL PIT RECORD

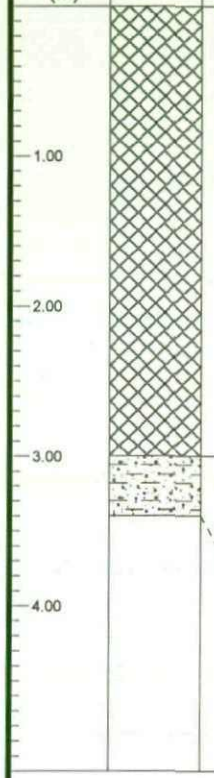
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of very dark grey, with brown pockets, sandy silt. Some organic debris present also).			0.50	ES			
1.00					1.50	ES			
			(3.00)		2.00	B			
2.00					2.40	ES			
			3.00	72.40					
3.00		Stiff grey and orangish brown sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded coal, mudstone and sandstone.	(0.40)		3.20	ES B	3.20		140 / 88 kPa
			3.40	72.00					
4.00		End of Trial Pit at 3.40 m							

Date of Excavation: 20/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 75.4
Coordinates: 432866E - 409567N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP152

TRIAL PIT RECORD

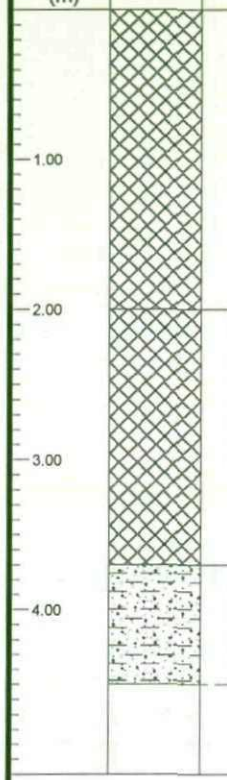
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of grey and greyish brown claybound fine to coarse gravel of angular and subangular mudstone, coal and brick).	(2.00)		0.50	ES			
1.00					1.70	ES			
			2.00	72.00					
2.00		MADE GROUND (Firm grey sandy gravelly to very gravelly reworked clay. Sand is fine to coarse. Gravel is fine to coarse angular and subangular mudstone, coal, brick and some sandstone. Iron bar present at 3.5m bgl).	(1.70)		2.50	ES			
3.00									
			3.70	70.30					
4.00		Stiff friable grey and orangish brown sandy slightly gravelly CLAY. Gravel is fine and medium angular to subrounded coal and sandstone.	(0.80)		4.00	ES	4.00		93 / 36 kPa
			4.50	69.50					
		End of Trial Pit at 4.50 m							

Date of Excavation: 15/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 74.0
Coordinates: 432956E - 409531N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP153

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
		MADE GROUND (Colliery discard consisting of grey claybound fine to coarse gravel of subangular mudstone with some coal, brick and sandstone. Cobbles of brick and rare cobbles of sandstone present also. Narrow partings of very dark grey sandy silt present after 2.5m bgl. Narrow rubber pipe present at 2.0m bgl discharging water. Pieces of fabric, timber and glass bottles present also).	(3.50)	
1.00				
2.00				
3.00				
			3.50	71.90
		MADE GROUND (Colliery discard consisting of very soft very dark grey very sandy very gravelly silt. Gravel is fine to coarse subangular mudstone, brick and sandstone. Pieces of timber, fabric and bricks present also).	(1.50)	
4.00				
			5.00	70.40
		End of Trial Pit at 5.00 m		

Samples

Depth (m)	Type
0.50	ES
1.50	B
2.00	ES
3.00	B
3.50	ES
4.00	B ES

Tests

Depth (m)	MEXE	Shear Vane (Peak/Res)
4.00		8 / 0 kPa

Date of Excavation: 15/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 75.4
Coordinates: 432936E - 409501N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Repeated collapse after 2.0m bgl. Trial pit terminated at 5.0m bgl due to excavator sinking.

Trial Pit: TP154

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata

Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)
		MADE GROUND (Colliery discard consisting of grey claybound fine to coarse sandy gravel of angular and subangular mudstone, coal and brick).	(1.60)	
1.00			1.60	71.00
		MADE GROUND (Colliery discard consisting of soft very dark grey sandy silt. Metal pipes and pieces of rubber present also below 2.8m).	(2.20)	
3.00			3.80	68.80
		Stiff grey and orangish brown sandy gravelly CLAY. Gravel is fine to coarse coal and mudstone.	(0.60)	
4.00			4.40	68.20
		End of Trial Pit at 4.40 m		

Samples

Depth (m)	Type
0.50	ES
1.80	ES
3.00	ES

Tests

Depth (m)	MEXE	Shear Vane (Peak/Res)
4.00		140 / 56 kPa

Date of Excavation: 15/04/2009
Equipment: Komatsu PC290 IC
Logged By: B Johnson
Ground Level: 72.6
Coordinates: 433048E - 409444N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Repeated collapse after 1.2m bgl.

Trial Pit: TP155

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of angular and subangular mudstone and coal).	(2.10)		0.60	ES			
1.00									
2.00			2.10	69.90					
		MADE GROUND (Colliery discard consisting of dark grey and reddish brown claybound fine to coarse gravel of angular and subangular mudstone and burnt shale).	2.30	69.70	2.20	ES			
					2.60	ES			
3.00		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of angular and subangular mudstone and coal. Occasional cobbles of sandstone, coal and brick present after 2.5m bgl.).	(2.40)		3.50	ES			
4.00									
		End of Trial Pit at 4.70 m	4.70	67.30					

Date of Excavation: 21/04/2009
Equipment: CAT 432D
Logged By: B Johnson
Ground Level: 72.0
Coordinates: 433093E - 409412N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.

Trial Pit: TP156

TRIAL PIT RECORD

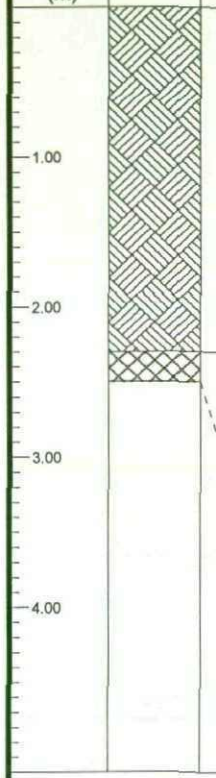
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL.	(2.30)		0.50	ES			
			2.30	72.60	2.00	ES			
		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of subangular mudstone and coal with rare burnt shale).	2.50	72.40	2.40	ES			
		End of Trial Pit at 2.50 m							

Date of Excavation: 15/07/2009
Equipment: JCB 4CX
Logged By: B Johnson
Ground Level: 74.9
Coordinates: 433058E - 409534N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Trial pit excavated within surface stockpile.

Trial Pit: TP157

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL.	(1.00) 1.00	73.60	0.60	ES			
1.00		MADE GROUND (Firm very friable brown sandy slightly *gravelly reworked clay*. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded coal, sandstone and mudstone).	(1.00) 2.00	72.60	1.50	ES B			
2.00		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of subangular mudstone and coal).	(0.40) 2.40	72.20	2.30	ES			
		End of Trial Pit at 2.40 m							
3.00									
4.00									

Date of Excavation: 15/07/2009
Equipment: JCB 4CX
Logged By: B Johnson
Ground Level: 74.6
Coordinates: 433079E - 409520N

Groundwater:
Groundwater not encountered.

Legend:
- D *Small Disturbed Sample*
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Trial pit excavated within surface stockpile.

Trial Pit: TP158

TRIAL PIT RECORD

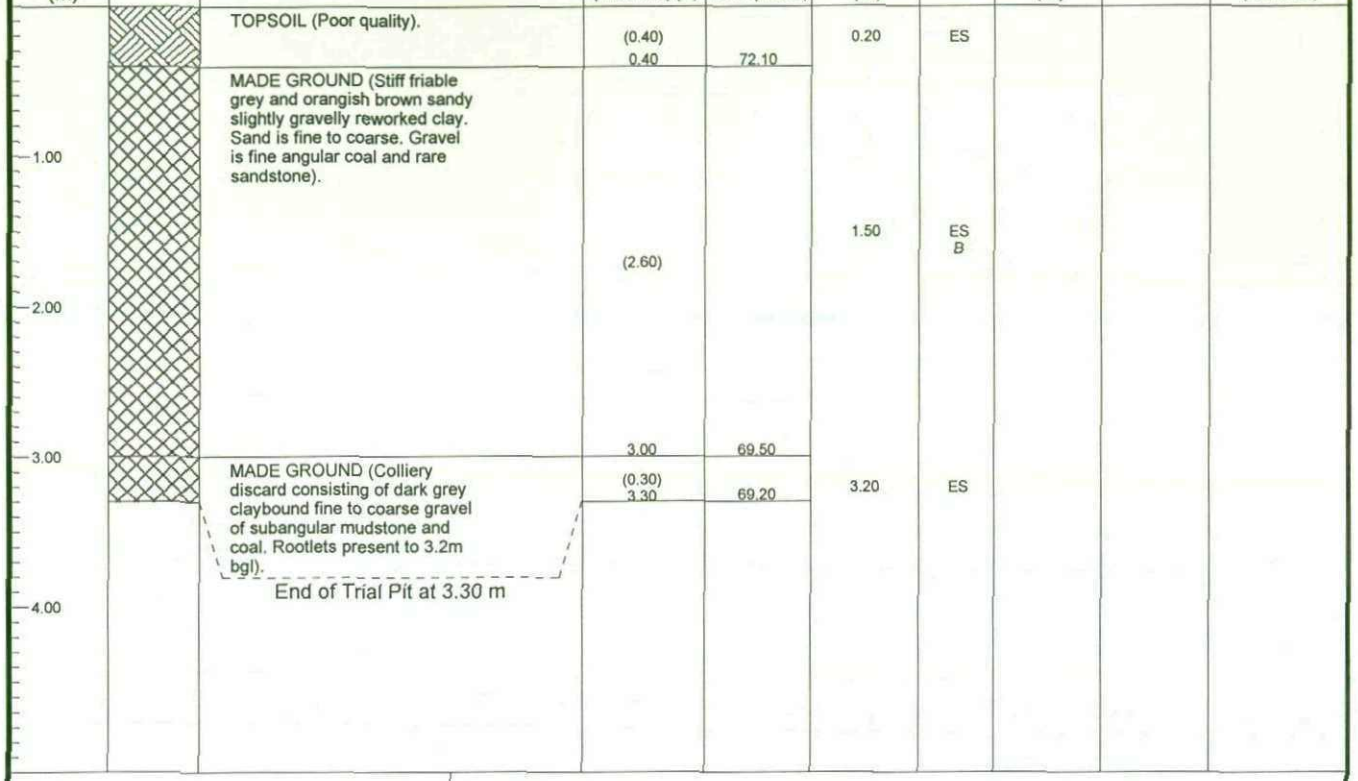
North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:



Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		TOPSOIL (Poor quality).	(0.40) 0.40	72.10	0.20	ES			
1.00		MADE GROUND (Stiff friable grey and orangish brown sandy slightly gravelly reworked clay. Sand is fine to coarse. Gravel is fine angular coal and rare sandstone).	(2.60)		1.50	ES B			
2.00									
3.00			3.00	69.50					
		MADE GROUND (Colliery discard consisting of dark grey claybound fine to coarse gravel of subangular mudstone and coal. Rootlets present to 3.2m bgl).	(0.30) 3.30	69.20	3.20	ES			
4.00		End of Trial Pit at 3.30 m							

Date of Excavation: 15/07/2009
Equipment: JCB 4CX
Logged By: B Johnson
Ground Level: 72.5
Coordinates: 433017E - 409534N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Trial pit excavated within surface stockpile.

Trial Pit: TP159

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

Photograph:

Strata					Samples		Tests		
Depth (m)	Legend	Description	Strata Depth (Thickness) (m)	Reduced Level (mAOD)	Depth (m)	Type	Depth (m)	MEXE	Shear Vane (Peak/Res)
		MADE GROUND (Stiff grey and orangish brown sandy gravelly reworked clay. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded sandstone and coal).	(1.50)		1.00	ES			
1.00			1.50	73.50					
		MADE GROUND (Firm dark grey sandy gravelly clay. Sand is fine to coarse. Gravel is angular and subangular burnt shale, coal and mudstone with pockets of ash).	(0.50)		1.70	ES			
2.00		End of Trial Pit at 2.00 m	2.00	73.00					
3.00									
4.00									

Date of Excavation: 15/07/2009
Equipment: JCB 4CX
Logged By: B Johnson
Ground Level: 75.0
Coordinates: 432997E - 409559N

Groundwater:
Groundwater not encountered.

Legend:
- D Small Disturbed Sample
- B Bulk Disturbed Sample
- EW Water Sample for Environmental Testing
- ES Soil Sample for Environmental Testing
- U Undisturbed Sample - Open Drive

Remarks:
Trial pit sides stable.
Trial pit excavated within surface stockpile.

Trial Pit: TP160

TRIAL PIT RECORD

North Gawber Colliery

Revision: Final

Project No. 09002

SCOTT DOHERTY associates

APPENDIX B
Geotechnical Laboratory Test Certificates

PSL
Professional Soils Laboratory

LABORATORY REPORT

UKAS TESTING
4043

Contract Number: PSL09/0681

Client's Reference: Report Date: 11 June 2009

Client Name: Scott Doherty
Derwentside Business Centre
Consett Business Park
Consett
Co Durham
DH8 6BP

For the attention of: Mark Doherty

Contract Title: North Gawber

Date Received: 22-May-09
Date Commenced: 22-May-09
Date Completed: 11-Jun-09

Notes: Observations and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Approved Signatories:

R Gunson (Director)

A Watkins (Director)

D Lambe (Senior Technician)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
TP102		B	4.00	Brown gravelly sandy very silty CLAY.
TP113		B	1.20	MADE GROUND dark grey very sandy clayey gravel.
TP115		B	3.60	Brown gravelly slightly sandy CLAY.
TP118		B	1.50	MADE GROUND dark grey very gravelly silty sand of ash & clinker.
TP118		B	3.00	Brown mottled grey slightly gravelly slightly sandy very silty CLAY.
TP151		B	0.80	Dark brown slightly gravelly slightly sandy organic CLAY.
TP151		B	1.50	Brown slightly gravelly slightly sandy CLAY.
TP151		B	2.00	Brown slightly gravelly slightly sandy CLAY.
TP154		B	4.00	Grey gravelly sandy CLAY.

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Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	11/6/09		11/6/09		11/6/09

NORTH GAWBER.

Contract No: PSL09/0681

Client Ref: 7053

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m^3 Clause 7.2	Dry Density Mg/m^3 Clause 7.2	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	% Passing .425mm	Remarks
TP102		B	4.00	20				49	20	29	86	Intermediate plasticity CI.
TP113		B	1.20	19								
TP115		B	3.60	17								
TP118		B	1.50	20								
TP118		B	3.00	23				54	26	28	92	High plasticity CH.
TP151		B	0.80	43				83	32	51	98	Very high plasticity CV.
TP151		B	1.50	21								
TP151		B	2.00	24								
TP154		B	4.00	20				48	22	26	78	Intermediate plasticity CI.

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

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	11/6/09		11/6/09		11/6/09

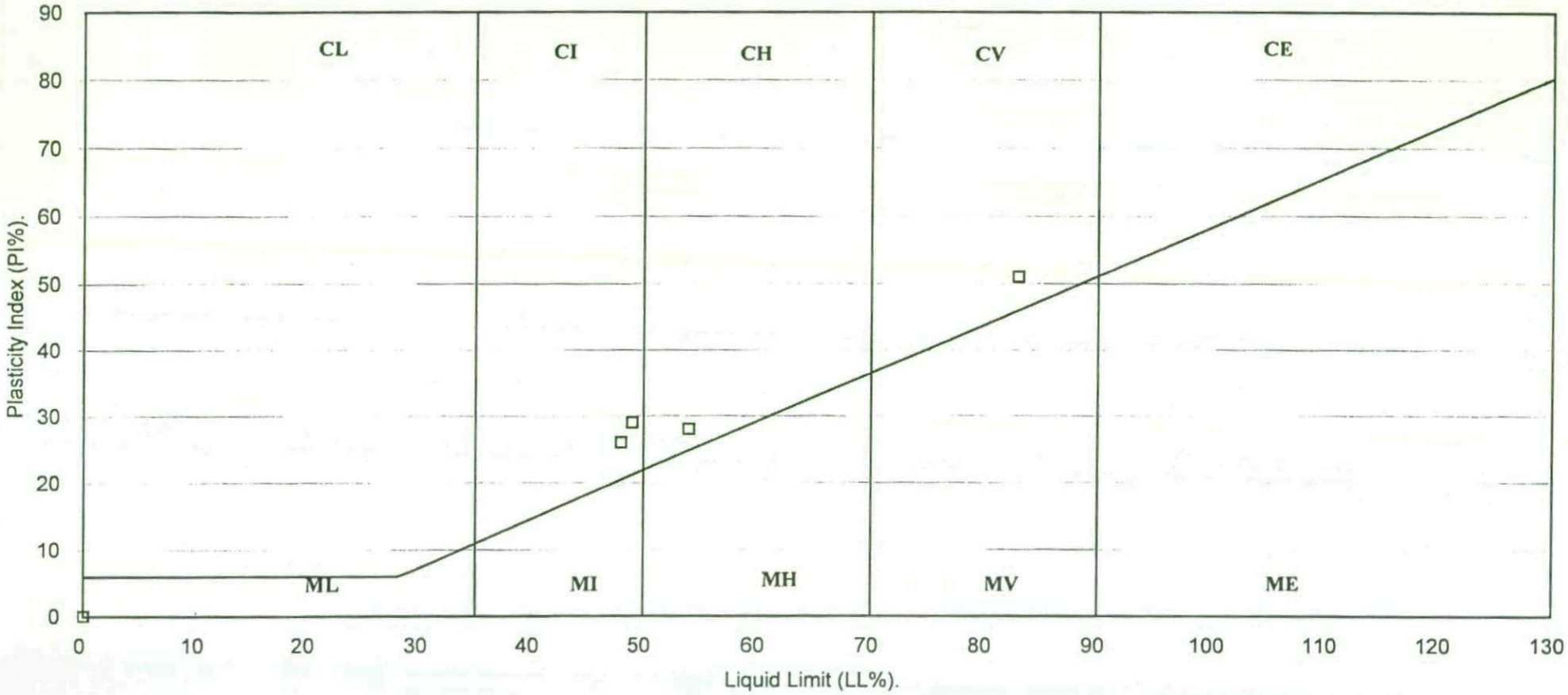
NORTH GAWBER.

Contract No: PSL09/0028

Client Ref: 08-336

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



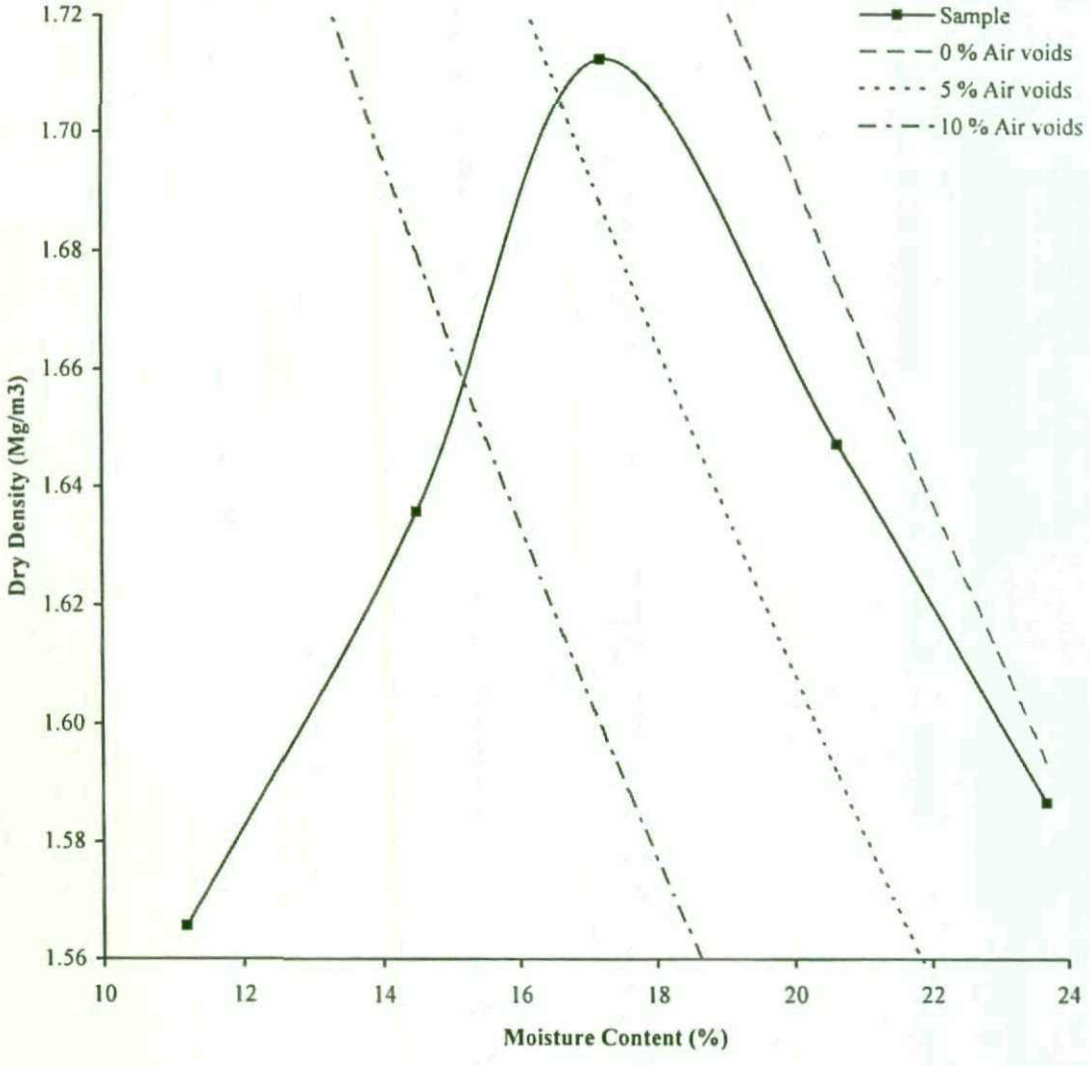
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		11/6/09		11/6/09		11/6/09
	NORTH GAWBER.				Contract No:	PSL09/0028
					Client Ref:	08-336

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: TP151 **Depth (m) :** 1.50

Sample Number: **Sample Type:** B



Initial Moisture Content:	21	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.56	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.71	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		17		
Remarks	See Summary of Soil Descriptions.			

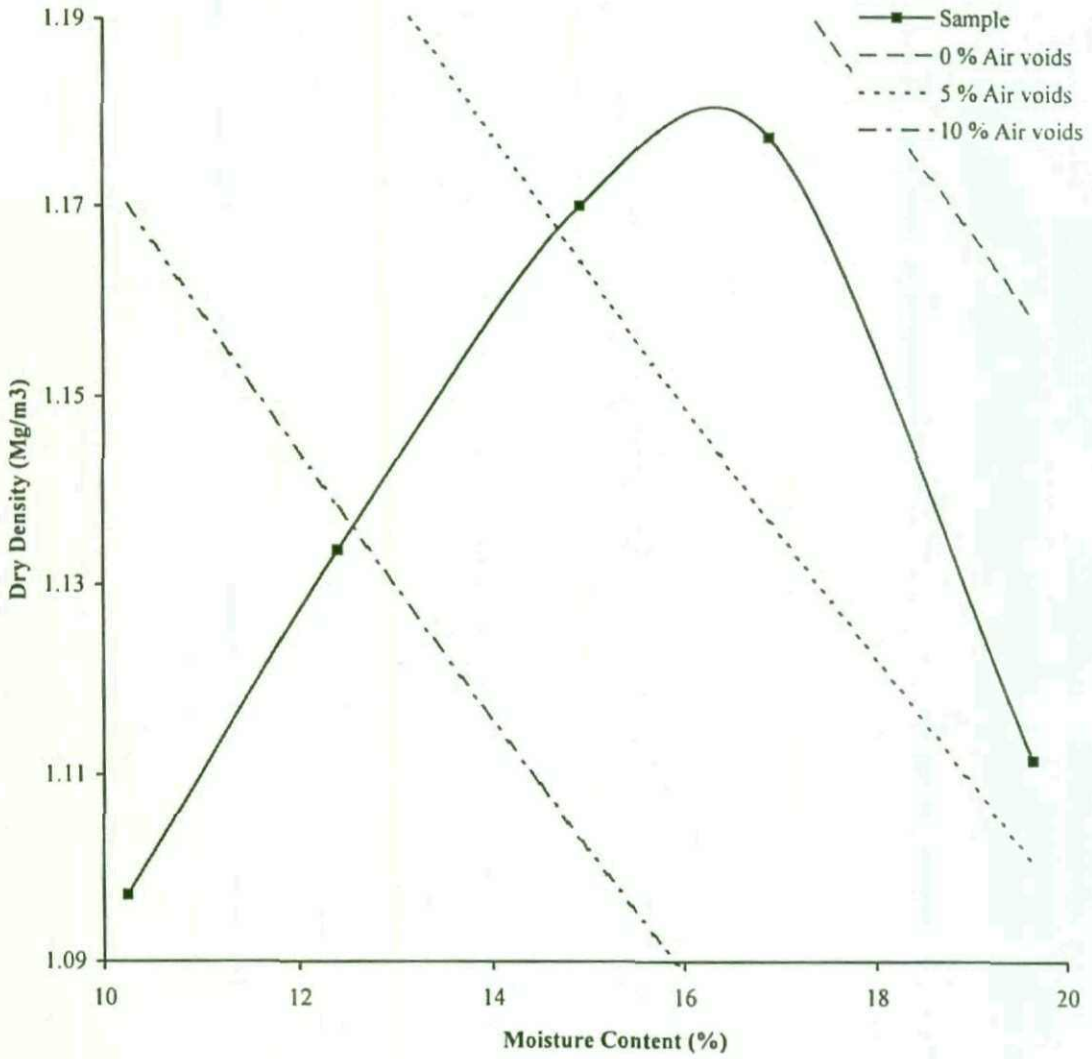
Checked By	Date	Approved By	Date
	11/6/06		11/6/06

PSL Professional Soils Laboratory	NORTH GAWBER.	Contract No. PSL09/0681

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP118**	**Depth (m) :**	**1.50**
Sample Number:		**Sample Type:**	**B**



Initial Moisture Content:	20	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	1.5	Assumed	Material Retained on 37.5 mm Test Sieve (%):	3
Maximum Dry Density (mg/m3):		1.18	Material Retained on 20.0 mm Test Sieve (%):	9
Optimum Moisture Content (%):		16		
Remarks	See Summary of Soil Descriptions.			

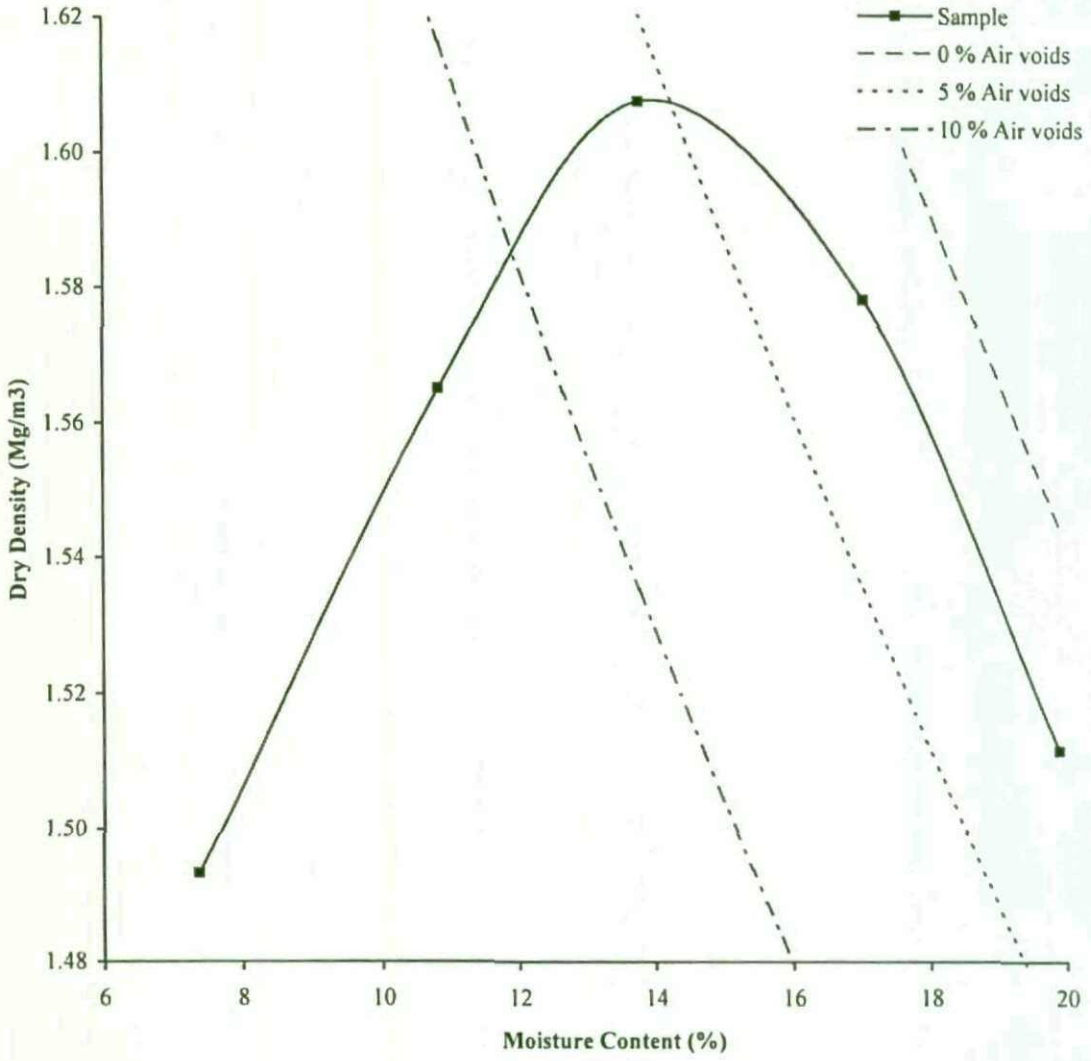
Checked By	Date	Approved By	Date
	11/6/09		11/6/09

PSL Professional Soils Laboratory	**NORTH GAWBER.**	**Contract No. PSL09/0681**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP154**	**Depth (m) :**	**4.00**
Sample Number:		**Sample Type:**	**B**



Initial Moisture Content:	20	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.23	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.61	Material Retained on 20.0 mm Test Sieve (%):	7
Optimum Moisture Content (%):		14		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	11/6/05		11/6/05

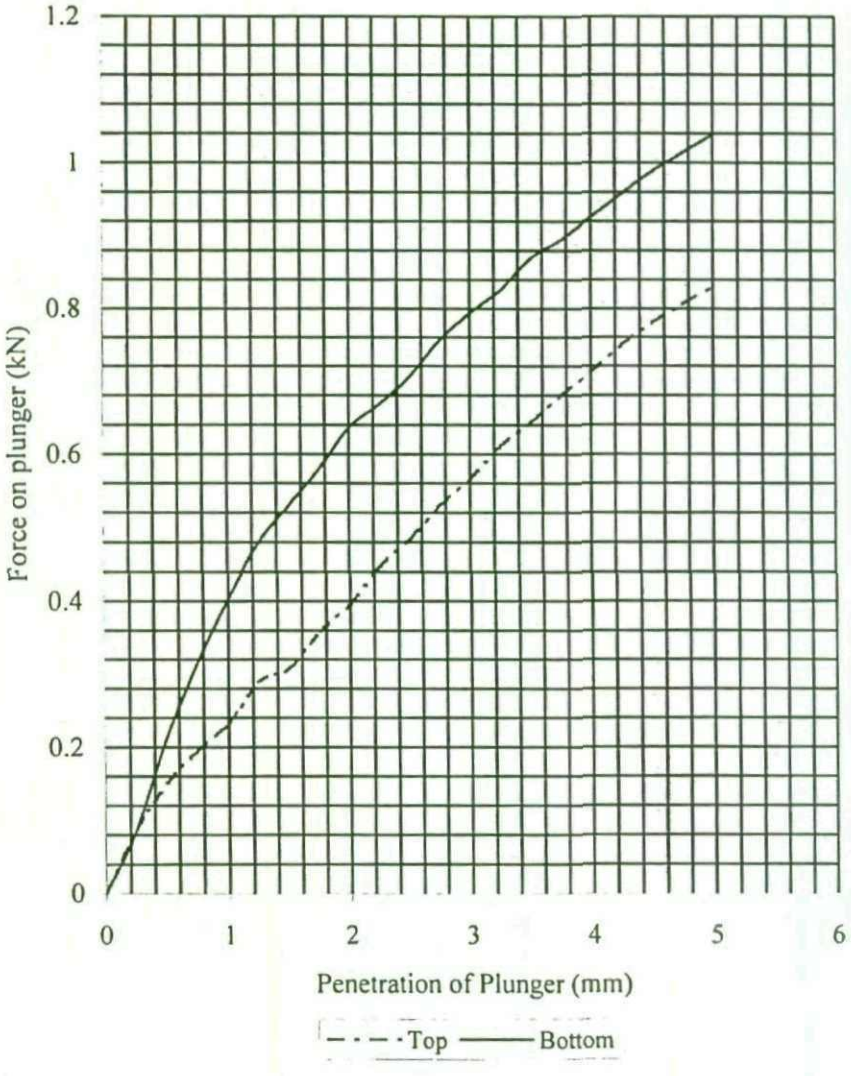
PSL Professional Soils Laboratory	**NORTH GAWBER.**	**Contract No. PSL09/0681**

California Bearing Ratio Test.

BS 1377 : Part 4 : 1990

Hole Number: TP151 **Depth (m):** 1.50

Sample Number: **Sample Type:** B



Initial Sample Conditions		Test Conditions		Method of compaction		2.5Kg Rammer	
Moisture Content:	20.6	Surcharge Kg:	4.20	Final Moisture Content %		C.B.R. Value %	
Bulk Density Mg/m3:	2.00	Soaking Time hrs	0	Sample Top	21.2	Sample Top	4.2
Dry Density Mg/m3:	1.65	Swelling mm:	0	Sample Bottom	20.4	Sample Bottom	5.3
Percentage retained on 20mm BS test sieve:	0	Remarks:	See Summary of Soil Description.				

Checked by	Date	Approved By	Date
	11/6/09		11/6/09

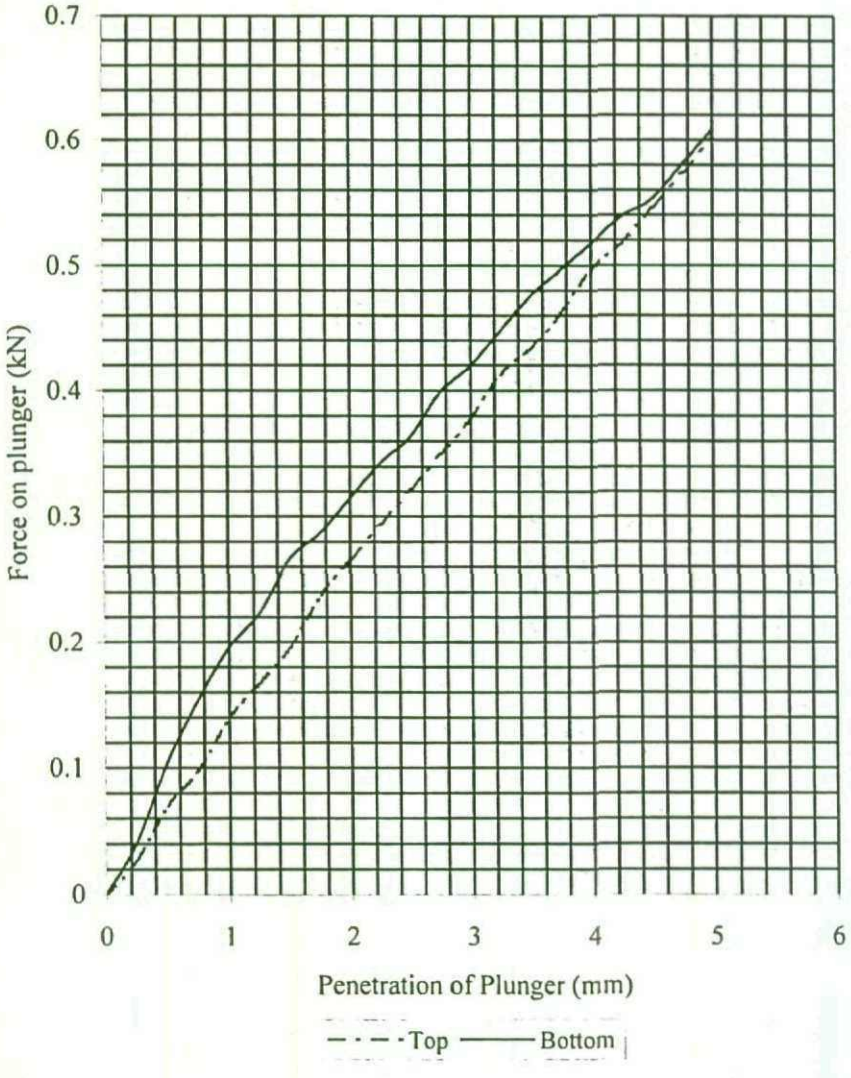
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California Bearing Ratio Test.

BS 1377 : Part 4 : 1990

Hole Number: TP151 **Depth (m):** 2.00

Sample Number: **Sample Type:** B



Initial Sample Conditions		Test Conditions		Method of compaction		2.5Kg Rammer	
Moisture Content:	23.9	Surcharge Kg:	4.20	Final Moisture Content %		C.B.R. Value %	
Bulk Density Mg/m3:	2.00	Soaking Time hrs	0	Sample Top	24.3	Sample Top	3.0
Dry Density Mg/m3:	1.61	Swelling mm:	0	Sample Bottom	23.6	Sample Bottom	3.0
Percentage retained on 20mm BS test sieve:	0	Remarks:	See Summary of Soil Description.				

Checked by	Date	Approved By	Date
	11/09		11/09

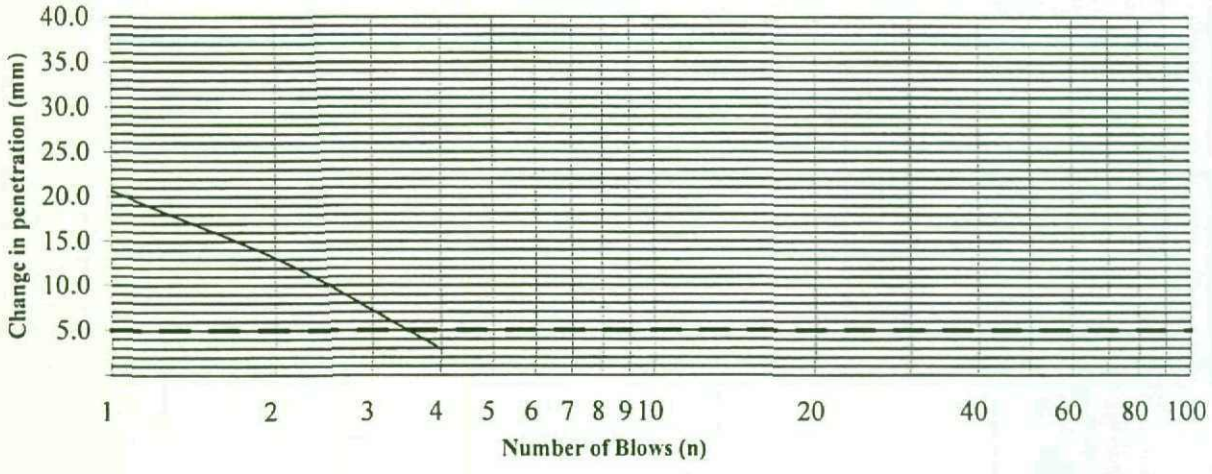
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MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number:	**TP102**	**Depth (m):**	**4.00**
Sample Number:		**Sample Type:**	**B**

Material Retained on the 20mm BS Test Sieve (%):	0

MCV Determination



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	71.5	20.6
2	61.3	13.1
3	55.3	7.2
4	50.9	2.9
6	48.3	
8	48.2	
12	48.1	
16	48.0	
24		
32		
48		
64		
96		
128		
192		
256		

Test Results.

Moisture Content (%).	20.2
MCV	5.5

Checked	Date	Approved	Date
	11/6/09		11/6/09

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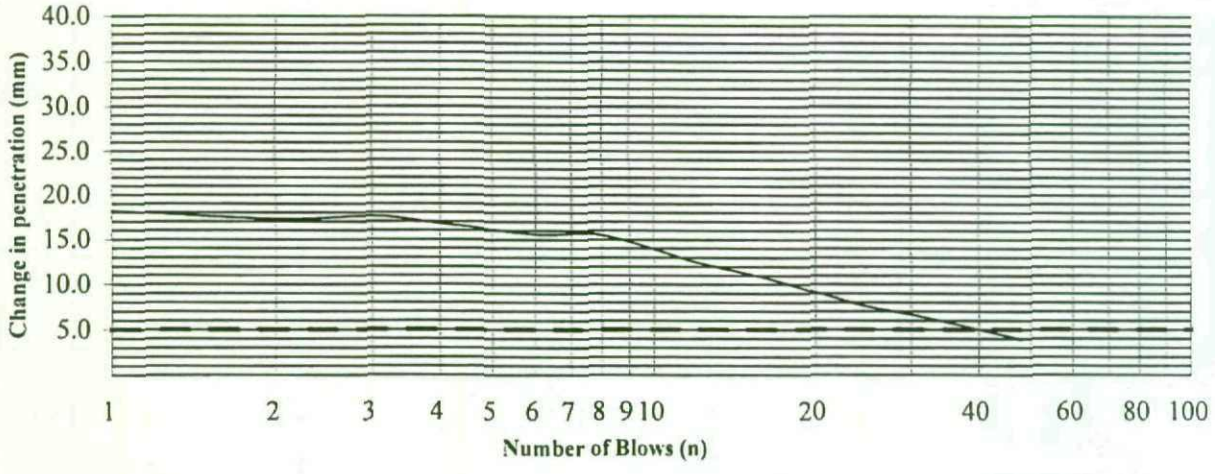
MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number: TP113 **Depth (m):** 1.20

Sample Number: **Sample Type:** B

Material Retained on the 20mm BS Test Sieve (%):	0

MCV Determination



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	107.9	18.2
2	99.3	17.3
3	93.8	17.6
4	89.7	16.8
6	84.3	15.6
8	82.0	15.5
12	76.2	12.5
16	72.9	10.8
24	68.7	7.8
32	66.5	6.3
48	63.7	3.9
64	62.1	
96	60.9	
128	60.2	
192	59.8	
256		

Test Results.

Moisture Content (%).	18.7
MCV	16.1

Checked	Date	Approved	Date
	11/6/09		11/6/09

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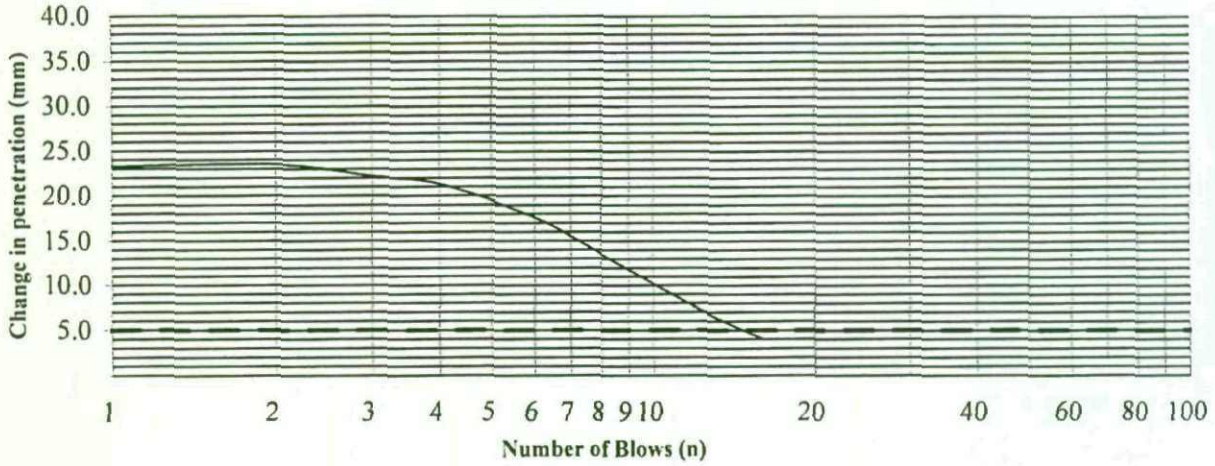
MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number: TP115 **Depth (m):** 3.60

Sample Number: **Sample Type:** B

Material Retained on the 20mm BS Test Sieve (%):	0

MCV Determination



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	95.0	23.3
2	83.9	23.5
3	76.2	22.2
4	71.7	21.3
6	65.4	17.6
8	60.4	13.5
12	54.0	7.5
16	50.4	4.0
24	47.8	
32	46.9	
48	48.5	
64	46.4	
96		
128		
192		
256		

Test Results.

Moisture Content (%).	16.6
MCV	11.8

Checked	Date	Approved	Date
	11/6/09		11/6/09

PSL Professional Soils Laboratory	NORTH GAWBER.	Contract No: PSL09/0681

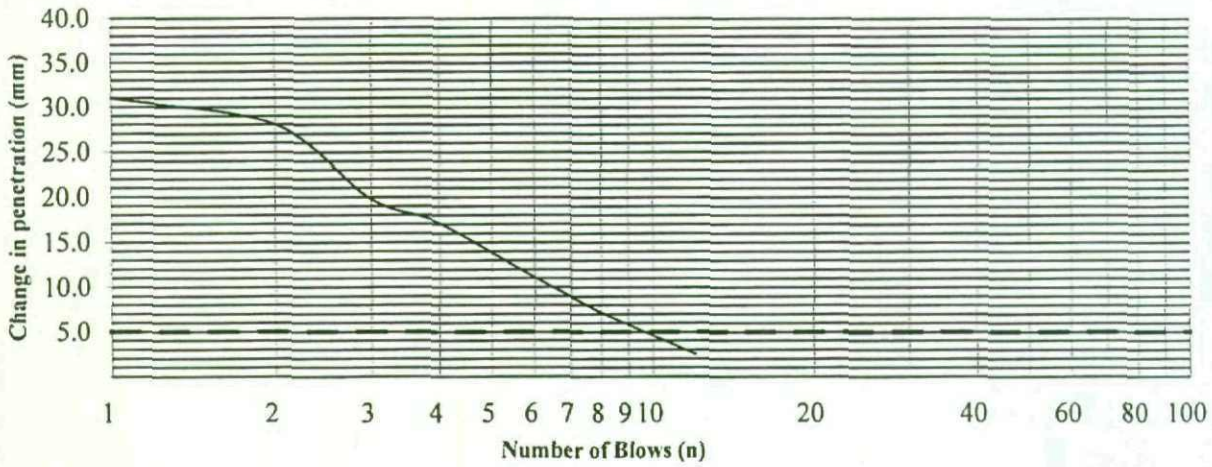
MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number: TP118 **Depth (m):** 3.00

Sample Number: **Sample Type:** B

Material Retained on the 20mm BS Test Sieve (%):	0

MCV Determination



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	97.2	31.0
2	84.1	28.0
3	71.1	19.8
4	66.2	17.1
6	60.1	11.1
8	56.1	7.2
12	51.3	2.5
16	49.1	
24	49.0	
32	48.9	
48	48.8	
64		
96		
128		
192		
256		

Test Results.

Moisture Content (%).	22.6
MCV	9.9

Checked	Date	Approved	Date
	11/6/09		11/6/09

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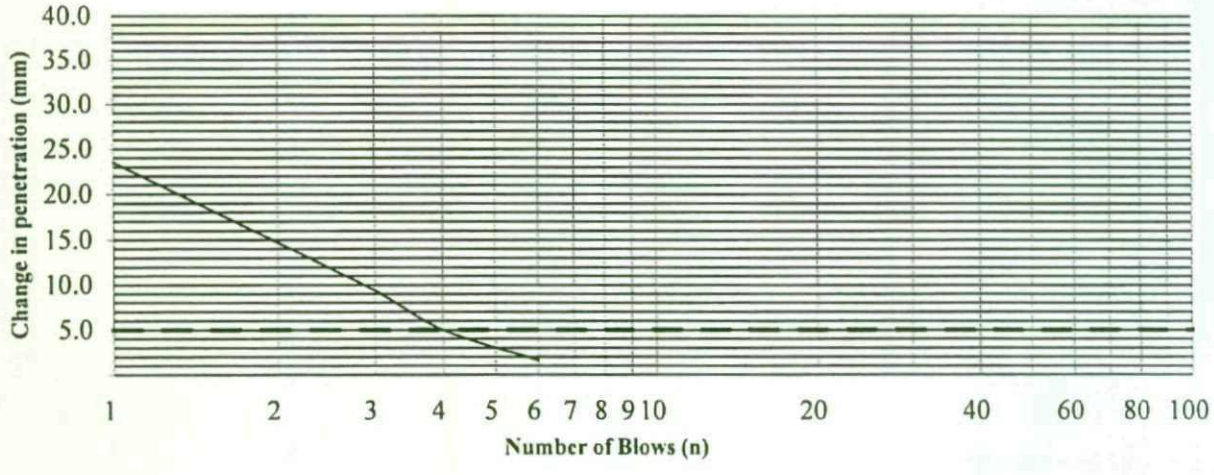
MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number: TP151 **Depth (m):** 0.80

Sample Number: **Sample Type:** B

Material Retained on the 20mm BS Test Sieve (%):	0

MCV Determination



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	95.0	23.5
2	81.8	14.7
3	76.0	9.4
4	71.5	5.0
6	68.0	1.6
8	67.1	
12	66.6	
16	66.5	
24	66.4	
32		
48		
64		
96		
128		
192		
256		

Test Results.

Moisture Content (%).	42.8
MCV	6.0

Checked	Date	Approved	Date
	11/6/05		11/6/05

PSL Professional Soils Laboratory	NORTH GAWBER.	Contract No: PSL09/0681

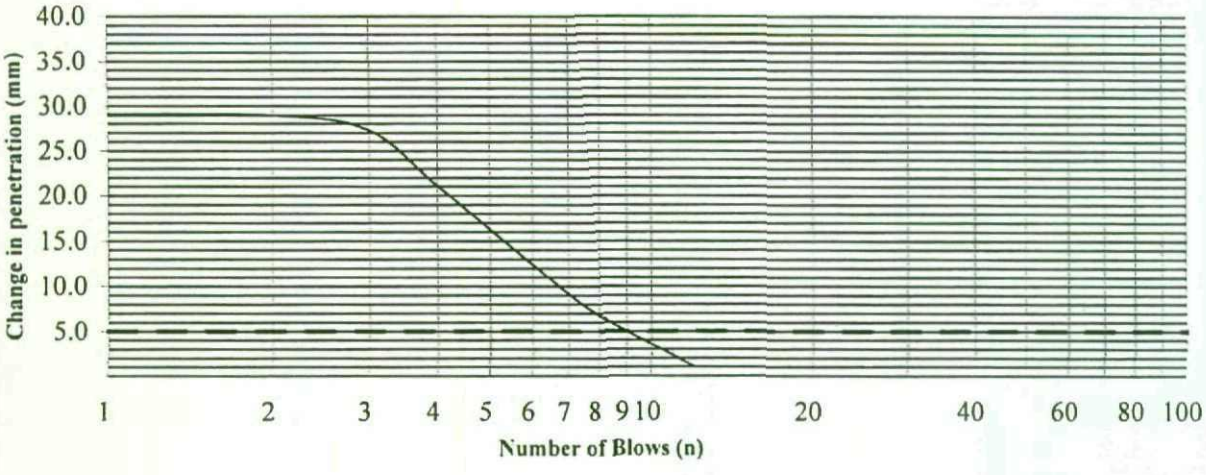
MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number: TP151 **Depth (m):** 2.00

Sample Number: **Sample Type:** B

Material Retained on the 20mm BS Test Sieve (%):	0

MCV Determination



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	102.4	29.1
2	87.6	29.0
3	80.2	27.3
4	73.3	21.1
6	64.4	12.4
8	58.6	6.7
12	52.9	1.1
16	52.2	
24	52.0	
32	51.9	
48	51.8	
64		
96		
128		
192		
256		

Test Results.

Moisture Content (%).	24.1
MCV	9.5

Checked	Date	Approved	Date
	11/6/09		11/6/09

PSL Professional Soils Laboratory	NORTH GAWBER.	Contract No: PSL09/0681

APPENDIX C
Chemical Laboratory Analytical Test Certificates

UKAS TESTING
2531

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ANALYTICAL TEST REPORT

Contract no: SDA/39205

Contract name: North Gawber

Client reference: -

Clients name: Scott Doherty Associates

Clients address: Consett Business Park
Consett
Co Durham
DH8 6BP

Date received: 10 June 2009

Date started: 16 June 2009

Date of issue: 23 June 2009

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd were not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are exclusive of stones.
This report shall not be reproduced except in full, withour prior written approval.
Samples will be disposed of 8 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
NAF Non asbestos fibres

Approved by: J. Campbell

Karan Campbell, Director
John Campbell, Director

Unit 25a - 25b, Number One Industrial Estate, Medomsley Road, Consett, Co. Durham DH8 6TJ
Tel: 01207 581260 Fax: 01207 581582 Email: info@chemtech-env.co.uk www.chemtech-env.co.uk

Vat Reg. No. 772 5703 18 Registered in England Number 4284013

Chemtech Environmental Limited

WATERS

Lab number Sample id Depth (m)			39205-1 BH 105 -	39205-2 BH 109 -	39205-3 BH 115 -	39205-4 Sample A -	39205-5 Sample C -	39205-6 Sample D -
Test	**Method**	**Units**						
Arsenic	CE055	mg/l	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	CE063	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Cadmium	CE055 U	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	CE055 U	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper	CE055 U	mg/l	0.005	<0.004	0.015	0.007	<0.004	0.008
Lead	CE055 U	mg/l	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Mercury	CE055	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	CE055 U	mg/l	<0.003	0.010	0.066	0.008	<0.003	0.017
Selenium	CE055	mg/l	0.002	0.002	0.007	0.001	<0.001	0.002
Zinc	CE055 U	mg/l	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
pH	CE004	units	7.6	8.0	6.9	7.6	7.7	7.7
Sulphate	CE049 U	mg/l	26	124	3585	1488	84	31
Sulphide	CE079	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide (total)	CE077	mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenols (total)	CE073	mg/l	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
PAHs								
PAH (total)	CE087	mg/l	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
TPH								
TPH (C10-C40)	CE052	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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WATERS

Lab number Sample id Depth (m)			39205-7 Sample E -
Test	**Method**	**Units**	
Arsenic	CE055	mg/l	0.002
Boron	CE063	mg/l	<0.03
Cadmium	CE055 U	mg/l	<0.001
Chromium	CE055 U	mg/l	<0.003
Copper	CE055 U	mg/l	0.005
Lead	CE055 U	mg/l	<0.009
Mercury	CE055	mg/l	<0.001
Nickel	CE055 U	mg/l	<0.003
Selenium	CE055	mg/l	0.003
Zinc	CE055 U	mg/l	<0.020
pH	CE004	units	7.1
Sulphate	CE049 U	mg/l	27
Sulphide	CE079	mg/l	<0.1
Cyanide (total)	CE077	mg/l	<0.02
Phenols (total)	CE073	mg/l	<0.0005
PAHs			
PAH (total)	CE087	mg/l	<0.0001
TPH			
TPH (C10-C40)	CE052	mg/l	<0.01

Chemtech Environmental Limited

METHOD DETAILS

METHOD	WATERS	METHOD SUMMARY	STATUS	LOD	UNITS
CE055	Arsenic	ICP-OES	U	0.001	mg/l
CE063	Boron	ICP-OES	U	0.03	mg/l
CE055	Cadmium	ICP-OES	U	0.001	mg/l
CE055	Chromium	ICP-OES	U	0.003	mg/l
CE055	Copper	ICP-OES	U	0.004	mg/l
CE055	Lead	ICP-OES	U	0.009	mg/l
CE055	Mercury	ICP-OES		0.001	mg/l
CE055	Nickel	ICP-OES	U	0.003	mg/l
CE055	Selenium	ICP-OES	U	0.001	mg/l
CE055	Zinc	ICP-OES	U	0.02	mg/l
CE004	pH	BS 1377, pH Meter	U	0.1	units
CE049	Sulphate	Ion Chromatography	U	10	mg/l
CE079	Sulphide	Continuous Flow Colorimetry		0.1	mg/l
CE077	Cyanide (total)	Continuous Flow Colorimetry		0.02	mg/l
CE073	Phenols (total)	HPLC		0.0005	mg/l
CE087	PAH (total)	Solvent extraction, GC-MS		0.0001	mg/l
CE052	TPH (C10-C40)	Solvent extraction, GC-FID		0.01	mg/l

chemtech environmental

UKAS TESTING 2531

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

ANALYTICAL TEST REPORT

Contract no: SDA/39022(1)

Contract name: North Gawber Colliery Site - Area 1

Client reference: -

Clients name: Scott Doherty Associates

Clients address: Consett Business Park
Consett
Co Durham
DH8 6BP

Date received: 23 April 2009

Date started: 07 May 2009

Date of issue: 16 June 2009

This is a supplementary report to report number SDA/39022 issued 18 May 2009.

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd were not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are exclusive of stones.
This report shall not be reproduced except in full, withour prior written approval.
Samples will be disposed of 8 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
NAF Non asbestos fibres

Approved by: KCampbell

Karan Campbell, Director
John Campbell, Director

Unit 25a - 25b, Number One Industrial Estate, Medomsley Road, Consett, Co. Durham DH8 6TJ
Tel: 01207 581260 Fax: 01207 581582 Email: info@chemtech-env.co.uk www.chemtech-env.co.uk

Vat Reg. No. 772 5703 18 Registered in England Number 4284013

Chemtech Environmental Limited

SAMPLE DESCRIPTIONS

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation.
They are not intended as full geological descriptions.
MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample.
Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab number	Sample id	Depth (m)	Description	Moisture (%)
39022-1	Area 1 TP 101	1.90	Mudstone (Clay)	10.7
39022-2	Area 1 TP 101	4.60	Mudstone (Clay)	12.4
39022-3	Area 1 TP 106	0.50	Mudstone (Clay)	9.7
39022-4	Area 1 TP 106	3.00	Clay	13.1
39022-5	Area 1 TP 115	0.60	Sandy Clay	12.2
39022-6	Area 1 TP 115	6.30	Loamy Clay	13.2
39022-7	Area 1 TP 125	1.80	Loamy Clay	13.8
39022-8	Area 1 TP 125	2.50	Clay	16.7

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SOILS

Lab number			39022-1	39022-2	39022-3	39022-4	39022-5	39022-6
Sample id			Area 1 TP 101	Area 1 TP 101	Area 1 TP 106	Area 1 TP 106	Area 1 TP 115	Area 1 TP 115
Depth (m)			1.90	4.60	0.50	3.00	0.60	6.30
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	17	24	21	7.4	11	20
Cadmium (total)	CE054 M	mg/kg	0.5	0.5	0.6	0.7	0.9	0.6
Chromium (total)	CE054 M	mg/kg	19	18	17	24	26	17
Copper (total)	CE054 M	mg/kg	41	45	38	27	31	50
Lead (total)	CE054 M	mg/kg	30	26	26	17	18	86
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	20	20	32	42	50	32
Selenium (total)	CE054 M	mg/kg	1.1	1.1	1.5	0.9	1.1	1.1
Zinc (total)	CE054 M	mg/kg	85	74	77	75	85	87
pH	CE004 M	units	3.5	3.6	7.5	7.1	6.3	7.2
Sulphate (2:1 water soluble)	CE049 U	mg/l	765	-	-	-	-	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	71	-	-	-	-	-
Sulphate (total)	CE010 M	mg/kg	5754	4807	4947	700	840	3103
Sulphur (total)	CE061	mg/kg	3998	-	-	-	-	-
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	1.0	0.7	<0.5	<0.5
Organic matter content	CE005 M	% w/w	3.64	4.38	3.52	1.69	2.34	3.05
Toluene extractable matter	CE031 U	mg/kg	240	240	310	210	200	320
PAH								
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	<5	<5
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	<0.01	-	<0.01
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	<0.01	-	<0.01
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	<0.01	-	<0.01
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	<1	-	<1
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	<1	-	<1
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	<1	-	<1
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	<1	-	<1
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	<0.1	-	<0.1
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	<0.1	-	<0.1
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	<0.1	-	<0.1
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	<1	-	3
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	<1	-	11
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	-	-	1	-	20
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	-	-	9	-	38
Subcontracted analysis								
Asbestos	$	-	-	-	-	NAF	-	-

Chemtech Environmental Limited

SOILS

Lab number			39022-7	39022-8
Sample id			Area 1 TP 125	Area 1 TP 125
Depth (m)			1.80	2.50
Test	**Method**	**Units**		
Arsenic (total)	CE054 M	mg/kg	16	11
Cadmium (total)	CE054 M	mg/kg	0.5	0.6
Chromium (total)	CE054 M	mg/kg	18	27
Copper (total)	CE054 M	mg/kg	39	28
Lead (total)	CE054 M	mg/kg	20	20
Mercury (total)	CE054	mg/kg	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	21	52
Selenium (total)	CE054 M	mg/kg	0.9	0.7
Zinc (total)	CE054 M	mg/kg	60	95
pH	CE004 M	units	4.2	6.3
Sulphate (2:1 water soluble)	CE049 U	mg/l	715	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	78	-
Sulphate (total)	CE010 M	mg/kg	6133	132
Sulphur (total)	CE061	mg/kg	2815	-
Sulphide	CE079	mg/kg	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5
Organic matter content	CE005 M	% w/w	3.50	1.05
Toluene extractable matter	CE031 U	mg/kg	160	110
PAH				
PAH (total)	CE087	mg/kg	<5	<5
TPH				
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	-
Subcontracted analysis				
Asbestos	$	-	NAF	-

Chemtech Environmental Limited

LEACHATES

Lab number			39022-1L
Sample id			Area 1 TP 101
Depth (m)			1.90
Test	**Method**	**Units**	
Arsenic	CE055	mg/l	<0.001
Boron	CE063	mg/l	<0.03
Cadmium	CE055 U	mg/l	0.002
Chromium	CE055 U	mg/l	<0.003
Copper	CE055 U	mg/l	0.030
Lead	CE055 U	mg/l	<0.009
Mercury	CE055	mg/l	<0.001
Nickel	CE055 U	mg/l	0.153
Selenium	CE055	mg/l	<0.001
Zinc	CE055 U	mg/l	0.284
pH	CE004	units	3.8
Sulphate	CE049 U	mg/l	221
Sulphide	CE079	mg/l	<0.1
Cyanide (total)	CE077	mg/l	<0.02
Phenols (total)	CE073	mg/l	<0.0005
PAHs			
PAH (total)	CE087	mg/l	<0.0001
TPH			
TPH (C10-C40)	CE052	mg/l	<0.01

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	STATUS	LOD	UNITS
CE054	Arsenic (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Cadmium (total)	Aqua regia digest, ICP-OES	M	0.2	mg/kg
CE054	Chromium (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Copper (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Lead (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Mercury (total)	Aqua regia digest, ICP-OES		0.5	mg/kg
CE054	Nickel (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Selenium (total)	Aqua regia digest, ICP-OES	M	0.3	mg/kg
CE054	Zinc (total)	Aqua regia digest, ICP-OES	M	3	mg/kg
CE004	pH	BS 1377, pH Meter	M	0.1	units
CE049	Sulphate (2:1 water soluble)	Aqueous extraction, IC-COND	U	10	mg/l
CE056	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	U	0.03	mg/l
CE010	Sulphate (total)	Acid extraction, Gravimetry	M	100	mg/kg
CE061	Sulphur (total)	Acid extraction, ICP-OES		100	mg/kg
CE079	Sulphide	Extraction, Continuous Flow Colorimetry		10	mg/kg
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry		2	mg/kg
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry		0.5	mg/kg
CE005	Organic matter content	BS 1377, Colorimetry	M	0.01	% w/w
CE031	Toluene extractable matter	Solvent extraction, Gravimetry	U	50	mg/kg
CE087	PAH (total)	Solvent extraction, GC-MS		5	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	U	-	-

Chemtech Environmental Limited

METHOD DETAILS

METHOD	LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE055	Arsenic	ICP-OES		0.001	mg/l
CE063	Boron	ICP-OES		0.03	mg/l
CE055	Cadmium	ICP-OES	U	0.001	mg/l
CE055	Chromium	ICP-OES	U	0.003	mg/l
CE055	Copper	ICP-OES	U	0.004	mg/l
CE055	Lead	ICP-OES	U	0.009	mg/l
CE055	Mercury	ICP-OES		0.001	mg/l
CE055	Nickel	ICP-OES	U	0.003	mg/l
CE055	Selenium	ICP-OES		0.001	mg/l
CE055	Zinc	ICP-OES	U	0.02	mg/l
CE004	pH	BS 1377, pH Meter		0.1	units
CE049	Sulphate	Ion Chromatography	U	10	mg/l
CE079	Sulphide	Continuous Flow Colorimetry		0.1	mg/l
CE077	Cyanide (total)	Continuous Flow Colorimetry		0.02	mg/l
CE073	Phenols (total)	HPLC		0.0005	mg/l
CE087	PAH (EPA 16)	Solvent extraction, GC-MS		0.0001	mg/l
CE087	PAH (total)	Solvent extraction, GC-MS		0.0001	mg/l
CE052	TPH (C10-C40)	Solvent extraction, GC-FID		0.01	mg/l

2531

ANALYTICAL TEST REPORT

Contract no: SDA/39023(1)

Contract name: North Gawber Colliery Site - Area 2

Client reference: -

Clients name: Scott Doherty Associates

Clients address: Consett Business Park
Consett
Co Durham
DH8 6BP

Date received: 23 April 2009

Date started: 07 May 2009

Date of issue: 16 June 2009

This is a supplementary report to report number SDA/39023 issued 18 May 2009.

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
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M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
NAF Non asbestos fibres

Approved by: K Campbell

Karan Campbell Director

John Campbell Director

Unit 25a - 25b, Number One Industrial Estate, Medomsley Road, Consett, Co. Durham DH8 6TJ
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Lab number	Sample id	Depth (m)	Description	Moisture (%)
39023-1	Area 2 107	3.40	Sandy Clay	18.4
39023-2	Area 2 108	0.50	Gravelly Sand	18.3
39023-3	Area 2 109	0.60	Mudstone (Clay)	8.8
39023-4	Area 2 109	2.80	Mudstone (Clay)	11.5
39023-5	Area 2 109	5.30	Loamy Clay	30.0
39023-6	Area 2 116	1.80	Gravelly Sandy Clay	13.3
39023-7	Area 2 116	3.60	Gravelly Sandy Clay	16.4
39023-8	Area 2 117	1.20	Clay Loam	19.4
39023-9	Area 2 117	2.20	Clay	24.6
39023-10	Area 2 118	0.50	Ashy Sand	10.0
39023-11	Area 2 118	2.30	Clay	17.4
39023-12	Area 2 118	5.00	Clay	13.2
39023-13	Area 2 119	0.50	Clay	16.0
39023-14	Area 2 119	1.50	Clay	16.2
39023-15	Area 2 119	5.50	Clay	18.8
39023-16	Area 2 127	1.80	Mudstone (Clay)	16.3
39023-17	Area 2 134	0.40	Clay Loam	15.4
39023-18	Area 2 134	2.00	Clay	15.1
39023-19	Area 2 135	1.20	Ashy Clay	26.1
39023-20	Area 2 135	3.80	Clay	20.6

Chemtech Environmental Limited

SOILS

Lab number			39023-1	39023-2	39023-3	39023-4	39023-5	39023-6
Sample id			Area 2	Area 2	Area 2	Area 2	Area 2	Area 2
			107	108	109	109	109	116
Depth (m)			3.40	0.50	0.60	2.80	5.30	1.80
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	41	37	50	24	42	64
Cadmium (total)	CE054 M	mg/kg	0.9	0.6	0.5	2.0	0.9	0.8
Chromium (total)	CE054 M	mg/kg	24	10	24	21	24	20
Copper (total)	CE054 M	mg/kg	25	62	2.6	29	142	63
Lead (total)	CE054 M	mg/kg	56	21	18	25	260	35
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	0.9	1.0	<0.5
Nickel (total)	CE054 M	mg/kg	36	27	37	54	41	31
Selenium (total)	CE054 M	mg/kg	0.9	1.7	0.8	1.8	2.3	1.6
Zinc (total)	CE054 M	mg/kg	63	31	96	109	182	78
pH	CE004 M	units	7.1	7.0	5.5	5.3	7.6	7.6
Sulphate (2:1 water soluble)	CE049 U	mg/l	-	-	-	-	-	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	-	-	-	-	-	-
Sulphate (total)	CE010 M	mg/kg	4297	181	255	790	338	181
Sulphur (total)	CE061	mg/kg	-	-	-	-	-	-
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Organic matter content	CE005 M	% w/w	0.95	9.52	0.85	4.51	8.86	2.33
Toluene extractable matter	CE031 U	mg/kg	<50	540	<50	<50	1180	620
PAH								
Naphthalene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthylene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthene	CE087	mg/kg	-	-	-	-	-	-
Fluorene	CE087	mg/kg	-	-	-	-	-	-
Phenanthrene	CE087	mg/kg	-	-	-	-	-	-
Anthracene	CE087	mg/kg	-	-	-	-	-	-
Fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Pyrene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	CE087	mg/kg	-	-	-	-	-	-
Chrysene	CE087	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	CE087	mg/kg	-	-	-	-	-	-
Indeno(123cd)pyrene	CE087	mg/kg	-	-	-	-	-	-
Dibenz(ah)anthracene	CE087	mg/kg	-	-	-	-	-	-
Benzo(ghi)perylene	CE087	mg/kg	-	-	-	-	-	-
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	7.9	<5

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SOILS

Lab number			39023-1	39023-2	39023-3	39023-4	39023-5	39023-6
Sample id			Area 2	Area 2	Area 2	Area 2	Area 2	Area 2
			107	108	109	109	109	116
Depth (m)			3.40	0.50	0.60	2.80	5.30	1.80
Test	**Method**	**Units**						
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	-	0.02	-	-	<0.01	0.01
TPH Aromatic EC7-EC8	CE068	mg/kg	-	<0.01	-	-	<0.01	<0.01
TPH Aromatic EC8-EC10	CE068	mg/kg	-	<0.01	-	-	<0.01	<0.01
TPH Aromatic EC10-EC12	CE068	mg/kg	-	<1	-	-	<1	<1
TPH Aromatic EC12-EC16	CE068	mg/kg	-	<1	-	-	<1	<1
TPH Aromatic EC16-EC21	CE068	mg/kg	-	2	-	-	4	2
TPH Aromatic EC21-EC35	CE068	mg/kg	-	<1	-	-	4	<1
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	<0.1	-	-	<0.1	<0.1
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	<0.1	-	-	<0.1	<0.1
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	<0.1	-	-	<0.1	<0.1
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	10	-	-	5	6
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	51	-	-	30	31
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	97	-	-	65	56
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	214	-	-	243	214
Subcontracted analysis								
Asbestos	$	-	-	-	-	NAF	-	-

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SOILS

Lab number			39023-7	39023-8	39023-9	39023-10	39023-11	39023-12
Sample id			Area 2	Area 2	Area 2	Area 2	Area 2	Area 2
			116	117	117	118	118	118
Depth (m)			3.60	1.20	2.20	0.50	2.30	5.00
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	30	11	12	37	6.1	2.1
Cadmium (total)	CE054 M	mg/kg	0.6	0.7	0.9	0.8	0.5	0.4
Chromium (total)	CE054 M	mg/kg	18	15	26	12	23	23
Copper (total)	CE054 M	mg/kg	36	24	20	101	18	29
Lead (total)	CE054 M	mg/kg	34	30	28	35	14	19
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	30	23	17	31	21	36
Selenium (total)	CE054 M	mg/kg	1.3	0.9	0.9	1.7	0.9	0.5
Zinc (total)	CE054 M	mg/kg	70	43	58	39	62	105
pH	CE004 M	units	7.2	6.1	5.8	4.8	4.8	6.3
Sulphate (2:1 water soluble)	CE049 U	mg/l	-	-	-	-	-	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	-	-	-	-	-	-
Sulphate (total)	CE010 M	mg/kg	74	189	288	1605	296	173
Sulphur (total)	CE061	mg/kg	-	-	-	-	-	-
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	1.6	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	4.98	5.55	2.11	7.37	1.04	0.59
Toluene extractable matter	CE031 U	mg/kg	530	340	<50	1240	60	<50
PAH								
Naphthalene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthylene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthene	CE087	mg/kg	-	-	-	-	-	-
Fluorene	CE087	mg/kg	-	-	-	-	-	-
Phenanthrene	CE087	mg/kg	-	-	-	-	-	-
Anthracene	CE087	mg/kg	-	-	-	-	-	-
Fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Pyrene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	CE087	mg/kg	-	-	-	-	-	-
Chrysene	CE087	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	CE087	mg/kg	-	-	-	-	-	-
Indeno(123cd)pyrene	CE087	mg/kg	-	-	-	-	-	-
Dibenz(ah)anthracene	CE087	mg/kg	-	-	-	-	-	-
Benzo(ghi)perylene	CE087	mg/kg	-	-	-	-	-	-
PAH (total)	CE087	mg/kg	5.9	<5	<5	8.0	<5	<5

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SOILS

Lab number			39023-7	39023-8	39023-9	39023-10	39023-11	39023-12
Sample id			Area 2	Area 2	Area 2	Area 2	Area 2	Area 2
			116	117	117	118	118	118
Depth (m)			3.60	1.20	2.20	0.50	2.30	5.00
Test	**Method**	**Units**						
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	0.01	0.01	-	0.02	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	<0.01	<0.01	-	<0.01	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	<0.01	<0.01	-	<0.01	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	2	<1	-	1	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	1	<1	-	1	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	3	<1	-	7	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	1	<1	-	1	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	<0.1	<0.1	-	<0.1	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	<0.1	<0.1	-	<0.1	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	<0.1	<0.1	-	<0.1	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	11	3	-	29	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	58	25	-	104	-	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	107	43	-	235	-	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	175	200	-	712	-	-
Subcontracted analysis								
Asbestos	$	-	-	-	-	-	-	-

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SOILS

Lab number			39023-13	39023-14	39023-15	39023-16	39023-17	39023-18
Sample id			Area 2 119	Area 2 119	Area 2 119	Area 2 127	Area 2 134	Area 2 134
Depth (m)			0.50	1.50	5.50	1.80	0.40	2.00
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	72	113	7.8	116	59	6.9
Cadmium (total)	CE054 M	mg/kg	0.5	0.6	0.6	0.6	0.7	0.6
Chromium (total)	CE054 M	mg/kg	13	14	23	6.0	17	19
Copper (total)	CE054 M	mg/kg	23	36	11	24	47	20
Lead (total)	CE054 M	mg/kg	27	27	13	28	40	19
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	11	7.7	23	2.0	30	23
Selenium (total)	CE054 M	mg/kg	1.2	1.3	0.6	3.0	1.4	0.7
Zinc (total)	CE054 M	mg/kg	34	25	55	7.4	123	54
pH	CE004 M	units	6.5	4.3	4.0	3.0	6.6	8.1
Sulphate (2:1 water soluble)	CE049 U	mg/l	251	426	1586	973	1488	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	72	92	105	42	104	-
Sulphate (total)	CE010 M	mg/kg	9985	15221	11764	35488	25684	576
Sulphur (total)	CE061	mg/kg	5669	7350	4036	14440	8216	-
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	4.97	3.75	1.00	5.89	11.13	1.12
Toluene extractable matter	CE031 U	mg/kg	510	280	<50	260	520	580
PAH								
Naphthalene	CE087	mg/kg	-	-	-	-	-	0.2
Acenaphthylene	CE087	mg/kg	-	-	-	-	-	<0.1
Acenaphthene	CE087	mg/kg	-	-	-	-	-	0.8
Fluorene	CE087	mg/kg	-	-	-	-	-	0.8
Phenanthrene	CE087	mg/kg	-	-	-	-	-	7.3
Anthracene	CE087	mg/kg	-	-	-	-	-	2.4
Fluoranthene	CE087	mg/kg	-	-	-	-	-	12.0
Pyrene	CE087	mg/kg	-	-	-	-	-	10.7
Benzo(a)anthracene	CE087	mg/kg	-	-	-	-	-	6.3
Chrysene	CE087	mg/kg	-	-	-	-	-	4.8
Benzo(b)fluoranthene	CE087	mg/kg	-	-	-	-	-	9.3
Benzo(k)fluoranthene	CE087	mg/kg	-	-	-	-	-	9.0
Benzo(a)pyrene	CE087	mg/kg	-	-	-	-	-	6.1
Indeno(123cd)pyrene	CE087	mg/kg	-	-	-	-	-	2.4
Dibenz(ah)anthracene	CE087	mg/kg	-	-	-	-	-	1.0
Benzo(ghi)perylene	CE087	mg/kg	-	-	-	-	-	3.4
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	<5	77

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SOILS

Lab number			39023-13	39023-14	39023-15	39023-16	39023-17	39023-18
Sample id			Area 2 119	Area 2 119	Area 2 119	Area 2 127	Area 2 134	Area 2 134
Depth (m)			0.50	1.50	5.50	1.80	0.40	2.00
Test	**Method**	**Units**						
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	<0.01	-	-	-	<0.01	<0.01
TPH Aromatic EC7-EC8	CE068	mg/kg	<0.01	-	-	-	<0.01	<0.01
TPH Aromatic EC8-EC10	CE068	mg/kg	<0.01	-	-	-	<0.01	<0.01
TPH Aromatic EC10-EC12	CE068	mg/kg	1	-	-	-	1	<1
TPH Aromatic EC12-EC16	CE068	mg/kg	1	-	-	-	2	2
TPH Aromatic EC16-EC21	CE068	mg/kg	2	-	-	-	1	36
TPH Aromatic EC21-EC35	CE068	mg/kg	<1	-	-	-	<1	45
TPH Aliphatic EC5-EC6	CE068	mg/kg	<0.1	-	-	-	<0.1	<0.1
TPH Aliphatic EC6-EC8	CE068	mg/kg	<0.1	-	-	-	<0.1	<0.1
TPH Aliphatic EC8-EC10	CE068	mg/kg	<0.1	-	-	-	0.1	<0.1
TPH Aliphatic EC10-EC12	CE068	mg/kg	7	-	-	-	11	7
TPH Aliphatic EC12-EC16	CE068	mg/kg	21	-	-	-	41	20
TPH Aliphatic EC16-EC21	CE068	mg/kg	37	-	-	-	72	48
TPH Aliphatic EC21-EC35	CE068	mg/kg	324	-	-	-	240	414
Subcontracted analysis								
Asbestos	$	-	NAF	-	-	-	NAF	-

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SOILS

Lab number			39023-19	39023-20
Sample id			Area 2	Area 2
			135	135
Depth (m)			1.20	3.80
Test	**Method**	**Units**		
Arsenic (total)	CE054 M	mg/kg	38	6.1
Cadmium (total)	CE054 M	mg/kg	1.1	1.4
Chromium (total)	CE054 M	mg/kg	11	23
Copper (total)	CE054 M	mg/kg	106	5.7
Lead (total)	CE054 M	mg/kg	70	23
Mercury (total)	CE054	mg/kg	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	13	15
Selenium (total)	CE054 M	mg/kg	1.1	0.9
Zinc (total)	CE054 M	mg/kg	124	50
pH	CE004 M	units	6.6	5.3
Sulphate (2:1 water soluble)	CE049 U	mg/l	-	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	-	-
Sulphate (total)	CE010 M	mg/kg	1457	1399
Sulphur (total)	CE061	mg/kg	-	-
Sulphide	CE079	mg/kg	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5
Organic matter content	CE005 M	% w/w	2.12	1.89
Toluene extractable matter	CE031 U	mg/kg	840	60
PAH				
Naphthalene	CE087	mg/kg	-	-
Acenaphthylene	CE087	mg/kg	-	-
Acenaphthene	CE087	mg/kg	-	-
Fluorene	CE087	mg/kg	-	-
Phenanthrene	CE087	mg/kg	-	-
Anthracene	CE087	mg/kg	-	-
Fluoranthene	CE087	mg/kg	-	-
Pyrene	CE087	mg/kg	-	-
Benzo(a)anthracene	CE087	mg/kg	-	-
Chrysene	CE087	mg/kg	-	-
Benzo(b)fluoranthene	CE087	mg/kg	-	-
Benzo(k)fluoranthene	CE087	mg/kg	-	-
Benzo(a)pyrene	CE087	mg/kg	-	-
Indeno(123cd)pyrene	CE087	mg/kg	-	-
Dibenz(ah)anthracene	CE087	mg/kg	-	-
Benzo(ghi)perylene	CE087	mg/kg	-	-
PAH (total)	CE087	mg/kg	9.1	<5

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SOILS

Lab number			39023-19	39023-20
Sample id			Area 2 135	Area 2 135
Depth (m)			1.20	3.80
Test	**Method**	**Units**		
TPH				
TPH Aromatic EC5-EC7	CE068	mg/kg	0.24	-
TPH Aromatic EC7-EC8	CE068	mg/kg	0.08	-
TPH Aromatic EC8-EC10	CE068	mg/kg	0.04	-
TPH Aromatic EC10-EC12	CE068	mg/kg	2	-
TPH Aromatic EC12-EC16	CE068	mg/kg	1	-
TPH Aromatic EC16-EC21	CE068	mg/kg	7	-
TPH Aromatic EC21-EC35	CE068	mg/kg	1	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	0.3	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	0.3	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	0.3	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	17	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	61	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	107	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	402	-
Subcontracted analysis				
Asbestos	$	-	-	-

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LEACHATES

Lab number			39023-4L	39023-14L	39023-19L
Sample id			Area 2	Area 2	Area 2
			109	119	135
Depth (m)			2.80	1.50	1.20
Test	**Method**	**Units**			
Arsenic	CE055	mg/l	<0.001	0.001	<0.001
Boron	CE063	mg/l	<0.03	<0.03	<0.03
Cadmium	CE055 U	mg/l	<0.001	<0.001	0.003
Chromium	CE055 U	mg/l	<0.003	<0.003	<0.003
Copper	CE055 U	mg/l	0.012	0.006	0.007
Lead	CE055 U	mg/l	<0.009	<0.009	<0.009
Mercury	CE055	mg/l	<0.001	<0.001	<0.001
Nickel	CE055 U	mg/l	0.004	0.009	0.015
Selenium	CE055	mg/l	<0.001	<0.001	0.001
Zinc	CE055 U	mg/l	0.058	<0.020	0.077
pH	CE004	units	6.4	5.3	6.1
Sulphate	CE049 U	mg/l	<10	126	75
Sulphide	CE079	mg/l	<0.1	<0.1	<0.1
Cyanide (total)	CE077	mg/l	<0.02	<0.02	<0.02
Phenols (total)	CE073	mg/l	<0.0005	<0.0005	<0.0005
PAHs					
PAH (total)	CE087	mg/l	<0.0001	<0.0001	<0.0001
TPH					
TPH (C10-C40)	CE052	mg/l	<0.01	<0.01	<0.01

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	STATUS	LOD	UNITS
CE054	Arsenic (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Cadmium (total)	Aqua regia digest, ICP-OES	M	0.2	mg/kg
CE054	Chromium (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Copper (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Lead (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Mercury (total)	Aqua regia digest, ICP-OES		0.5	mg/kg
CE054	Nickel (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Selenium (total)	Aqua regia digest, ICP-OES	M	0.3	mg/kg
CE054	Zinc (total)	Aqua regia digest, ICP-OES	M	3	mg/kg
CE004	pH	BS 1377, pH Meter	M	0.1	units
CE049	Sulphate (2:1 water soluble)	Aqueous extraction, IC-COND	U	10	mg/l
CE056	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	U	0.03	mg/l
CE010	Sulphate (total)	Acid extraction, Gravimetry	M	100	mg/kg
CE061	Sulphur (total)	Acid extraction, ICP-OES		100	mg/kg
CE079	Sulphide	Extraction, Continuous Flow Colorimetry		10	mg/kg
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry		2	mg/kg
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry		0.5	mg/kg
CE005	Organic matter content	BS 1377, Colorimetry	M	0.01	% w/w
CE031	Toluene extractable matter	Solvent extraction, Gravimetry	U	50	mg/kg
CE087	PAH (EPA 16)	Solvent extraction, GC-MS		0.1	mg/kg
CE087	PAH (total)	Solvent extraction, GC-MS		5	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C5-C10)	Headspace GC-FID		0.01-0.1	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C10-C44)	Solvent extraction, GC-FID		1	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	U	-	-

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METHOD DETAILS

METHOD	LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE055	Arsenic	ICP-OES		0.001	mg/l
CE063	Boron	ICP-OES		0.03	mg/l
CE055	Cadmium	ICP-OES	U	0.001	mg/l
CE055	Chromium	ICP-OES	U	0.003	mg/l
CE055	Copper	ICP-OES	U	0.004	mg/l
CE055	Lead	ICP-OES	U	0.009	mg/l
CE055	Mercury	ICP-OES		0.001	mg/l
CE055	Nickel	ICP-OES	U	0.003	mg/l
CE055	Selenium	ICP-OES		0.001	mg/l
CE055	Zinc	ICP-OES	U	0.02	mg/l
CE004	pH	BS 1377, pH Meter		0.1	units
CE049	Sulphate	Ion Chromatography	U	10	mg/l
CE079	Sulphide	Continuous Flow Colorimetry		0.1	mg/l
CE077	Cyanide (total)	Continuous Flow Colorimetry		0.02	mg/l
CE073	Phenols (total)	HPLC		0.0005	mg/l
CE087	PAH (EPA 16)	Solvent extraction, GC-MS		0.0001	mg/l
CE087	PAH (total)	Solvent extraction, GC-MS		0.0001	mg/l
CE052	TPH (C10-C40)	Solvent extraction, GC-FID		0.01	mg/l

UKAS TESTING
2531

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

chemtech environmental

ANALYTICAL TEST REPORT

Contract no: SDA/39024(1)

Contract name: North Gawber Colliery Site - Area 3

Client reference: -

Clients name: Scott Doherty Associates

Clients address: Consett Business Park
Consett
Co Durham
DH8 6BP

Date received: 23 April 2009

Date started: 07 May 2009

Date of issue: 16 June 2009

This is a supplementary report to report number SDA/39024 issued 18 May 2009.

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd were not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are exclusive of stones.
This report shall not be reproduced except in full, withour prior written approval.
Samples will be disposed of 8 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
NAF Non asbestos fibres

Approved by: KCampbell

Karan Campbell, Director
John Campbell, Director

Unit 25a - 25b, Number One Industrial Estate, Medomsley Road, Consett, Co. Durham DH8 6TJ
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Vat Reg. No. 772 5703 18 Registered in England Number 4284013

Chemtech Environmental Limited

SAMPLE DESCRIPTIONS

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation.
They are not intended as full geological descriptions.
MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample.
Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab number	Sample id	Depth (m)	Description	Moisture (%)
39024-1	Area 3 136	0.80	Gravelly Sand	15.6
39024-2	Area 3 136	3.40	Gravelly Sand	27.4
39024-3	Area 3 136	4.00	Clay	17.6
39024-4	Area 3 137	0.50	Clay	17.0
39024-5	Area 3 137	3.00	Gravelly Sand	15.0
39024-6	Area 3 138	1.00	Mudstone (Clay)	6.0
39024-7	Area 3 138	3.00	Sandy Clay	24.3
39024-8	Area 3 140	0.50	Gravelly Sand	10.2
39024-9	Area 3 141	2.00	Gravelly Sand	14.3
39024-10	Area 3 141	4.30	Clay	19.0
39024-11	Area 3 142	1.00	Mudstone (Clay)	11.2
39024-12	Area 3 142	3.00	Sand & Shale	12.6
39024-13	Area 3 143	0.40	Clay	15.2
39024-14	Area 3 143	2.10	Ashy Clay	18.2
39024-15	Area 3 144	1.20	Clay	20.9
39024-16	Area 3 145	0.40	Gravelly Sand	8.5
39024-17	Area 3 145	2.80	Gravelly Sand	19.1

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SOILS

Lab number			39024-1	39024-2	39024-3	39024-4	39024-5	39024-6
Sample id			Area 3	Area 3	Area 3	Area 3	Area 3	Area 3
			136	136	136	137	137	138
Depth (m)			0.80	3.40	4.00	0.50	3.00	1.00
Test	**Method**	***Units***						
Arsenic (total)	CE054 M	mg/kg	108	17	7.6	180	35	11
Cadmium (total)	CE054 M	mg/kg	0.6	0.4	0.8	0.9	0.6	0.4
Chromium (total)	CE054 M	mg/kg	28	14	24	14	13	21
Copper (total)	CE054 M	mg/kg	42	40	24	26	59	29
Lead (total)	CE054 M	mg/kg	26	17	19	32	17	17
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	33	31	30	8.5	31	34
Selenium (total)	CE054 M	mg/kg	0.9	2.2	0.7	3.1	1.6	0.5
Zinc (total)	CE054 M	mg/kg	58	27	71	34	23	70
pH	CE004 M	units	3.9	3.7	6.0	4.2	5.6	8.0
Sulphate (2:1 water soluble)	CE049 U	mg/l	923	1326	-	287	1488	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	10	100	-	50	89	-
Sulphate (total)	CE010 M	mg/kg	16637	17559	3515	14052	22646	634
Sulphur (total)	CE061	mg/kg	27260	8362	-	8307	10860	-
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	0.93	3.18	1.09	3.20	2.35	4.14
Toluene extractable matter	CE031 U	mg/kg	80	140	<50	50	70	60
PAH								
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	<5	<5
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	-	-	-	-	-
Subcontracted analysis								
Asbestos	$	-	NAF	-	-	-	-	NAF

Chemtech Environmental Limited

SOILS

Lab number			39024-7	39024-8	39024-9	39024-10	39024-11	39024-12
Sample id			Area 3	Area 3	Area 3	Area 3	Area 3	Area 3
			138	140	141	141	142	142
Depth (m)			3.00	0.50	2.00	4.30	1.00	3.00
Test	***Method***	***Units***						
Arsenic (total)	CE054 M	mg/kg	6.4	101	52	9.9	150	57
Cadmium (total)	CE054 M	mg/kg	0.7	2.2	0.7	0.4	0.5	2.0
Chromium (total)	CE054 M	mg/kg	16	11	16	23	14	12
Copper (total)	CE054 M	mg/kg	5.0	<1	50	28	23	3.5
Lead (total)	CE054 M	mg/kg	19	31	30	16	25	16
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	30	17	27	24	13	14
Selenium (total)	CE054 M	mg/kg	0.9	<0.3	1.5	0.5	1.6	2.2
Zinc (total)	CE054 M	mg/kg	80	5.1	31	59	33	16
pH	CE004 M	units	6.9	4.7	3.5	5.4	3.2	4.2
Sulphate (2:1 water soluble)	CE049 U	mg/l	-	1639	422	-	413	1269
Magnesium (2:1 water soluble)	CE056 U	mg/l	-	20	28	-	38	44
Sulphate (total)	CE010 M	mg/kg	560	32698	14472	1589	8010	11607
Sulphur (total)	CE061	mg/kg	-	8666	9327	-	6969	5364
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	0.9	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	2.47	0.92	8.07	2.98	3.48	0.54
Toluene extractable matter	CE031 U	mg/kg	<50	140	<50	250	90	160
PAH								
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	<5	<5
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	-	-	-	-	-
Subcontracted analysis								
Asbestos	$	-	-	NAF	-	-	NAF	-

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SOILS

Lab number			39024-13	39024-14	39024-15	39024-16	39024-17
Sample id			Area 3	Area 3	Area 3	Area 3	Area 3
			143	143	144	145	145
Depth (m)			0.40	2.10	1.20	0.40	2.80
Test	**Method**	**Units**					
Arsenic (total)	CE054 M	mg/kg	134	42	14	28	49
Cadmium (total)	CE054 M	mg/kg	0.6	0.6	0.7	0.5	0.9
Chromium (total)	CE054 M	mg/kg	15	8.4	22	11	18
Copper (total)	CE054 M	mg/kg	32	58	19	28	102
Lead (total)	CE054 M	mg/kg	30	53	35	12	19
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	13	36	21	17	28
Selenium (total)	CE054 M	mg/kg	2.6	2.1	0.9	0.5	2.2
Zinc (total)	CE054 M	mg/kg	33	98	91	40	17
pH	CE004 M	units	3.7	6.5	4.8	6.2	4.0
Sulphate (2:1 water soluble)	CE049 U	mg/l	1148	1919	-	-	1739
Magnesium (2:1 water soluble)	CE056 U	mg/l	78	92	-	-	56
Sulphate (total)	CE010 M	mg/kg	17691	17427	1860	2675	48519
Sulphur (total)	CE061	mg/kg	16980	17570	-	-	26840
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	2.39	5.02	4.19	3.59	2.91
Toluene extractable matter	CE031 U	mg/kg	140	260	400	400	400
PAH							
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	<5
TPH							
TPH Aromatic EC5-EC7	CE068	mg/kg	-	0.03	<0.01	<0.01	<0.01
TPH Aromatic EC7-EC8	CE068	mg/kg	-	0.01	<0.01	<0.01	<0.01
TPH Aromatic EC8-EC10	CE068	mg/kg	-	<0.01	<0.01	<0.01	<0.01
TPH Aromatic EC10-EC12	CE068	mg/kg	-	2	<1	<1	<1
TPH Aromatic EC12-EC16	CE068	mg/kg	-	<1	<1	<1	<1
TPH Aromatic EC16-EC21	CE068	mg/kg	-	3	<1	<1	<1
TPH Aromatic EC21-EC35	CE068	mg/kg	-	<1	<1	<1	<1
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	0.1	<0.1	<0.1	<0.1
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	0.1	<0.1	<0.1	<0.1
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	0.1	<0.1	<0.1	<0.1
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	4	<1	<1	1
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	42	<1	<1	2
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	96	4	<1	6
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	173	116	3	14
Subcontracted analysis							
Asbestos	$	-	-	-	-	-	-

Chemtech Environmental Limited

LEACHATES

Lab number			39024-6L	39024-8L	39024-12L
Sample id			Area 3	Area 3	Area 3
			138	140	142
Depth (m)			1.00	0.50	3.00
Test	**Method**	**Units**			
Arsenic	CE055	mg/l	0.002	0.004	0.004
Boron	CE063	mg/l	0.03	<0.03	<0.03
Cadmium	CE055 U	mg/l	<0.001	<0.001	<0.001
Chromium	CE055 U	mg/l	<0.003	<0.003	<0.003
Copper	CE055 U	mg/l	0.006	0.007	0.015
Lead	CE055 U	mg/l	<0.009	<0.009	<0.009
Mercury	CE055	mg/l	<0.001	<0.001	<0.001
Nickel	CE055 U	mg/l	0.003	0.004	0.048
Selenium	CE055	mg/l	<0.001	<0.001	<0.001
Zinc	CE055 U	mg/l	<0.020	<0.020	0.068
pH	CE004	units	7.4	5.1	4.6
Sulphate	CE049 U	mg/l	74	686	611
Sulphide	CE079	mg/l	<0.1	<0.1	<0.1
Cyanide (total)	CE077	mg/l	<0.02	<0.02	<0.02
Phenols (total)	CE073	mg/l	<0.0005	<0.0005	<0.0005
PAHs					
PAH (total)	CE087	mg/l	<0.0001	<0.0001	<0.0001
TPH					
TPH (C10-C40)	CE052	mg/l	<0.01	<0.01	<0.01

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	STATUS	LOD	UNITS
CE054	Arsenic (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Cadmium (total)	Aqua regia digest, ICP-OES	M	0.2	mg/kg
CE054	Chromium (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Copper (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Lead (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Mercury (total)	Aqua regia digest, ICP-OES		0.5	mg/kg
CE054	Nickel (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Selenium (total)	Aqua regia digest, ICP-OES	M	0.3	mg/kg
CE054	Zinc (total)	Aqua regia digest, ICP-OES	M	3	mg/kg
CE004	pH	BS 1377, pH Meter	M	0.1	units
CE049	Sulphate (2:1 water soluble)	Aqueous extraction, IC-COND	U	10	mg/l
CE056	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	U	0.03	mg/l
CE010	Sulphate (total)	Acid extraction, Gravimetry	M	100	mg/kg
CE061	Sulphur (total)	Acid extraction, ICP-OES		100	mg/kg
CE079	Sulphide	Extraction, Continuous Flow Colorimetry		10	mg/kg
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry		2	mg/kg
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry		0.5	mg/kg
CE005	Organic matter content	BS 1377, Colorimetry	M	0.01	% w/w
CE031	Toluene extractable matter	Solvent extraction, Gravimetry	U	50	mg/kg
CE087	PAH (total)	Solvent extraction, GC-MS		5	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C5-C10)	Headspace GC-FID		0.01-0.1	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C10-C44)	Solvent extraction, GC-FID		1	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	U	-	-

Chemtech Environmental Limited

METHOD DETAILS

METHOD	LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE055	Arsenic	ICP-OES		0.001	mg/l
CE063	Boron	ICP-OES		0.03	mg/l
CE055	Cadmium	ICP-OES	U	0.001	mg/l
CE055	*Chromium*	*ICP-OES*	*U*	*0.003*	mg/l
CE055	Copper	ICP-OES	U	0.004	mg/l
CE055	Lead	ICP-OES	U	0.009	mg/l
CE055	Mercury	ICP-OES		0.001	mg/l
CE055	Nickel	ICP-OES	U	0.003	mg/l
CE055	Selenium	ICP-OES		0.001	mg/l
CE055	Zinc	ICP-OES	U	0.02	mg/l
CE004	pH	BS 1377, pH Meter		0.1	units
CE049	Sulphate	Ion Chromatography	U	10	mg/l
CE079	Sulphide	Continuous Flow Colorimetry		0.1	mg/l
CE077	Cyanide (total)	Continuous Flow Colorimetry		0.02	mg/l
CE073	Phenols (total)	HPLC		0.0005	mg/l
CE087	PAH (EPA 16)	Solvent extraction, GC-MS		0.0001	mg/l
CE087	PAH (total)	Solvent extraction, GC-MS		0.0001	mg/l
CE052	TPH (C10-C40)	Solvent extraction, GC-FID		0.01	mg/l

chemtech environmental

UKAS TESTING 2531

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

ANALYTICAL TEST REPORT

Contract no: SDA/39025(1)

Contract name: North Gawber Colliery Site - Area 4

Client reference: -

Clients name: Scott Doherty Associates

Clients address: Consett Business Park
Consett
Co Durham
DH8 6BP

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22 JUN 2009

Date received: 23 April 2009

Date started: 07 May 2009

Date of issue: 16 June 2009

This is a supplementary report to report number SDA/39025 issued 19 May 2009.

Notes:

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd were not responsible for sampling.
Methods, procedures and performance data are available on request.
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All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
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Key:

U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
NAF Non asbestos fibres

Approved by: KCampbell

Karan Campbell, Director
John Campbell, Director

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Chemtech Environmental Limited

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MCERTS (Soils):

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Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab number	Sample id	Depth (m)	Description	Moisture (%)
39025-1	Area 4 139	0.60	Gravelly Sand	16.2
39025-2	Area 4 139	1.30	Sandy Clay	20.5
39025-3	Area 4 146	0.50	Loamy Clay	15.4
39025-4	Area 4 147	0.40	Loamy Clay	15.4
39025-5	Area 4 148	0.50	Loamy Clay	17.1
39025-6	Area 4 148	1.60	Ashy Clay	16.9
39025-7	Area 4 148	2.80	Clay	13.8
39025-8	*Area 4 149*	*1.70*	*Clay*	*20.0*
39025-9	Area 4 150	0.50	Clay	16.2
39025-10	Area 4 150	1.50	Clay	15.6
39025-11	Area 4 151	0.80	Sandy Clay	20.3
39025-12	Area 4 152	0.50	Clay	16.5
39025-13	Area 4 152	3.20	Clay	14.8
39025-14	Area 4 153	0.50	Clay	10.9
39025-15	Area 4 153	2.50	Clay	14.3
39025-16	Area 4 154	0.50	Clay	13.5
39025-17	Area 4 154	4.00	Clay	14.4
39025-18	Area 4 155	1.80	Clay	24.1
39025-19	Area 4 156	2.20	Clay	11.0
39025-20	Area 4 156	2.60	Clay	10.8

Chemtech Environmental Limited

SOILS

Lab number			39025-1	39025-2	39025-3	39025-4	39025-5	39025-6
Sample id			Area 4 139	Area 4 139	Area 4 146	Area 4 147	Area 4 148	Area 4 148
Depth (m)			0.60	1.30	0.50	0.40	0.50	1.60
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	34	4.8	14	35	19	7.4
Cadmium (total)	CE054 M	mg/kg	0.9	0.8	0.5	0.7	0.5	0.3
Chromium (total)	CE054 M	mg/kg	20	23	17	19	20	10
Copper (total)	CE054 M	mg/kg	71	14	40	36	31	33
Lead (total)	CE054 M	mg/kg	35	19	32	36	28	21
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	30	11	28	28	32	22
Selenium (total)	CE054 M	mg/kg	1.1	1.1	1.1	1.4	0.9	0.8
Zinc (total)	CE054 M	mg/kg	45	67	84	77	65	43
pH	CE004 M	units	6.5	5.7	7.7	5.4	7.0	7.5
Sulphate (2:1 water soluble)	CE049 U	mg/l	-	-	-	1384	699	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	-	-	-	91	76	-
Sulphate (total)	CE010 M	mg/kg	3243	263	1128	9607	5869	1276
Sulphur (total)	CE061	mg/kg	-	-	-	4538	1998	-
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	0.7
Organic matter content	CE005 M	% w/w	2.94	2.11	4.03	3.59	2.61	4.11
Toluene extractable matter	CE031 U	mg/kg	600	260	340	300	100	60
PAH								
PAH (total)	CE087	mg/kg	6.5	<5	<5	<5	<5	<5
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	<0.01	-	0.02	0.02	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	<0.01	-	<0.01	<0.01	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	<0.01	-	<0.01	<0.01	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	<1	-	<1	<1	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	<1	-	<1	<1	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	4	-	2	3	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	3	-	<1	<1	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	<0.1	-	<0.1	<0.1	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	<0.1	-	<0.1	<0.1	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	<0.1	-	0.3	0.2	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	6	-	5	3	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	21	-	21	20	-	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	50	-	27	44	-	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	182	-	57	213	-	-
Subcontracted analysis								
Asbestos	$	-	-	-	NAF	-	NAF	-

Chemtech Environmental Limited

SOILS

Lab number			39025-7	39025-8	39025-9	39025-10	39025-11	39025-12
Sample id			Area 4	Area 4	Area 4	Area 4	Area 4	Area 4
			148	149	150	150	151	152
Depth (m)			2.80	1.70	0.50	1.50	0.80	0.50
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	16	16	9.3	6.0	15	41
Cadmium (total)	CE054 M	mg/kg	0.6	0.4	0.6	0.8	0.8	0.5
Chromium (total)	CE054 M	mg/kg	25	15	25	23	22	22
Copper (total)	CE054 M	mg/kg	30	35	32	11	30	38
Lead (total)	CE054 M	mg/kg	20	21	19	18	46	36
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	40	25	50	19	26	16
Selenium (total)	CE054 M	mg/kg	0.7	0.9	0.8	0.5	1.0	0.9
Zinc (total)	CE054 M	mg/kg	73	52	86	53	97	47
pH	CE004 M	units	6.9	6.8	5.4	5.5	5.6	3.4
Sulphate (2:1 water soluble)	CE049 U	mg/l	-	-	-	-	-	878
Magnesium (2:1 water soluble)	CE056 U	mg/l	-	-	-	-	-	76
Sulphate (total)	CE010 M	mg/kg	1103	3490	906	642	823	9105
Sulphur (total)	CE061	mg/kg	-	-	-	-	-	2996
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	2.55	5.86	7.09	1.82	4.12	4.00
Toluene extractable matter	CE031 U	mg/kg	<50	80	40	<50	160	40
PAH								
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	<5	<5
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	-	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	-	-	-	-	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	-	-	-	-	-
Subcontracted analysis								
Asbestos	$	-	-	-	NAF	-	-	NAF

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SOILS

Lab number			39025-13	39025-14	39025-15	39025-16	39025-17	39025-18
Sample id			Area 4	Area 4	Area 4	Area 4	Area 4	Area 4
			152	153	153	154	154	155
Depth (m)			3.20	0.50	2.50	0.50	4.00	1.80
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	11	160	88	28	31	16
Cadmium (total)	CE054 M	mg/kg	0.6	0.7	0.6	0.5	0.5	0.4
Chromium (total)	CE054 M	mg/kg	25	17	18	17	15	16
Copper (total)	CE054 M	mg/kg	18	39	42	34	33	40
Lead (total)	CE054 M	mg/kg	13	48	33	27	24	71
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	21	23	25	30	27	30
Selenium (total)	CE054 M	mg/kg	0.3	1.6	1.9	1.7	1.1	1.6
Zinc (total)	CE054 M	mg/kg	58	56	58	71	87	52
pH	CE004 M	units	7.1	8.9	5.2	4.7	6.6	7.1
Sulphate (2:1 water soluble)	CE049 U	mg/l	-	1912	1462	948	693	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	-	322	167	65	70	-
Sulphate (total)	CE010 M	mg/kg	387	36254	21255	8849	5878	1836
Sulphur (total)	CE061	mg/kg	-	19980	9553	4360	5584	-
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	1.12	2.15	3.57	3.89	4.24	2.30
Toluene extractable matter	CE031 U	mg/kg	160	140	140	220	270	180
PAH								
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	<5	<5
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	-	0.01	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	-	<0.01	-
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	-	<0.01	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	-	<1	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	-	<1	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	-	<1	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	-	<1	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	-	<0.1	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	-	<0.1	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	-	0.2	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	-	8	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	-	34	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	-	-	-	76	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	-	-	-	587	-
Subcontracted analysis								
Asbestos	$	-	-	-	-	-	-	-

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SOILS

Lab number			39025-19	39025-20
Sample id			Area 4	Area 4
			156	156
Depth (m)			2.20	2.60
Test	**Method**	**Units**		
Arsenic (total)	CE054 M	mg/kg	44	54
Cadmium (total)	CE054 M	mg/kg	0.5	0.6
Chromium (total)	CE054 M	mg/kg	17	20
Copper (total)	CE054 M	mg/kg	37	35
Lead (total)	CE054 M	mg/kg	22	26
Mercury (total)	CE054	mg/kg	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	33	31
Selenium (total)	CE054 M	mg/kg	1.4	1.6
Zinc (total)	CE054 M	mg/kg	66	54
pH	CE004 M	units	7.0	7.1
Sulphate (2:1 water soluble)	CE049 U	mg/l	1516	1972
Magnesium (2:1 water soluble)	CE056 U	mg/l	188	149
Sulphate (total)	CE010 M	mg/kg	13994	8512
Sulphur (total)	CE061	mg/kg	5590	9967
Sulphide	CE079	mg/kg	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5
Organic matter content	CE005 M	% w/w	6.67	1.79
Toluene extractable matter	CE031 U	mg/kg	50	110
PAH				
PAH (total)	CE087	mg/kg	<5	<5
TPH				
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-
TPH Aliphatic EC8-EC10	*CE068*	*mg/kg*	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	-
Subcontracted analysis				
Asbestos	$	-	NAF	-

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LEACHATES

Lab number			39025-1L
Sample id			Area 4 139
Depth (m)			0.60
Test	**Method**	**Units**	
Arsenic	CE055	mg/l	0.004
Boron	CE063	mg/l	<0.03
Cadmium	CE055 U	mg/l	<0.001
Chromium	CE055 U	mg/l	<0.003
Copper	CE055 U	mg/l	0.012
Lead	CE055 U	mg/l	<0.009
Mercury	CE055	mg/l	<0.001
Nickel	CE055 U	mg/l	<0.003
Selenium	CE055	mg/l	<0.001
Zinc	CE055 U	mg/l	<0.020
pH	CE004	units	6.9
Sulphate	CE049 U	mg/l	52
Sulphide	CE079	mg/l	<0.1
Cyanide (total)	CE077	mg/l	<0.02
Phenols (total)	CE073	mg/l	<0.0005
PAHs			
PAH (total)	CE087	mg/l	<0.0001
TPH			
TPH (C10-C40)	CE052	mg/l	<0.01

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	STATUS	LOD	UNITS
CE054	Arsenic (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Cadmium (total)	Aqua regia digest, ICP-OES	M	0.2	mg/kg
CE054	Chromium (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Copper (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Lead (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Mercury (total)	Aqua regia digest, ICP-OES		0.5	mg/kg
CE054	Nickel (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Selenium (total)	Aqua regia digest, ICP-OES	M	0.3	mg/kg
CE054	Zinc (total)	Aqua regia digest, ICP-OES	M	3	mg/kg
CE004	pH	BS 1377, pH Meter	M	0.1	units
CE049	Sulphate (2:1 water soluble)	Aqueous extraction, IC-COND	U	10	mg/l
CE056	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	U	0.03	mg/l
CE010	Sulphate (total)	Acid extraction, Gravimetry	M	100	mg/kg
CE061	Sulphur (total)	Acid extraction, ICP-OES		100	mg/kg
CE079	Sulphide	Extraction, Continuous Flow Colorimetry		10	mg/kg
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry		2	mg/kg
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry		0.5	mg/kg
CE005	Organic matter content	BS 1377, Colorimetry	M	0.01	% w/w
CE031	Toluene extractable matter	Solvent extraction, Gravimetry	U	50	mg/kg
CE087	PAH (total)	Solvent extraction, GC-MS		5	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C5-C10)	Headspace GC-FID		0.01-0.1	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C10-C44)	Solvent extraction, GC-FID		1	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	U	-	-

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METHOD DETAILS

METHOD	LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE055	Arsenic	ICP-OES		0.001	mg/l
CE063	Boron	ICP-OES		0.03	mg/l
CE055	Cadmium	ICP-OES	U	0.001	mg/l
CE055	Chromium	ICP-OES	U	0.003	mg/l
CE055	Copper	ICP-OES	U	0.004	mg/l
CE055	Lead	ICP-OES	U	0.009	mg/l
CE055	Mercury	ICP-OES		0.001	mg/l
CE055	Nickel	ICP-OES	U	0.003	mg/l
CE055	Selenium	ICP-OES		0.001	mg/l
CE055	Zinc	ICP-OES	U	0.02	mg/l
CE004	pH	BS 1377, pH Meter		0.1	units
CE049	Sulphate	Ion Chromatography	U	10	mg/l
CE079	Sulphide	Continuous Flow Colorimetry		0.1	mg/l
CE077	Cyanide (total)	Continuous Flow Colorimetry		0.02	mg/l
CE073	Phenols (total)	HPLC		0.0005	mg/l
CE087	PAH (EPA 16)	Solvent extraction, GC-MS		0.0001	mg/l
CE087	PAH (total)	Solvent extraction, GC-MS		0.0001	mg/l
CE052	TPH (C10-C40)	Solvent extraction, GC-FID		0.01	mg/l

chemtech environmental

UKAS TESTING 2531

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

ANALYTICAL TEST REPORT

Contract no: SDA/39026(1)

Contract name: North Gawber Colliery Site - Area 5

Client reference: -

RECEIVED 22 JUN 2009

Clients name: Scott Doherty Associates

Clients address: Consett Business Park
Consett
Co Durham
DH8 6BP

Date received: 23 April 2009

Date started: 07 May 2009

Date of issue: 16 June 2009

This is a supplementary report to report number SDA/39026 issued 18 May 2009.

Notes:

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd were not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are exclusive of stones.
This report shall not be reproduced except in full, withour prior written approval.
Samples will be disposed of 8 weeks from initial receipt unless otherwise instructed.

Key:

U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
NAF Non asbestos fibres

Approved by:

K Campbell

Karan Campbell — Director
John Campbell — Director

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Chemtech Environmental Limited

SAMPLE DESCRIPTIONS

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation.
They are not intended as full geological descriptions.
MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample.
Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab number	Sample id	Depth (m)	Description	Moisture (%)
39026-1	Area 5 102	0.60	Sandy Clay	17.8
39026-2	Area 5 102	3.00	Mudstone (Clay)	7.0
39026-3	Area 5 103	0.20	Gravelly Sand	13.0
39026-4	Area 5 103	1.50	Clay	15.2
39026-5	Area 5 104	1.80	Sandy Clay	11.1
39026-6	Area 5 105	0.40	Gravelly Sand	13.3
39026-7	Area 5 105	1.10	Sandy Clay	10.4
39026-8	Area 5 110	1.40	Mudstone (Clay)	9.6
39026-9	Area 5 110	4.80	Clay	14.8
39026-10	Area 5 111	2.00	Gravelly Sand	9.9
39026-11	Area 5 111	4.70	Clay	14.6
39026-12	Area 5 112	0.60	Gravelly Sand	9.8
39026-13	Area 5 112	3.90	Ashy Clay	14.5
39026-14	Area 5 113	0.60	Gravelly Sand	14.5
39026-15	Area 5 113	3.30	Clay	12.7
39026-16	Area 5 114	1.80	Gravelly Sand	17.8
39026-17	Area 5 120	0.60	Ashy Clay	11.5
39026-18	Area 5 120	6.00	Gravelly Sand	15.2
39026-19	Area 5 121	0.50	Ashy Clay	8.4
39026-20	Area 5 121	4.50	Mudstone (Clay)	17.5
39026-21	Area 5 122	1.40	Clay	13.7
39026-22	Area 5 122	4.10	Clay	12.7
39026-23	Area 5 123	0.60	Gravelly Sand	16.3
39026-24	Area 5 123	2.60	Ashy Clay	11.7
39026-25	Area 5 124	1.70	Gravelly Clay	19.7
39026-26	Area 5 128	0.50	Gravelly Sand	9.7
39026-27	Area 5 128	1.20	Gravelly Sand	7.9
39026-28	Area 5 128	3.80	Gravelly Sand	8.2
39026-29	Area 5 129	1.00	Gravelly Clay	10.8
39026-30	Area 5 129	5.20	Clay	19.6
39026-31	Area 5 130	1.70	Gravelly Sand	18.7
39026-32	Area 5 130	5.50	Gravelly Sand	16.5

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SAMPLE DESCRIPTIONS

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Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab number	Sample id	Depth (m)	Description	Moisture (%)
39026-33	Area 5 131	1.60	Mudstone (Clay)	13.2
39026-34	Area 5 131	3.60	Gravelly Sand	15.0
39026-35	Area 5 132	0.60	Clay	14.1
39026-36	Area 5 133	1.50	Mudstone (Clay)	6.7
39026-37	Area 5 133	3.00	Clay	16.6

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SOILS

Lab number			39026-1	39026-2	39026-3	39026-4	39026-5	39026-6
Sample id			Area 5 102	Area 5 102	Area 5 103	Area 5 103	Area 5 104	Area 5 105
Depth (m)			0.60	3.00	0.20	1.50	1.80	0.40
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	80	3.8	28	5.8	9.7	32
Cadmium (total)	CE054 M	mg/kg	0.8	0.6	1.1	0.6	0.8	1.2
Chromium (total)	CE054 M	mg/kg	29	20	17	14	140	21
Copper (total)	CE054 M	mg/kg	34	38	74	12	24	81
Lead (total)	CE054 M	mg/kg	51	20	36	21	29	37
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	33	45	30	16	39	34
Selenium (total)	CE054 M	mg/kg	1.6	0.6	1.3	0.7	1.4	1.4
Zinc (total)	CE054 M	mg/kg	48	94	71	61	113	85
pH	CE004 M	units	5.4	8.7	8.2	8.4	8.4	7.9
Sulphate (2:1 water soluble)	CE049 U	mg/l	116	-	-	-	-	73
Magnesium (2:1 water soluble)	CE056 U	mg/l	11	-	-	-	-	18
Sulphate (total)	CE010 M	mg/kg	23255	1408	1852	239	1663	5293
Sulphur (total)	CE061	mg/kg	10460	-	-	-	-	2722
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	1.07	1.76	7.56	1.75	3.56	9.52
Toluene extractable matter	CE031 U	mg/kg	120	50	820	<50	2810	830
PAH								
Naphthalene	CE087	mg/kg	-	-	-	-	1.7	1.9
Acenaphthylene	CE087	mg/kg	-	-	-	-	0.5	<0.1
Acenaphthene	CE087	mg/kg	-	-	-	-	5.9	0.5
Fluorene	CE087	mg/kg	-	-	-	-	6.3	0.6
Phenanthrene	CE087	mg/kg	-	-	-	-	51.6	5.2
Anthracene	CE087	mg/kg	-	-	-	-	15.1	1.2
Fluoranthene	CE087	mg/kg	-	-	-	-	51.6	6.5
Pyrene	CE087	mg/kg	-	-	-	-	42.4	5.3
Benzo(a)anthracene	CE087	mg/kg	-	-	-	-	24.1	2.5
Chrysene	CE087	mg/kg	-	-	-	-	19.5	2.7
Benzo(b)fluoranthene	CE087	mg/kg	-	-	-	-	27.7	2.9
Benzo(k)fluoranthene	CE087	mg/kg	-	-	-	-	15.2	2.2
Benzo(a)pyrene	CE087	mg/kg	-	-	-	-	28.0	3.1
Indeno(123cd)pyrene	CE087	mg/kg	-	-	-	-	11.4	0.9
Dibenz(ah)anthracene	CE087	mg/kg	-	-	-	-	3.9	0.8
Benzo(ghi)perylene	CE087	mg/kg	-	-	-	-	12.9	1.9
PAH (total)	CE087	mg/kg	<5	<5	11	<5	318	38

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SOILS

Lab number			39026-1	39026-2	39026-3	39026-4	39026-5	39026-6
Sample id			Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
			102	102	103	103	104	105
Depth (m)			0.60	3.00	0.20	1.50	1.80	0.40
Test	**Method**	**Units**						
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	0.02	-	<0.01	0.02
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	<0.01	-	<0.01	<0.01
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	<0.01	-	<0.01	<0.01
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	2	-	2	2
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	<1	-	7	2
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	7	-	167	20
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	2	-	151	17
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	<0.1	-	<0.1	<0.1
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	<0.1	-	<0.1	<0.1
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	<0.1	-	<0.1	<0.1
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	12	-	5	19
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	62	-	21	66
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	-	153	-	127	138
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	-	804	-	1945	879
Subcontracted analysis								
Asbestos	$	-	NAF	-	-	-	-	-

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SOILS

Lab number			39026-7	39026-8	39026-9	39026-10	39026-11	39026-12
Sample id			Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
			105	110	110	111	111	112
Depth (m)			1.10	1.40	4.80	2.00	4.70	0.60
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	3.6	13	6.2	6.1	19	6.0
Cadmium (total)	CE054 M	mg/kg	0.6	0.6	0.6	0.6	0.8	0.6
Chromium (total)	CE054 M	mg/kg	15	21	15	48	18	52
Copper (total)	CE054 M	mg/kg	3.9	42	19	23	43	25
Lead (total)	CE054 M	mg/kg	16	33	19	47	33	46
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	15	43	22	15	32	13
Selenium (total)	CE054 M	mg/kg	0.6	0.6	0.7	1.1	0.9	0.9
Zinc (total)	CE054 M	mg/kg	68	92	59	53	91	92
pH	CE004 M	units	4.8	8.3	8.1	8.4	8.1	8.2
Sulphate (2:1 water soluble)	CE049 U	mg/l	-	-	-	-	-	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	-	-	-	-	-	-
Sulphate (total)	CE010 M	mg/kg	1515	774	230	1169	1704	2107
Sulphur (total)	CE061	mg/kg	-	-	-	-	-	-
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	2.63	0.77	3.51	2.74	7.67	3.53
Toluene extractable matter	CE031 U	mg/kg	190	230	240	4110	430	3830
PAH								
Naphthalene	CE087	mg/kg	-	-	-	1.6	-	0.9
Acenaphthylene	CE087	mg/kg	-	-	-	0.4	-	0.3
Acenaphthene	CE087	mg/kg	-	-	-	8.6	-	2.5
Fluorene	CE087	mg/kg	-	-	-	5.4	-	2.5
Phenanthrene	CE087	mg/kg	-	-	-	27.0	-	25.3
Anthracene	CE087	mg/kg	-	-	-	10.0	-	8.0
Fluoranthene	CE087	mg/kg	-	-	-	30.6	-	35.6
Pyrene	CE087	mg/kg	-	-	-	23.9	-	30.9
Benzo(a)anthracene	CE087	mg/kg	-	-	-	12.9	-	17.1
Chrysene	CE087	mg/kg	-	-	-	11.6	-	14.9
Benzo(b)fluoranthene	CE087	mg/kg	-	-	-	14.7	-	22.1
Benzo(k)fluoranthene	CE087	mg/kg	-	-	-	11.1	-	10.7
Benzo(a)pyrene	CE087	mg/kg	-	-	-	15.0	-	27.0
Indeno(123cd)pyrene	CE087	mg/kg	-	-	-	6.8	-	11.5
Dibenz(ah)anthracene	CE087	mg/kg	-	-	-	2.9	-	4.2
Benzo(ghi)perylene	CE087	mg/kg	-	-	-	8.1	-	12.6
PAH (total)	CE087	mg/kg	<5	<5	<5	191	<5	226

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SOILS

Lab number			39026-7	39026-8	39026-9	39026-10	39026-11	39026-12
Sample id			Area 5 105	Area 5 110	Area 5 110	Area 5 111	Area 5 111	Area 5 112
Depth (m)			1.10	1.40	4.80	2.00	4.70	0.60
Test	**Method**	**Units**						
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	<0.01	0.01	<0.01
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	<0.01	<0.01	<0.01
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	<0.01	<0.01	<0.01
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	2	<1	1
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	10	<1	3
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	102	<1	105
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	86	<1	124
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	<0.1	<0.1	<0.1
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	<0.1	<0.1	<0.1
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	<0.1	<0.1	<0.1
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	7	12	6
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	48	39	29
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	-	-	218	69	102
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	-	-	1876	413	1846
Subcontracted analysis								
Asbestos	$	-	-	-	-	-	-	-

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SOILS

Lab number			39026-13	39026-14	39026-15	39026-16	39026-17	39026-18
Sample id			Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
			112	113	113	114	120	120
Depth (m)			3.90	0.60	3.30	1.80	0.60	6.00
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	22	30	4.8	47	7.0	85
Cadmium (total)	CE054 M	mg/kg	1.7	0.5	0.5	0.5	0.3	0.6
Chromium (total)	CE054 M	mg/kg	29	14	12	4.6	11	15
Copper (total)	CE054 M	mg/kg	59	67	8.5	37	42	40
Lead (total)	CE054 M	mg/kg	43	22	13	20	29	25
Mercury (total)	CE054	mg/kg	<0.5	0.5	<0.5	0.7	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	37	15	18	6.9	25	9.5
Selenium (total)	CE054 M	mg/kg	1.1	1.6	0.5	2.1	0.9	1.2
Zinc (total)	CE054 M	mg/kg	129	77	73	9.1	64	24
pH	CE004 M	units	7.3	3.2	3.8	4.6	7.2	4.1
Sulphate (2:1 water soluble)	CE049 U	mg/l	-	1116	-	53	-	1172
Magnesium (2:1 water soluble)	CE056 U	mg/l	-	51	-	3	-	85
Sulphate (total)	CE010 M	mg/kg	2791	20242	4618	10842	1120	15888
Sulphur (total)	CE061	mg/kg	-	9185	-	5292	-	13770
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	1.0	1.2	<0.5	1.1	1.0	<0.5
Organic matter content	CE005 M	% w/w	6.95	10.66	5.83	15.73	5.5	3.98
Toluene extractable matter	CE031 U	mg/kg	2990	130	120	<50	80	140
PAH								
Naphthalene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthylene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthene	CE087	mg/kg	-	-	-	-	-	-
Fluorene	CE087	mg/kg	-	-	-	-	-	-
Phenanthrene	CE087	mg/kg	-	-	-	-	-	-
Anthracene	CE087	mg/kg	-	-	-	-	-	-
Fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Pyrene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	CE087	mg/kg	-	-	-	-	-	-
Chrysene	CE087	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	CE087	mg/kg	-	-	-	-	-	-
Indeno(123cd)pyrene	CE087	mg/kg	-	-	-	-	-	-
Dibenz(ah)anthracene	CE087	mg/kg	-	-	-	-	-	-
Benzo(ghi)perylene	CE087	mg/kg	-	-	-	-	-	-
PAH (total)	CE087	mg/kg	13	<5	<5	<5	<5	<5

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SOILS

Lab number			39026-13	39026-14	39026-15	39026-16	39026-17	39026-18
Sample id			Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
			112	113	113	114	120	120
Depth (m)			3.90	0.60	3.30	1.80	0.60	6.00
Test	**Method**	**Units**						
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	<0.01	-	-	-	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	<0.01	-	-	-	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	<0.01	-	-	-	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	2	-	-	-	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	1	-	-	-	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	8	-	-	-	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	3	-	-	-	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	<0.1	-	-	-	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	<0.1	-	-	-	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	<0.1	-	-	-	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	27	-	-	-	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	134	-	-	-	-	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	408	-	-	-	-	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	2177	-	-	-	-	-
Subcontracted analysis								
Asbestos	$	-	-	-	-	-	-	-

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SOILS

Lab number			39026-19	39026-20	39026-21	39026-22	39026-23	39026-24
Sample id			Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
			121	121	122	122	123	123
Depth (m)			0.50	4.50	1.40	4.10	0.60	2.60
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	19	91	9.8	17	34	13
Cadmium (total)	CE054 M	mg/kg	0.5	3.0	0.5	0.5	0.9	0.6
Chromium (total)	CE054 M	mg/kg	11	11	17	14	19	19
Copper (total)	CE054 M	mg/kg	36	22	36	33	69	39
Lead (total)	CE054 M	mg/kg	26	21	26	32	54	33
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	30	4.6	29	27	29	38
Selenium (total)	CE054 M	mg/kg	1.5	1.2	1.5	1.5	1.6	0.9
Zinc (total)	CE054 M	mg/kg	49	29	60	60	127	107
pH	CE004 M	units	6.9	6.6	7.7	8.3	7.8	8.0
Sulphate (2:1 water soluble)	CE049 U	mg/l	-	251	-	-	44	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	-	23	-	-	10	-
Sulphate (total)	CE010 M	mg/kg	2766	17147	848	1120	5499	140
Sulphur (total)	CE061	mg/kg	-	7733	-	-	3188	-
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	4.13	3.53	4.13	6.12	7.63	1.8
Toluene extractable matter	CE031 U	mg/kg	200	130	160	120	650	<50
PAH								
Naphthalene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthylene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthene	CE087	mg/kg	-	-	-	-	-	-
Fluorene	CE087	mg/kg	-	-	-	-	-	-
Phenanthrene	CE087	mg/kg	-	-	-	-	-	-
Anthracene	CE087	mg/kg	-	-	-	-	-	-
Fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Pyrene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	CE087	mg/kg	-	-	-	-	-	-
Chrysene	CE087	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	CE087	mg/kg	-	-	-	-	-	-
Indeno(123cd)pyrene	CE087	mg/kg	-	-	-	-	-	-
Dibenz(ah)anthracene	CE087	mg/kg	-	-	-	-	-	-
Benzo(ghi)perylene	CE087	mg/kg	-	-	-	-	-	-
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	11	<5

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SOILS

Lab number			39026-19	39026-20	39026-21	39026-22	39026-23	39026-24
Sample id			Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
			121	121	122	122	123	123
Depth (m)			0.50	4.50	1.40	4.10	0.60	2.60
Test	**Method**	**Units**						
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	-	0.02	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	-	0.01	-
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	-	0.12	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	-	1	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	-	1	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	-	5	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	-	6	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	-	<0.1	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	-	<0.1	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	-	3.7	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	-	12	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	-	42	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	-	-	-	90	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	-	-	-	433	-
Subcontracted analysis								
Asbestos	$	-	NAF	-	-	-	-	-

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SOILS

Lab number			39026-25	39026-26	39026-27	39026-28	39026-29	39026-30
Sample id			Area 5 124	Area 5 128	Area 5 128	Area 5 128	Area 5 129	Area 5 129
Depth (m)			1.70	0.50	1.20	3.80	1.00	5.20
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	36	256	67	91	37	148
Cadmium (total)	CE054 M	mg/kg	1.1	0.8	0.5	0.9	0.6	0.8
Chromium (total)	CE054 M	mg/kg	25	18	10	17	12	14
Copper (total)	CE054 M	mg/kg	127	30	13	202	38	16
Lead (total)	CE054 M	mg/kg	104	34	13	28	54	32
Mercury (total)	CE054	mg/kg	<0.5	0.6	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	45	9.0	11	17	23	2.7
Selenium (total)	CE054 M	mg/kg	1.8	5.1	1.0	1.1	1.4	1.8
Zinc (total)	CE054 M	mg/kg	180	17	7.5	30	71	51
pH	CE004 M	units	7.2	3.6	4.3	5.1	3.7	4.1
Sulphate (2:1 water soluble)	CE049 U	mg/l	-	-	-	1697	1741	217
Magnesium (2:1 water soluble)	CE056 U	mg/l	-	-	-	63	105	13
Sulphate (total)	CE010 M	mg/kg	<100	<100	<100	16225	13262	18950
Sulphur (total)	CE061	mg/kg	-	-	-	7835	7079	13740
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	1.8	<0.5	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	6.2	3.22	0.92	2.47	5.44	3.69
Toluene extractable matter	CE031 U	mg/kg	690	400	<50	180	220	190
PAH								
Naphthalene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthylene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthene	CE087	mg/kg	-	-	-	-	-	-
Fluorene	CE087	mg/kg	-	-	-	-	-	-
Phenanthrene	CE087	mg/kg	-	-	-	-	-	-
Anthracene	CE087	mg/kg	-	-	-	-	-	-
Fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Pyrene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	CE087	mg/kg	-	-	-	-	-	-
Chrysene	CE087	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	CE087	mg/kg	-	-	-	-	-	-
Indeno(123cd)pyrene	CE087	mg/kg	-	-	-	-	-	-
Dibenz(ah)anthracene	CE087	mg/kg	-	-	-	-	-	-
Benzo(ghi)perylene	CE087	mg/kg	-	-	-	-	-	-
PAH (total)	CE087	mg/kg	8.5	7.7	<5	<5	<5	<5

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SOILS

Lab number			39026-25	39026-26	39026-27	39026-28	39026-29	39026-30
Sample id			Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
			124	128	128	128	129	129
Depth (m)			1.70	0.50	1.20	3.80	1.00	5.20
Test	**Method**	**Units**						
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	<0.01	<0.01	-	-	-	-
TPH Aromatic EC7-EC8	CE068	mg/kg	<0.01	<0.01	-	-	-	-
TPH Aromatic EC8-EC10	CE068	mg/kg	<0.01	<0.01	-	-	-	-
TPH Aromatic EC10-EC12	CE068	mg/kg	<1	<1	-	-	-	-
TPH Aromatic EC12-EC16	CE068	mg/kg	<1	<1	-	-	-	-
TPH Aromatic EC16-EC21	CE068	mg/kg	3	4	-	-	-	-
TPH Aromatic EC21-EC35	CE068	mg/kg	6	4	-	-	-	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	<0.1	<0.1	-	-	-	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	<0.1	<0.1	-	-	-	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	0.4	<0.1	-	-	-	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	6	<1	-	-	-	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	19	7	-	-	-	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	44	56	-	-	-	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	305	478	-	-	-	-
Subcontracted analysis								
Asbestos	$	-	-	-	-	-	NAF	-

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SOILS

Lab number			39026-31	39026-32	39026-33	39026-34	39026-35	39026-36
Sample id			Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
			130	130	131	131	132	133
Depth (m)			1.70	5.50	1.60	3.60	0.60	1.50
Test	**Method**	**Units**						
Arsenic (total)	CE054 M	mg/kg	34	29	55	187	60	9.2
Cadmium (total)	CE054 M	mg/kg	0.7	0.7	0.5	1.5	0.6	0.2
Chromium (total)	CE054 M	mg/kg	14	15	17	24	16	27
Copper (total)	CE054 M	mg/kg	81	81	27	16	41	20
Lead (total)	CE054 M	mg/kg	13	7.9	22	26	35	9.6
Mercury (total)	CE054	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE054 M	mg/kg	40	40	16	30	18	35
Selenium (total)	CE054 M	mg/kg	2.3	2.1	0.9	1.9	1.5	0.8
Zinc (total)	CE054 M	mg/kg	20	26	47	62	98	43
pH	CE004 M	units	5.0	4.6	2.7	3.8	3.3	6.3
Sulphate (2:1 water soluble)	CE049 U	mg/l	1089	1652	1463	1794	1573	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	22	34	136	140	141	-
Sulphate (total)	CE010 M	mg/kg	15229	24424	21543	28030	18777	2593
Sulphur (total)	CE061	mg/kg	7153	15140	16140	22190	8069	-
Sulphide	CE079	mg/kg	<10	<10	<10	<10	<10	<10
Cyanide (total)	CE077	mg/kg	<2	<2	<2	<2	<2	<2
Phenols (total)	CE078	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Organic matter content	CE005 M	% w/w	11.59	1.91	2.65	0.86	5.18	1.04
Toluene extractable matter	CE031 U	mg/kg	50	80	140	100	80	250
PAH								
Naphthalene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthylene	CE087	mg/kg	-	-	-	-	-	-
Acenaphthene	CE087	mg/kg	-	-	-	-	-	-
Fluorene	CE087	mg/kg	-	-	-	-	-	-
Phenanthrene	CE087	mg/kg	-	-	-	-	-	-
Anthracene	CE087	mg/kg	-	-	-	-	-	-
Fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Pyrene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	CE087	mg/kg	-	-	-	-	-	-
Chrysene	CE087	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	CE087	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	CE087	mg/kg	-	-	-	-	-	-
Indeno(123cd)pyrene	CE087	mg/kg	-	-	-	-	-	-
Dibenz(ah)anthracene	CE087	mg/kg	-	-	-	-	-	-
Benzo(ghi)perylene	CE087	mg/kg	-	-	-	-	-	-
PAH (total)	CE087	mg/kg	<5	<5	<5	<5	<5	<5

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SOILS

Lab number			39026-31	39026-32	39026-33	39026-34	39026-35	39026-36
Sample id			Area 5	Area 5	Area 5	Area 5	Area 5	Area 5
			130	130	131	131	132	133
Depth (m)			1.70	5.50	1.60	3.60	0.60	1.50
Test	**Method**	**Units**						
TPH								
TPH Aromatic EC5-EC7	CE068	mg/kg	-	-	-	-	-	<0.01
TPH Aromatic EC7-EC8	CE068	mg/kg	-	-	-	-	-	<0.01
TPH Aromatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	<0.01
TPH Aromatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	<1
TPH Aromatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	<1
TPH Aromatic EC16-EC21	CE068	mg/kg	-	-	-	-	-	<1
TPH Aromatic EC21-EC35	CE068	mg/kg	-	-	-	-	-	<1
TPH Aliphatic EC5-EC6	CE068	mg/kg	-	-	-	-	-	<0.1
TPH Aliphatic EC6-EC8	CE068	mg/kg	-	-	-	-	-	<0.1
TPH Aliphatic EC8-EC10	CE068	mg/kg	-	-	-	-	-	<0.1
TPH Aliphatic EC10-EC12	CE068	mg/kg	-	-	-	-	-	<1
TPH Aliphatic EC12-EC16	CE068	mg/kg	-	-	-	-	-	<1
TPH Aliphatic EC16-EC21	CE068	mg/kg	-	-	-	-	-	<1
TPH Aliphatic EC21-EC35	CE068	mg/kg	-	-	-	-	-	4
Subcontracted analysis								
Asbestos	$	-	-	-	-	-	NAF	-

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SOILS

Lab number			39026-37
Sample id			Area 5 133
Depth (m)			3.00
Test	**Method**	**Units**	
Arsenic (total)	CE054 M	mg/kg	6.2
Cadmium (total)	CE054 M	mg/kg	1.1
Chromium (total)	CE054 M	mg/kg	19
Copper (total)	CE054 M	mg/kg	<1
Lead (total)	CE054 M	mg/kg	20
Mercury (total)	CE054	mg/kg	<0.5
Nickel (total)	CE054 M	mg/kg	7.1
Selenium (total)	CE054 M	mg/kg	1.1
Zinc (total)	CE054 M	mg/kg	51
pH	CE004 M	units	6.6
Sulphate (2:1 water soluble)	CE049 U	mg/l	-
Magnesium (2:1 water soluble)	CE056 U	mg/l	-
Sulphate (total)	CE010 M	mg/kg	601
Sulphur (total)	CE061	mg/kg	-
Sulphide	CE079	mg/kg	<10
Cyanide (total)	CE077	mg/kg	<2
Phenols (total)	CE078	mg/kg	<0.5
Organic matter content	CE005 M	% w/w	1.39
Toluene extractable matter	CE031 U	mg/kg	140
PAH			
Naphthalene	CE087	mg/kg	-
Acenaphthylene	CE087	mg/kg	-
Acenaphthene	CE087	mg/kg	-
Fluorene	CE087	mg/kg	-
Phenanthrene	CE087	mg/kg	-
Anthracene	CE087	mg/kg	-
Fluoranthene	CE087	mg/kg	-
Pyrene	CE087	mg/kg	-
Benzo(a)anthracene	CE087	mg/kg	-
Chrysene	CE087	mg/kg	-
Benzo(b)fluoranthene	CE087	mg/kg	-
Benzo(k)fluoranthene	CE087	mg/kg	-
Benzo(a)pyrene	CE087	mg/kg	-
Indeno(123cd)pyrene	CE087	mg/kg	-
Dibenz(ah)anthracene	CE087	mg/kg	-
Benzo(ghi)perylene	CE087	mg/kg	-
PAH (total)	CE087	mg/kg	<5

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SOILS

Lab number			39026-37
Sample id			Area 5 133
Depth (m)			3.00
Test	**Method**	**Units**	
TPH			
TPH Aromatic EC5-EC7	CE068	mg/kg	-
TPH Aromatic EC7-EC8	CE068	mg/kg	-
TPH Aromatic EC8-EC10	CE068	mg/kg	-
TPH Aromatic EC10-EC12	CE068	mg/kg	-
TPH Aromatic EC12-EC16	CE068	mg/kg	-
TPH Aromatic EC16-EC21	CE068	mg/kg	-
TPH Aromatic EC21-EC35	CE068	mg/kg	-
TPH Aliphatic EC5-EC6	CE068	mg/kg	-
TPH Aliphatic EC6-EC8	CE068	mg/kg	-
TPH Aliphatic EC8-EC10	CE068	mg/kg	-
TPH Aliphatic EC10-EC12	CE068	mg/kg	-
TPH Aliphatic EC12-EC16	CE068	mg/kg	-
TPH Aliphatic EC16-EC21	CE068	mg/kg	-
TPH Aliphatic EC21-EC35	CE068	mg/kg	-
Subcontracted analysis			
Asbestos	$	-	-

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LEACHATES

Lab number			39026-5L	39026-20L
Sample id			Area 5	Area 5
			104	121
Depth (m)			1.80	4.50
Test	**Method**	**Units**		
Arsenic	CE055	mg/l	0.002	0.001
Boron	CE063	mg/l	<0.03	<0.03
Cadmium	CE055 U	mg/l	<0.001	<0.001
Chromium	CE055 U	mg/l	<0.003	0.003
Copper	CE055 U	mg/l	0.009	0.015
Lead	CE055 U	mg/l	<0.009	<0.009
Mercury	CE055	mg/l	<0.001	<0.001
Nickel	CE055 U	mg/l	<0.003	<0.003
Selenium	CE055	mg/l	<0.001	<0.001
Zinc	CE055 U	mg/l	<0.020	<0.020
pH	CE004	units	7.2	7.2
Sulphate	CE049 U	mg/l	15	55
Sulphide	CE079	mg/l	<0.1	<0.1
Cyanide (total)	CE077	mg/l	<0.02	<0.02
Phenols (total)	CE073	mg/l	<0.0005	<0.0005
PAHs				
PAH (total)	CE087	mg/l	0.0064	<0.0001
TPH				
TPH (C10-C40)	CE052	mg/l	0.08	<0.01

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	STATUS	LOD	UNITS
CE054	Arsenic (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Cadmium (total)	Aqua regia digest, ICP-OES	M	0.2	mg/kg
CE054	Chromium (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Copper (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Lead (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Mercury (total)	Aqua regia digest, ICP-OES		0.5	mg/kg
CE054	Nickel (total)	Aqua regia digest, ICP-OES	M	1	mg/kg
CE054	Selenium (total)	Aqua regia digest, ICP-OES	M	0.3	mg/kg
CE054	Zinc (total)	Aqua regia digest, ICP-OES	M	3	mg/kg
CE004	pH	BS 1377, pH Meter	M	0.1	units
CE049	Sulphate (2:1 water soluble)	Aqueous extraction, IC-COND	U	10	mg/l
CE056	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	U	0.03	mg/l
CE010	Sulphate (total)	Acid extraction, Gravimetry	M	100	mg/kg
CE061	Sulphur (total)	Acid extraction, ICP-OES		100	mg/kg
CE079	Sulphide	Extraction, Continuous Flow Colorimetry		10	mg/kg
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry		2	mg/kg
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry		0.5	mg/kg
CE005	Organic matter content	BS 1377, Colorimetry	M	0.01	% w/w
CE031	Toluene extractable matter	Solvent extraction, Gravimetry	U	50	mg/kg
CE087	PAH (EPA 16)	Solvent extraction, GC-MS		0.1	mg/kg
CE087	PAH (total)	Solvent extraction, GC-MS		5	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C5-C10)	Headspace GC-FID		0.01-0.1	mg/kg
CE068	TPH Aliphatic/Aromatic fractions (C10-C44)	Solvent extraction, GC-FID		1	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	U	-	-

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METHOD DETAILS

METHOD	LEACHATES	METHOD SUMMARY	STATUS	LOD	UNITS
CE055	Arsenic	ICP-OES		0.001	mg/l
CE063	Boron	ICP-OES		0.03	mg/l
CE055	Cadmium	ICP-OES	U	0.001	mg/l
CE055	Chromium	ICP-OES	U	0.003	mg/l
CE055	Copper	ICP-OES	U	0.004	mg/l
CE055	Lead	ICP-OES	U	0.009	mg/l
CE055	Mercury	ICP-OES		0.001	mg/l
CE055	Nickel	ICP-OES	U	0.003	mg/l
CE055	Selenium	ICP-OES		0.001	mg/l
CE055	Zinc	ICP-OES	U	0.02	mg/l
CE004	pH	BS 1377, pH Meter		0.1	units
CE049	Sulphate	Ion Chromatography	U	10	mg/l
CE079	Sulphide	Continuous Flow Colorimetry		0.1	mg/l
CE077	Cyanide (total)	Continuous Flow Colorimetry		0.02	mg/l
CE073	Phenols (total)	HPLC		0.0005	mg/l
CE087	PAH (EPA 16)	Solvent extraction, GC-MS		0.0001	mg/l
CE087	PAH (total)	Solvent extraction, GC-MS		0.0001	mg/l
CE052	TPH (C10-C40)	Solvent extraction, GC-FID		0.01	mg/l

APPENDIX D
Summary Tables of Chemical Analysis

Made Ground (Area 1)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	20 (SGV)	mg/kg	7	28	5
Cadmium	1 (SGV)	mg/kg	<0.2	1.3	1
Chromium	130 (SGV)	mg/kg	8	26	0
Lead	450 (SGV)	mg/kg	14	86	0
Mercury	8 (SGV)	mg/kg	<0.3	<0.5	0
Selenium	35 (SGV)	mg/kg	<0.3	1.5	0
Copper	130 (GSSV)	mg/kg	13	50	0
Nickel	50 (SGV)	mg/kg	9	50	0
Zinc	580 (GSSV)	mg/kg	49	87	0
Boron	1,300 (GSSV)	mg/kg	0.5	1.6	0
Water Soluble Magnesium	1,200 (no SGV or GSSV)	mg/l	35	78	0

Table 1: Summary of Soil Contamination Levels (Metal Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Total Sulphate	10,000 (no SGV or GSSV)	mg/kg	200	8,800	0
Total Sulphur	5,000 (no SGV or GSSV)	mg/kg	2,815	3,998	0
Water Soluble Sulphate	(no SGV or GSSV)	mg/l	715	1,750	-
Sulphide	250 (no SGV or GSSV)	mg/kg	<10	43	0
Cyanide	66 (GSSV)	mg/kg	<1	<2	0
Loss on Ignition	25 (no SGV or GSSV)	% w/w	7.85	40.43	1
Calorific Value	2,000 (no SGV or GSSV)	kJ/kg	5,235 (one Sample)	5,235 (one Sample)	1
pH	<5.5 (no SGV or GSSV)	-	3.5	7.7	7

Table 2: Summary of Soil Contamination Levels (Inorganic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Organic Matter	(No SGV or GSSV)	% w/w	1.66	9.26	-
TEM	500 (No SGV or GSSV)	mg/kg	<40	760	2
Total Phenols	280 (SGV)	mg/kg	0.3	2.5	0
Total PAH	15 (GSSV)	mg/kg	<5	38	2
TPH C5-C10	4.63 (GSSV)	mg/kg	<1 (one sample)	<1 (one sample)	0
TPH C10-C28	132.59 (GSSV)	mg/kg	1,043 (one sample)	1,043 (one sample)	1
TPH C28-C40	1,801.7 (GSSV)	mg/kg	397 (one sample)	397 (one sample)	0

Table 3: Summary of Soil Contamination Levels (Organic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Naphthalene	16.9 (GSSV)	mg/kg	1.7	1.7	0
Acenaphthylene	659.2 (GSSV)	mg/kg	1.2	1.2	0
Acenaphthene	1,860.4 (GSSV)	mg/kg	0.6	0.6	0
Fluorene	1,774.4 (GSSV)	mg/kg	2.2	2.2	0
Phenanthrene	1,447.2 (GSSV)	mg/kg	2.2	2.2	0
Anthracene	15,108.9 (GSSV)	mg/kg	11.0	11.0	0
Fluoranthene	2,468.1 (GSSV)	mg/kg	0.5	0.5	0
Pyrene	1,817 (GSSV)	mg/kg	2.1	2.1	0
Benzo(a)anthracene	12.1 (GSSV)	mg/kg	0.9	0.9	0
Chrysene	27.6 (GSSV)	mg/kg	<0.1	<0.1	0
Benzo(b)fluoranthene	9.6 (GSSV)	mg/kg	0.7	0.7	0
Benzo(k)fluoranthene	42.3 (GSSV)	mg/kg	0.2	0.2	0
Benzo(a)pyrene	1.3 (GSSV)	mg/kg	0.7	0.7	0
Indeno(123cd)pyrene	15.7 (GSSV)	mg/kg	0.6	0.6	0
Dibenz(ah)anthracene	0.67 (GSSV)	mg/kg	<0.1	<0.1	0
Benzo(ghi)perylene	1,906.5 (GSSV)	mg/kg	0.7	0.7	0

Table 3A: Summary of Soil Contamination Levels (Speciated PAH's) 5% SOM

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Aromatic C5-C7	0.1 (GSSV)	mg/kg	0.03	0.03	0
Aromatic C7-C8	14.3 (GSSV)	mg/kg	<0.01	<0.01	0
Aromatic C8-C10	26.0 (GSSV)	mg/kg	<0.01	<0.01	0
Aromatic C10-C12	122.8 (GSSV)	mg/kg	2	2	0
Aromatic C12-C16	452.9 (GSSV)	mg/kg	5	5	0
Aromatic C16-C21	1,058.2 (GSSV)	mg/kg	25	25	0
Aromatic C21-C35	1,801.7 (GSSV)	mg/kg	10	10	0
Aliphatic C5-C6	23.3 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C6-C8	65.4 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C8-C10	16.5 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C10-C12	85.2 (GSSV)	mg/kg	88	88	1
Aliphatic C12-C16	373.8 (GSSV)	mg/kg	165	165	0
Aliphatic C16-C21	28,937.7 (GSSV)	mg/kg	485	485	0
Aliphatic C21-C35	28,937.7 (GSSV)	mg/kg	702	702	0

Table 3B: Summary of Soil Contamination Levels (Speciated TPH's) 5% SOM

Made Ground (Area 2)

Contaminant	*Screening Value*	*Units*	*Minimum Value*	*Maximum Value*	*No. Exceeding Screen*
Arsenic	20 (SGV)	mg/kg	2.1	116	28
Cadmium	1 (SGV)	mg/kg	<0.2	2.0	2
Chromium	130 (SGV)	mg/kg	<1	41	0
Lead	450 (SGV)	mg/kg	10	260	0
Mercury	8 (SGV)	mg/kg	<0.3	1.0	0
Selenium	35 (SGV)	mg/kg	<0.3	3.0	0
Copper	130 (GSSV)	mg/kg	3	142	1
Nickel	50 (SGV)	mg/kg	2	54	1
Zinc	580 (GSSV)	mg/kg	7.4	182	0
Boron	1,300 (GSSV)	mg/kg	0.3	1.9	0
Water Soluble Magnesium	1,200 (no SGV or GSSV)	mg/l	18	105	0

Table 4: Summary of Soil Contamination Levels (Metal Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Total Sulphate	10,000 (no SGV or GSSV)	mg/kg	74	45,992	9
Total Sulphur	5,000 (no SGV or GSSV)	mg/kg	2,750	17,073	7
Water Soluble Sulphate	(no SGV or GSSV)	mg/l	251	3,303	-
Sulphide	250 (no SGV or GSSV)	mg/kg	<10	43	0
Cyanide	66 (GSSV)	mg/kg	<1	<2	0
Loss on Ignition	25 (no SGV or GSSV)	% w/w	5.66	52.59	5
Calorific Value	2,000 (no SGV or GSSV)	kJ/kg	1,901	7,277	4
pH	<5.5 (no SGV or GSSV)	-	3.0	8.3	17

Table 5: Summary of Soil Contamination Levels (Inorganic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Organic Matter	(No SGV or GSSV)	% w/w	0.59	12.65	-
TEM	500 (No SGV or GSSV)	mg/kg	<40	4,170	14
Total Phenols	307.3 (SGV)	mg/kg	<0.2	3.3	0
Total PAH	15 (GSSV)	mg/kg	<5	18	2
TPH C5-C10	4.63 (GSSV)	mg/kg	<1	<1	0
TPH C10-C28	132.59 (GSSV)	mg/kg	<10	883	5
TPH C28-C40	1,801.7 (GSSV)	mg/kg	<10	767	0

Table 6: Summary of Soil Contamination Levels (Organic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Naphthalene	16.9 (GSSV)	mg/kg	0.6	0.9	0
Acenaphthylene	659.2 (GSSV)	mg/kg	0.1	0.2	0
Acenaphthene	1,860.4 (GSSV)	mg/kg	0.2	0.2	0
Fluorene	1,774.4 (GSSV)	mg/kg	0.2	0.5	0
Phenanthrene	1,447.2 (GSSV)	mg/kg	1.8	1.8	0
Anthracene	15,108.9 (GSSV)	mg/kg	0.8	0.8	0
Fluoranthene	2,468.1 (GSSV)	mg/kg	2.8	3.0	0
Pyrene	1,817 (GSSV)	mg/kg	3.3	3.4	0
Benzo(a)anthracene	12.1 (GSSV)	mg/kg	1.6	1.7	0
Chrysene	27.6 (GSSV)	mg/kg	<0.1	<0.1	0
Benzo(b)fluoranthene	9.6 (GSSV)	mg/kg	2.1	2.2	0
Benzo(k)fluoranthene	42.3 (GSSV)	mg/kg	0.6	1.4	0
Benzo(a)pyrene	1.3 (GSSV)	mg/kg	1.5	1.9	2
Indeno(123cd)pyrene	15.7 (GSSV)	mg/kg	0.1	0.2	0
Dibenz(ah)anthracene	0.67 (GSSV)	mg/kg	<0.1	0.1	0
Benzo(ghi)perylene	1,906.5 (GSSV)	mg/kg	<0.1	0.3	0

Table 6A: Summary of Soil Contamination Levels (Speciated PAH's) 5% SOM

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Aromatic C5-C7	0.1 (GSSV)	mg/kg	<0.01	0.24	1
Aromatic C7-C8	14.3 (GSSV)	mg/kg	<0.01	0.08	0
Aromatic C8-C10	26.0 (GSSV)	mg/kg	<0.01	0.04	0
Aromatic C10-C12	122.8 (GSSV)	mg/kg	<1	2	0
Aromatic C12-C16	452.9 (GSSV)	mg/kg	<1	2	0
Aromatic C16-C21	1,058.2 (GSSV)	mg/kg	1	18	0
Aromatic C21-C35	1,801.7 (GSSV)	mg/kg	<1	11	0
Aliphatic C5-C6	23.3 (GSSV)	mg/kg	<0.1	0.3	0
Aliphatic C6-C8	65.4 (GSSV)	mg/kg	<0.1	0.3	0
Aliphatic C8-C10	16.5 (GSSV)	mg/kg	<0.1	0.3	0
Aliphatic C10-C12	85.2 (GSSV)	mg/kg	5	43	0
Aliphatic C12-C16	373.8 (GSSV)	mg/kg	21	104	0
Aliphatic C16-C21	28,937.7 (GSSV)	mg/kg	37	351	0
Aliphatic C21-C35	28,937.7 (GSSV)	mg/kg	175	1,167	0

Table 6B: Summary of Soil Contamination Levels (Speciated TPH's) 5% SOM

Made Ground (Area 3)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	20 (SGV)	mg/kg	3	195	26
Cadmium	1 (SGV)	mg/kg	<0.2	2.2	4
Chromium	130 (SGV)	mg/kg	<1	33	0
Lead	450 (SGV)	mg/kg	5	53	0
Mercury	8 (SGV)	mg/kg	<0.3	<0.5	0
Selenium	35 (SGV)	mg/kg	<0.3	3.1	0
Copper	130 (GSSV)	mg/kg	<1	102	0
Nickel	50 (SGV)	mg/kg	2	56	1
Zinc	580 (GSSV)	mg/kg	5.1	140	0
Boron	1,300 (GSSV)	mg/kg	<0.3	2.1	0
Water Soluble Magnesium	1,200 (no SGV or GSSV)	mg/l	5.8	221	0

Table 7: Summary of Soil Contamination Levels (Metal Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Total Sulphate	10,000 (no SGV or GSSV)	mg/kg	634	60,100	22
Total Sulphur	5,000 (no SGV or GSSV)	mg/kg	2,231	27,260	18
Water Soluble Sulphate	(no SGV or GSSV)	mg/l	38	25,406	-
Sulphide	250 (no SGV or GSSV)	mg/kg	<10	230	0
Cyanide	66 (GSSV)	mg/kg	<1	7.4	0
Loss on Ignition	25 (no SGV or GSSV)	% w/w	3.69	46.58	5
Calorific Value	2,000 (no SGV or GSSV)	kJ/kg	5,142	11,488	5
pH	<5.5 (no SGV or GSSV)	-	2.7	8.0	25

Table 8: Summary of Soil Contamination Levels (Inorganic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Organic Matter	(No SGV or GSSV)	% w/w	0.51	11.90	-
TEM	500 (No SGV or GSSV)	mg/kg	<40	400	0
Total Phenols	307.3 (SGV)	mg/kg	<0.2	0.9	0
Total PAH	16.96 (GSSV)	mg/kg	<5	<5	0
TPH C5-C10	4.63 (GSSV)	mg/kg	-	-	-
TPH C10-C28	132.59 (GSSV)	mg/kg	-	-	-
TPH C28-C40	1,801.7 (GSSV)	mg/kg	-	-	-

Table 9: Summary of Soil Contamination Levels (Organic Compounds)

Made Ground (Area 4)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	20 (SGV)	mg/kg	<1	160	30
Cadmium	1 (SGV)	mg/kg	<0.2	1.0	0
Chromium	130 (SGV)	mg/kg	2	49	0
Lead	450 (SGV)	mg/kg	7	93	0
Mercury	8 (SGV)	mg/kg	<0.3	<0.5	0
Selenium	35 (SGV)	mg/kg	<0.3	2.3	0
Copper	130 (GSSV)	mg/kg	9	71	0
Nickel	50 (SGV)	mg/kg	7	50	0
Zinc	580 (GSSV)	mg/kg	23	186	0
Boron	1,300 (GSSV)	mg/kg	0.2	2.4	0
Water Soluble Magnesium	1,200 (no SGV or GSSV)	mg/l	16	322	0

Table 10: Summary of Soil Contamination Levels (Metal Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Total Sulphate	10,000 (no SGV or GSSV)	mg/kg	500	36,254	13
Total Sulphur	5,000 (no SGV or GSSV)	mg/kg	1,998	19,980	12
Water Soluble Sulphate	(no SGV or GSSV)	mg/l	107	3,192	-
Sulphide	250 (no SGV or GSSV)	mg/kg	<10	93	0
Cyanide	66 (GSSV)	mg/kg	<1	4.6	0
Loss on Ignition	25 (no SGV or GSSV)	% w/w	3.51	65.75	2
Calorific Value	2,000 (no SGV or GSSV)	kJ/kg	7,875	13,389	2
pH	<5.5 (no SGV or GSSV)	-	3.4	8.9	16

Table 11: Summary of Soil Contamination Levels (Inorganic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Organic Matter	(No SGV or GSSV)	% w/w	1.37	14.95	-
TEM	500 (No SGV or GSSV)	mg/kg	<40	5,860	3
Total Phenols	307.3 (SGV)	mg/kg	<0.2	3.4	0
Total PAH	15 (GSSV)	mg/kg	<5	42	2
TPH C5-C10	4.63 (GSSV)	mg/kg	<1	<1	0
TPH C10-C28	132.59 (GSSV)	mg/kg	410	831	2
TPH C28-C40	1,801.7 (GSSV)	mg/kg	492	1,164	0

Table 12: Summary of Soil Contamination Levels (Organic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Naphthalene	16.9 (GSSV)	mg/kg	0.4	0.8	0
Acenaphthylene	659.2 (GSSV)	mg/kg	0.2	0.9	0
Acenaphthene	1,860.4 (GSSV)	mg/kg	0.1	0.3	0
Fluorene	1,774.4 (GSSV)	mg/kg	0.1	0.3	0
Phenanthrene	1,447.2 (GSSV)	mg/kg	1.7	2.0	0
Anthracene	15,108.9 (GSSV)	mg/kg	0.6	1.6	0
Fluoranthene	2,468.1 (GSSV)	mg/kg	3.3	5.0	0
Pyrene	1,817 (GSSV)	mg/kg	3.4	4.8	0
Benzo(a)anthracene	12.1 (GSSV)	mg/kg	1.8	3.8	0
Chrysene	27.6 (GSSV)	mg/kg	1.2	1.8	0
Benzo(b)fluoranthene	9.6 (GSSV)	mg/kg	3.1	5.3	0
Benzo(k)fluoranthene	42.3 (GSSV)	mg/kg	1.5	2.7	0
Benzo(a)pyrene	1.3 (GSSV)	mg/kg	2.7	5.0	2
Indeno(123cd)pyrene	15.7 (GSSV)	mg/kg	2.3	3.9	0
Dibenz(ah)anthracene	0.67 (GSSV)	mg/kg	0.1	0.7	1
Benzo(ghi)perylene	1,906.5 (GSSV)	mg/kg	1.8	3.6	0

Table 12A: Summary of Soil Contamination Levels (Speciated PAH's) 5% SOM

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Aromatic C5-C7	0.1 (GSSV)	mg/kg	<0.01	0.01	0
Aromatic C7-C8	14.3 (GSSV)	mg/kg	<0.01	<0.01	0
Aromatic C8-C10	26.0 (GSSV)	mg/kg	<0.01	<0.01	0
Aromatic C10-C12	122.8 (GSSV)	mg/kg	<1	2	0
Aromatic C12-C16	452.9 (GSSV)	mg/kg	<1	4	0
Aromatic C16-C21	1,058.2 (GSSV)	mg/kg	4	19	0
Aromatic C21-C35	1,801.7 (GSSV)	mg/kg	3	37	0
Aliphatic C5-C6	23.3 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C6-C8	65.4 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C8-C10	16.5 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C10-C12	85.2 (GSSV)	mg/kg	6	20	0
Aliphatic C12-C16	373.8 (GSSV)	mg/kg	21	53	0
Aliphatic C16-C21	28,937.7 (GSSV)	mg/kg	50	154	0
Aliphatic C21-C35	28,937.7 (GSSV)	mg/kg	182	1,768	0

Table 12B: Summary of Soil Contamination Levels (Speciated TPH's) 5% SOM

Made Ground (Area 5)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	20 (SGV)	mg/kg	3	256	60
Cadmium	2 (SGV)	mg/kg	<0.2	3.0	13
Chromium	130 (SGV)	mg/kg	<1	140	1
Lead	450 (SGV)	mg/kg	<1	203	0
Mercury	8 (SGV)	mg/kg	<0.3	1.4	0
Selenium	35 (SGV)	mg/kg	<0.3	6.3	0
Copper	130 (GSSV)	mg/kg	<1	328	7
Nickel	50 (SGV)	mg/kg	2	76	5
Zinc	580 (GSSV)	mg/kg	6	1,706	1
Boron	1,300 (GSSV)	mg/kg	0.3	2.7	0
Water Soluble Magnesium	1,200 (no SGV or GSSV)	mg/l	1.5	141	0

Table 13: Summary of Soil Contamination Levels (Metal Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Total Sulphate	10,000 (no SGV or GSSV)	mg/kg	<100	66,589	34
Total Sulphur	5,000 (no SGV or GSSV)	mg/kg	1,969	23,120	29
Water Soluble Sulphate	(no SGV or GSSV)	mg/l	30	2,229	-
Sulphide	250 (no SGV or GSSV)	mg/kg	<10	550	4
Cyanide	66 (GSSV)	mg/kg	<1	8.6	0
Loss on Ignition	25 (no SGV or GSSV)	% w/w	2.84	32.46	2
Calorific Value	2,000 (no SGV or GSSV)	kJ/kg	6,160	7,411	2
pH	<5.5 (no SGV or GSSV)	-	2.7	11.1	32

Table 14: Summary of Soil Contamination Levels (Inorganic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Organic Matter	(No SGV or GSSV)	% w/w	0.46	15.73	-
TEM	500 (No SGV or GSSV)	mg/kg	<40	12,000	31
Total Phenols	307.3 (SGV)	mg/kg	<0.2	4.6	0
Total PAH	15 (GSSV)	mg/kg	<5	550	20
TPH C5-C10	4.63 (GSSV)	mg/kg	<1	<20	0
TPH C10-C28	132.59 (GSSV)	mg/kg	<20	3,000	15
TPH C28-C40	1801.7 (GSSV)	mg/kg	<10	10,000	4

Table 15: Summary of Soil Contamination Levels (Organic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Naphthalene	16.9 (GSSV)	mg/kg	<0.1	35.5	1
Acenaphthylene	659.2 (GSSV)	mg/kg	<0.1	2.65	0
Acenaphthene	1,860.4 (GSSV)	mg/kg	<0.1	8.6	0
Fluorene	1,774.4 (GSSV)	mg/kg	<0.1	6.8	0
Phenanthrene	1,447.2 (GSSV)	mg/kg	<0.1	80.6	0
Anthracene	15,108.9 (GSSV)	mg/kg	0.5	18.0	0
Fluoranthene	2,468.1 (GSSV)	mg/kg	<0.1	51.6	0
Pyrene	1,817 (GSSV)	mg/kg	0.9	42.4	0
Benzo(a)anthracene	12.1 (GSSV)	mg/kg	<0.1	86.9	4
Chrysene	27.6 (GSSV)	mg/kg	0.2	19.5	0
Benzo(b)fluoranthene	9.6 (GSSV)	mg/kg	<0.1	79.2	5
Benzo(k)fluoranthene	42.3 (GSSV)	mg/kg	<0.1	49.0	1
Benzo(a)pyrene	1.3 (GSSV)	mg/kg	0.4	71.1	10
Indeno(123cd)pyrene	15.7 (GSSV)	mg/kg	<0.1	12.6	0
Dibenz(ah)anthracene	0.67 (GSSV)	mg/kg	<0.1	6.44	6
Benzo(ghi)perylene	1,906.5 (GSSV)	mg/kg	<0.1	55.7	0

Table 15A: Summary of Soil Contamination Levels (Speciated PAH's) 5% SOM

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Aromatic C5-C7	0.1 (GSSV)	mg/kg	<0.01	0.11	1
Aromatic C7-C8	14.3 (GSSV)	mg/kg	<0.01	0.09	0
Aromatic C8-C10	26.0 (GSSV)	mg/kg	<0.01	0.12	0
Aromatic C10-C12	122.8 (GSSV)	mg/kg	<1	42	0
Aromatic C12-C16	452.9 (GSSV)	mg/kg	<1	67	0
Aromatic C16-C21	1,058.2 (GSSV)	mg/kg	<1	189	0
Aromatic C21-C35	1,801.7 (GSSV)	mg/kg	<1	456	0
Aliphatic C5-C6	23.3 (GSSV)	mg/kg	<0.1	0.1	0
Aliphatic C6-C8	65.4 (GSSV)	mg/kg	<0.1	0.1	0
Aliphatic C8-C10	16.5 (GSSV)	mg/kg	<0.1	3.7	0
Aliphatic C10-C12	85.2 (GSSV)	mg/kg	<1	97	1
Aliphatic C12-C16	373.8 (GSSV)	mg/kg	4	202	0
Aliphatic C16-C21	28,937.7 (GSSV)	mg/kg	19	1,368	0
Aliphatic C21-C35	28,937.7 (GSSV)	mg/kg	156	3,448	0

Table 15B: Summary of Soil Contamination Levels (Speciated TPH's) 5% SOM

Glacial Till (Area 1)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	20 (SGV)	mg/kg	9	11	0
Cadmium	1 (SGV)	mg/kg	<0.2	0.6	0
Chromium	130 (SGV)	mg/kg	23	27	0
Lead	450 (SGV)	mg/kg	13	20	0
Mercury	8 (SGV)	mg/kg	<0.5	<0.5	0
Selenium	35 (SGV)	mg/kg	<0.3	0.7	0
Copper	130 (GSSV)	mg/kg	22	28	0
Nickel	50 (SGV)	mg/kg	31	52	1
Zinc	580 (GSSV)	mg/kg	79	95	0
Boron	1,300 (GSSV)	mg/kg	0.6	0.6	0
Water Soluble Magnesium	1,200 (no SGV or GSSV)	mg/l	-	-	-

Table 16: Summary of Soil Contamination Levels (Metal Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Total Sulphate	10,000 (no SGV or GSSV)	mg/kg	132	230	0
Total Sulphur	5,000 (no SGV or GSSV)	mg/kg	-	-	-
Water Soluble Sulphate	(no SGV or GSSV)	mg/l	-	-	-
Sulphide	250 (no SGV or GSSV)	mg/kg	<10	10	0
Cyanide	66 (GSSV)	mg/kg	<2	<2	0
Loss on Ignition	25 (no SGV or GSSV)	% w/w	-	-	-
Calorific Value	2,000 (no SGV or GSSV)	kJ/kg	-	-	-
pH	<5.5 (no SGV or GSSV)	-	6.3	6.7	0

Table 17: Summary of Soil Contamination Levels (Inorganic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Organic Matter	(No SGV or GSSV)	% w/w	0.23	1.05	-
TEM	500 (No SGV or GSSV)	mg/kg	110	140	0
Total Phenols	78 (SGV)	mg/kg	<0.5	<0.5	0
Total PAH	15 (GSSV)	mg/kg	<5	<5	0
TPH C5-C10	1.08 (GSSV)	mg/kg	-	-	-
TPH C10-C28	27.36 (GSSV)	mg/kg	-	-	-
TPH C28-C40	1,206.6 (GSSV)	mg/kg	-	-	-

Table 18: Summary of Soil Contamination (Organic Compounds) 1% SOM

Glacial Till (Area 2)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	20 (SGV)	mg/kg	4	12	0
Cadmium	1 (SGV)	mg/kg	<0.2	1.4	1
Chromium	130 (SGV)	mg/kg	8	26	0
Lead	450 (SGV)	mg/kg	7	45	0
Mercury	8 (SGV)	mg/kg	<0.3	<0.5	0
Selenium	35 (SGV)	mg/kg	<0.3	1.5	0
Copper	130 (GSSV)	mg/kg	6	28	0
Nickel	50 (SGV)	mg/kg	13	29	0
Zinc	580 (GSSV)	mg/kg	42	92	0
Boron	1,300 (GSSV)	mg/kg	0.4	1.7	0
Water Soluble Magnesium	1,200 (no SGV or GSSV)	mg/l	-	-	-

Table 19: Summary of Soil Contamination Levels (Metal Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Total Sulphate	10,000 (no SGV or GSSV)	mg/kg	200	4,009	0
Total Sulphur	5,000 (no SGV or GSSV)	mg/kg	-	-	-
Water Soluble Sulphate	(no SGV or GSSV)	mg/l	-	-	-
Sulphide	250 (no SGV or GSSV)	mg/kg	<10	35	0
Cyanide	66 (GSSV)	mg/kg	<1	<2	0
Loss on Ignition	25 (no SGV or GSSV)	% w/w	-	-	-
Calorific Value	2,000 (no SGV or GSSV)	kJ/kg	-	-	-
pH	<5.5 (no SGV or GSSV)	-	5.0	8.1	2

Table 20: Summary of Soil Contamination Levels (Inorganic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Organic Matter	(No SGV or GSSV)	% w/w	0.95	5.74	
TEM	500 (No SGV or GSSV)	mg/kg	180	2150	1
Total Phenols	150 (SGV)	mg/kg	<0.5	<0.5	0
Total PAH	15 (GSSV)	mg/kg	<5	<5	0
TPH C5-C10	2.38 (GSSV)	mg/kg	<1	<1	-
TPH C10-C28	67.52 (GSSV)	mg/kg	963	963	1
TPH C28-C40	1,618.3 (GSSV)	mg/kg	1,694	1,694	1

Table 21: Summary of Soil Contamination (Organic Compounds) 2.5% SOM

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Aromatic C5-C7	0.06 (GSSV)	mg/kg	<0.01	<0.01	0
Aromatic C7-C8	7.3 (GSSV)	mg/kg	<0.01	<0.01	0
Aromatic C8-C10	13.1 (GSSV)	mg/kg	<0.01	<0.01	0
Aromatic C10-C12	62.5 (GSSV)	mg/kg	<1	<1	0
Aromatic C12-C16	241.8 (GSSV)	mg/kg	<1	2	0
Aromatic C16-C21	694.7 (GSSV)	mg/kg	<1	36	0
Aromatic C21-C35	1,618.3 (GSSV)	mg/kg	3	45	0
Aliphatic C5-C6	14.2 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C6-C8	35.2 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C8-C10	8.4 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C10-C12	43 (GSSV)	mg/kg	7	9	0
Aliphatic C12-C16	192.5 (GSSV)	mg/kg	20	26	0
Aliphatic C16-C21	16,237.9 (GSSV)	mg/kg	48	106	0
Aliphatic C21-C35	16,237.9 (GSSV)	mg/kg	414	2,516	0

Table 21A: Summary of Soil Contamination (Speciated TPH's) 2.5% SOM

Glacial Till (Area 3)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	20 (SGV)	mg/kg	6	43	2
Cadmium	1 (SGV)	mg/kg	0.2	0.8	0
Chromium	130 (SGV)	mg/kg	9	40	0
Lead	450 (SGV)	mg/kg	9	161	0
Mercury	8 (SGV)	mg/kg	<0.5	<0.5	0
Selenium	35 (SGV)	mg/kg	<0.3	1.2	0
Copper	130 (GSSV)	mg/kg	5	66	0
Nickel	50 (SGV)	mg/kg	10	30	0
Zinc	580 (GSSV)	mg/kg	46	198	0
Boron	1,300 (GSSV)	mg/kg	0.6	2.1	0
Water Soluble Magnesium	1,200 (no SGV or GSSV)	mg/l	103	103	0

Table 22: Summary of Soil Contamination Levels (Metal Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Total Sulphate	10,000 (no SGV or GSSV)	mg/kg	400	9,961	0
Total Sulphur	5,000 (no SGV or GSSV)	mg/kg	3,239	3,239	0
Water Soluble Sulphate	(no SGV or GSSV)	mg/l	15	15	-
Sulphide	250 (no SGV or GSSV)	mg/kg	<10	87	0
Cyanide	66 (GSSV)	mg/kg	<1	<2	0
Loss on Ignition	25 (no SGV or GSSV)	% w/w	-	-	-
Calorific Value	2,000 (no SGV or GSSV)	kJ/kg	-	-	-
pH	<5.5 (no SGV or GSSV)	-	3.6	7.9	2

Table 23: Summary of Soil Contamination Levels (Inorganic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Organic Matter	(No SGV or GSSV)	% w/w	1.09	6.54	-
TEM	500 (No SGV or GSSV)	mg/kg	<40	840	1
Total Phenols	280 (SGV)	mg/kg	<0.2	<0.5	0
Total PAH	15 (GSSV)	mg/kg	50	50	1
TPH C5-C10	4.63 (GSSV)	mg/kg	<1	<1	-
TPH C10-C28	132.59 (GSSV)	mg/kg	553	553	1
TPH C28-C40	1,801.7 (GSSV)	mg/kg	284	284	0

Table 24: Summary of Soil Contamination (Organic Compounds) 5% SOM

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Naphthalene	16.9 (GSSV)	mg/kg	0.3	0.3	0
Acenaphthylene	659.2 (GSSV)	mg/kg	1.0	1.0	0
Acenaphthene	1,860.4 (GSSV)	mg/kg	0.1	0.1	0
Fluorene	1,774.4 (GSSV)	mg/kg	0.3	0.3	0
Phenanthrene	1,447.2 (GSSV)	mg/kg	7.6	7.6	0
Anthracene	15,108.9 (GSSV)	mg/kg	2.9	2.9	0
Fluoranthene	2,468.1 (GSSV)	mg/kg	9.9	9.9	0
Pyrene	1817 (GSSV)	mg/kg	7.9	7.9	0
Benzo(a)anthracene	12.1 (GSSV)	mg/kg	5.1	5.1	0
Chrysene	27.6 (GSSV)	mg/kg	1.0	1.0	0
Benzo(b)fluoranthene	9.6 (GSSV)	mg/kg	4.1	4.1	0
Benzo(k)fluoranthene	42.3 (GSSV)	mg/kg	2.7	2.7	0
Benzo(a)pyrene	1.3 (GSSV)	mg/kg	4.0	4.0	1
Indeno(123cd)pyrene	15.7 (GSSV)	mg/kg	2.2	2.2	0
Dibenz(ah)anthracene	0.67 (GSSV)	mg/kg	0.5	0.5	0
Benzo(ghi)perylene	1,906.5 (GSSV)	mg/kg	<0.1	<0.1	0

Table 24A: Summary of Soil Contamination Levels (Speciated PAH's) 5% SOM

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Aromatic C5-C7	0.1 (GSSV)	mg/kg	<0.01	<0.01	0
Aromatic C7-C8	14.3 (GSSV)	mg/kg	<0.01	<0.01	0
Aromatic C8-C10	26.0 (GSSV)	mg/kg	<0.01	<0.01	0
Aromatic C10-C12	122.8 (GSSV)	mg/kg	<1	<1	0
Aromatic C12-C16	452.9 (GSSV)	mg/kg	5	5	0
Aromatic C16-C21	1,058.2 (GSSV)	mg/kg	41	41	0
Aromatic C21-C35	1,801.7 (GSSV)	mg/kg	27	27	0
Aliphatic C5-C6	23.3 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C6-C8	65.4 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C8-C10	16.5 (GSSV)	mg/kg	<0.1	<0.1	0
Aliphatic C10-C12	85.2 (GSSV)	mg/kg	33	33	0
Aliphatic C12-C16	373.8 (GSSV)	mg/kg	71	71	0
Aliphatic C16-C21	28,937.7 (GSSV)	mg/kg	232	232	0
Aliphatic C21-C35	28,937.7 (GSSV)	mg/kg	501	501	0

Table 24B: Summary of Soil Contamination Levels (Speciated TPH's) 5% SOM

Glacial Till (Area 4)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	20 (SGV)	mg/kg	1	37	1
Cadmium	2 (SGV)	mg/kg	0.3	1.4	0
Chromium	130 (SGV)	mg/kg	7	25	0
Lead	450 (SGV)	mg/kg	8	50	0
Mercury	8 (SGV)	mg/kg	<0.3	<0.5	0
Selenium	35 (SGV)	mg/kg	<0.3	2	0
Copper	130 (GSSV)	mg/kg	9	43	0
Nickel	50 (SGV)	mg/kg	9	40	0
Zinc	580 (GSSV)	mg/kg	40	97	0
Boron	1,300 (GSSV)	mg/kg	0.3	2.0	0
Water Soluble Magnesium	1,200 (no SGV or GSSV)	mg/l	34	34	0

Table 25: Summary of Soil Contamination Levels (Metal Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Total Sulphate	10,000 (no SGV or GSSV)	mg/kg	263	7,219	0
Total Sulphur	5,000 (no SGV or GSSV)	mg/kg	584	584	0
Water Soluble Sulphate	(no SGV or GSSV)	mg/l	455	455	-
Sulphide	250 (no SGV or GSSV)	mg/kg	<10	105	0
Cyanide	66 (GSSV)	mg/kg	<1	<2	0
Loss on Ignition	25 (no SGV or GSSV)	% w/w	-	-	-
Calorific Value	2,000 (no SGV or GSSV)	kJ/kg	-	-	-
pH	<5.5 (no SGV or GSSV)	-	5.5	7.9	0

Table 26: Summary of Soil Contamination Levels (Inorganic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Organic Matter	(No SGV or GSSV)	% w/w	0.38	2.55	-
TEM	500 (No SGV or GSSV)	mg/kg	<40	260	0
Total Phenols	307.3 (SGV)	mg/kg	<0.2	<0.5	0
Total PAH	15 (GSSV)	mg/kg	<5	<5	0
TPH C5-C10	1.08 (GSSV)	mg/kg	-	-	-
TPH C10-C28	27.36 (GSSV)	mg/kg	-	-	-
TPH C28-C40	1206.6 (GSSV)	mg/kg	-	-	-

Table 27: Summary of Soil Contamination (Organic Compounds) 1% SOM

Glacial Till (Area 5)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	20 (SGV)	mg/kg	3	9	0
Cadmium	2 (SGV)	mg/kg	<0.2	1.5	0
Chromium	130 (SGV)	mg/kg	4	15	0
Lead	450 (SGV)	mg/kg	5	21	0
Mercury	8 (SGV)	mg/kg	<0.3	0.7	0
Selenium	35 (SGV)	mg/kg	<0.3	1.0	0
Copper	130 (GSSV)	mg/kg	4	33	0
Nickel	50 (SGV)	mg/kg	4	26	0
Zinc	580 (GSSV)	mg/kg	27	81	0
Boron	1,300 (GSSV)	mg/kg	0.3	2.1	0
Water Soluble Magnesium	1,200 (no SGV or GSSV)	mg/l	8.8	8.8	0

Table 28: Summary of Soil Contamination Levels (Metal Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Total Sulphate	10,000 (no SGV or GSSV)	mg/kg	200	6,600	0
Total Sulphur	5,000 (no SGV or GSSV)	mg/kg	2,217	2,217	0
Water Soluble Sulphate	(no SGV or GSSV)	mg/l	715	715	-
Sulphide	250 (no SGV or GSSV)	mg/kg	<10	133	0
Cyanide	66 (GSSV)	mg/kg	<1	<2	0
Loss on Ignition	25 (no SGV or GSSV)	% w/w	-	-	-
Calorific Value	2,000 (no SGV or GSSV)	kJ/kg	-	-	-
pH	<5.5 (no SGV or GSSV)	-	4.2	8.4	5

Table 29: Summary of Soil Contamination Levels (Inorganic Compounds)

Contaminant	Screening Value	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Organic Matter	(No SGV or GSSV)	% w/w	0.51	2.63	-
TEM	500 (No SGV or GSSV)	Mg/kg	<40	200	0
Total Phenols	307.3 (SGV)	Mg/kg	<0.2	0.6	0
Total PAH	15 (GSSV)	Mg/kg	<5	<5	0
TPH C5-C10	1.08 (GSSV)	Mg/kg	-	-	-
TPH C10-C28	27.36 (GSSV)	Mg/kg	-	-	-
TPH C28-C40	1206.6 (GSSV)	Mg/kg	-	-	-

Table 30: Summary of Soil Contamination (Organic Compounds) 1% SOM

Leachates

Contaminant	EQS Standards	Drinking Water Standards	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	0.05	0.01	mg/l	<0.001	0.004	0
Cadmium	0.005	0.005	mg/l	<0.001	0.002	0
Chromium	0.005-0.25	0.05	mg/l	<0.003	<0.003	0
Lead	0.004-0.25	0.025	mg/l	<0.009	<0.009	0
Mercury	0.001	0.001	mg/l	<0.001	<0.001	0
Selenium		0.01	mg/l	<0.001	0.013	1
Copper	0.001-0.028	2	mg/l	<0.004	0.15	0
Nickel	0.05-0.2	0.02	mg/l	<0.003	0.17	0
Zinc	0.008-0.5	5	mg/l	<0.02	0.284	0
Boron	2	1	mg/l	<0.03	0.29	0
Cyanide total		0.05	mg/l	<0.02	<0.02	0
Sulphide	0.00025	150	mg/l	<0.1	<0.1	0
Sulphate	400	250	mg/l	<10	877	4
Acidity/alkalinity		<6.5	Units	3.8	8.9	7
Phenols	0.03(0.3)	0.0005	mg/l	<0.0005	<0.0005	0
PAH (total)		0.0001	mg/l	<0.0001	0.0148	3
TPH (C_{10}-C_{40})		0.01	mg/l	<0.01	1.13	10

Table 31: Summary of Leachate Test Results

Groundwater

Contaminant	EQS Standards	Drinking Water Standards	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	0.05	0.01	mg/l	<0.001	0.002	0
Cadmium	0.005	0.005	mg/l	<0.001	0.009	1
Chromium	0.005-0.25	0.05	mg/l	<0.003	0.01	0
Lead	0.004-0.25	0.025	mg/l	<0.009	0.02	0
Mercury	0.001	0.001	mg/l	<0.001	<0.001	0
Selenium		0.01	mg/l	<0.001	0.121	1
Copper	0.001-0.028	2	mg/l	<0.004	0.015	0
Nickel	0.05-0.2	0.02	mg/l	0.01	1.898	1
Zinc	0.008-0.5	5	mg/l	<0.02	4.353	0
Boron	2	1	mg/l	0.15	1.51	0
Cyanide total		0.05	mg/l	<0.02	<0.02	0
Sulphide	0.00025	150	mg/l	<0.1	0.81	0
Sulphate	400	250	mg/l	26	7243	9
Acidity/alkalinity		<6.5	Units	5.0	8.0	3
Phenols	0.03(0.3)	0.0005	mg/l	<0.0005	<0.0005	0
PAH (total)		0.0001	mg/l	<0.0001	0.0073	4
TPH (C_{10}-C_{40})		0.01	mg/l	<0.01	6.6	6

Table 32: Summary of Groundwater Test Results

Surface Water

Contaminant	EQS Standards	Drinking Water Standards	Units	Minimum Value	Maximum Value	No. Exceeding Screen
Arsenic	0.05	0.01	mg/l	<0.001	0.002	0
Cadmium	0.005	0.005	mg/l	<0.001	<0.001	0
Chromium	0.005-0.25	0.05	mg/l	<0.003	<0.003	0
Lead	0.004-0.25	0.025	mg/l	<0.009	<0.009	0
Mercury	0.001	0.001	mg/l	<0.001	<0.001	0
Selenium		0.01	mg/l	<0.001	0.003	0
Copper	0.001-0.028	2	mg/l	<0.004	0.008	0
Nickel	0.05-0.2	0.02	mg/l	<0.003	0.017	0
Zinc	0.008-0.5	5	mg/l	<0.02	<0.02	0
Boron	2	1	mg/l	<0.03	<0.03	0
Cyanide total		0.05	mg/l	<0.02	<0.02	0
Sulphide	0.00025	150	mg/l	<0.1	<0.1	0
Sulphate	400	250	mg/l	27	1488	1
Acidity/alkalinity		<6.5	Units	7.1	7.7	0
Phenols	0.03(0.3)	0.0005	mg/l	<0.0005	<0.0005	0
PAH (total)		0.0001	mg/l	<0.0001	<0.0001	0
TPH (C_{10}-C_{40})		0.01	mg/l	<0.01	<0.01	0

Table 33: Summary of Surface Water Test Results

APPENDIX E
Summary of Statistical Analysis

AREA 1 (Made Ground)

1st Tier Assessment

Arsenic — 5 samples exceeding SGV of 20mg/kg – Max = 28mg/kg

Cadmium — 1 sample exceeding SGV of 1mg/kg – Max = 1.3mg/kg

1.3mg/kg — 2005 BH08 at 4.0m depth

TEM — 2 samples exceeding SSV of 500mg/kg – Max = 760mg/kg

580mg/kg — 2005 TP11 at 2.2m depth – Total PAH of 38mg/kg.
No speciated analyses undertaken.

760mg/kg — 2008 TP2 at 1.85m depth – Total PAH of 25mg/kg.
Speciated PAH – No elevated results
Speciated TPH – Slightly elevated Aliphatic C10-C12
88mg/kg (GSSV = 85.2mg/kg)

2nd Tier Assessment

Arsenic — Raw data follows Normal Distribution – No outliers

US95 = 18.4mg/kg (SGV = 20mg/kg)

No significant contamination – and no hotspots

Cadmium — Raw data follows Normal Distribution – One outlier

Outlier	1.3mg/kg	2005 BH08 at 4.0m depth
With outlier	US95 = 0.61mg/kg (SGV = 1.0mg/kg)	
Without outlier	US95 = 0.55mg/kg	

No significant contamination – one outlier at depth

TEM — Raw data follows Normal Distribution – One outlier

Outlier	760mg/kg	2008 TP2 at 1.85m depth
With outlier	US95 = 317mg/kg (SSV = 500mg/kg)	
Without outlier	US95 = 279mg/kg	

No significant contamination – one outlier

Outlier has slightly elevated TPH (Aliphatic C10-C12) only, but there is insufficient data to carry out a proper statistical analysis.

Aliphatic C10-C12 = 88mg/kg (GSSV = 85.2mg/kg)

Outlier is not considered to be a hotspot as levels are only marginally elevated.

AREA 2 (Made Ground)

1st Tier Assessment

Arsenic — 28 samples exceeding SGV of 20mg/kg – Max = 116mg/kg

Cadmium — 2 samples exceeding SGV of 1mg/kg – Max = 2.0mg/kg

1.1mg/kg 2009 TP135 at 1.2m depth
2.0mg/kg 2009 TP109 at 2.8m depth

Copper — 1 sample exceeding SGV of 130mg/kg – Max = 142mg/kg

142mg/kg 2009 TP109 at 5.3m depth

Nickel — 1 sample exceeding SGV of 50mg/kg – Max = 54mg/kg

54mg/kg 2009 TP109 at 2.8m depth

Sulphate (tot) — 9 samples exceeding SSV of 10,000mg/kg – Max = 45,992mg/kg

TEM — 14 samples exceeding SSV of 500mg/kg – Max = 4,170mg/kg

Speciated TPH — Undertaken on all 14 samples

Aromatic C5-C7 in 2009 TP135 at 1.2m depth
0.24mg/kg (GSSV = 0.1mg/kg) – TEM = 840mg/kg

Speciated PAH — Undertaken on 2 samples both with total PAH >15mg/kg

Benzo(a)pyrene in both samples (GSSV = 1.3mg/kg)
2008 TP5 at 0.2m depth (1.9mg/kg) – TEM = 1,660mg/kg
2008 TP5 at 1.1m depth (1.5mg/kg) – TEM = 1,260mg/kg

2nd Tier Assessment

Arsenic — Raw data follows Non-Normal Distribution – Two outliers suggested
But, Log data follows Normal Distribution – No outliers

US95 = 30.1mg/kg (SGV = 20mg/kg)

Widespread contamination – but no hotspots

Cadmium — Raw data follows Non-Normal Distribution – One outlier suggested
But, Log data follows Normal Distribution – No outliers

US95 = 0.6mg/kg (SGV = 1.0mg/kg)

No significant contamination – and no hotspots

Copper — Raw data follows Non-Normal Distribution – One outlier suggested
Removing outlier – raw data still follows Non-Normal Distribution
Log data also follows Non-Normal Distribution – No outliers
On inspection, data appears to be more Log-Normal – No outliers

US95 = 57mg/kg (SGV = 130mg/kg)

No significant contamination – and no hotspots

Nickel — Raw data follows Normal Distribution – No outliers

US95 = 26.1mg/kg (SGV = 50mg/kg)

No significant contamination – and no hotspots

Sulphate (tot) — Raw data follows Non-Normal Distribution – Five outliers suggested
But, Log data follows Normal Distribution – No outliers

US95 = 4,066mg/kg (SSV = 10,000mg/kg)

No significant contamination – and no hotspots

TEM — Raw data follows Non-Normal Distribution – Three outliers suggested
Removing outliers – raw data still follows Non-Normal Distribution
Log data also follows Non-Normal Distribution – No outliers

On inspection data appears to be more Log-Normal
But based on judgement, consider three outliers as potential hotspots

Based on Non-Normal distribution of raw data

Outliers	4,170mg/kg	2008 TP9 at 2.0m depth
	1,780mg/kg	2008 TP7 at 1.0m depth
	1,660mg/kg	2008 TP5 at 0.2m depth
With outliers	US95 = 964mg/kg (SSV = 500mg/kg)	
Without outliers	US95 = 552mg/kg	

Marginal levels of contamination – three outliers

2008 TP9 at 2.0m	No elevated PAH or TPH
2008 TP7 at 1.0m	No elevated PAH or TPH
2008 TP5 at 0.2m	1.9mg/kg Benzo(a)pyrene (GSSV = 1.3mg/kg)

N.B. Elevated TPH (Aromatic C5-C7) in 2009 TP135 at 1.2m
Elevated PAH (Benzo(a)pyrene) in 2008 TP5 at 1.1m

These were not identified as TEM outliers

TPH — Based on speciated analyses of samples with TEM > 500mg/kg

Aromatic C5-C7 — Raw Data follows Non-Normal Distribution – one outlier

2009 TP135 at 1.2m	0.24mg/kg (GSSV = 0.1mg/kg)
With outlier	US95 = 0.10mg/kg
Without outlier	US95 = 0.02mg/kg

No significant contamination – but outlier is concluded to be a marginal hotspot

PAH (tot) — Raw data follows Non-Normal Distribution skewed by non-detects – Two outliers suggested
Log data also follows Non-Normal Distribution skewed by non-detects – No outliers

Based on inspection, raw data appears more Log-Normal – No outliers

US95 = 8.5mg/kg (GSSV = 15mg/kg)

Two results of elevated total PAH (GSSV = 15mg/kg)	2008 TP5 at 0.2m (18mg/kg) 2008 TP5 at 1.1m (16mg/kg)
Both with elevated Benzo(a)pyrene (GSSV = 1.3mg/kg)	2008 TP5 at 0.2m (1.9mg/kg) 2008 TP5 at 1.1m (1.5mg/kg)

These are only slightly elevated – neither are considered to be PAH hotspots

No significant contamination – and no hotspots

AREA 3 (Made Ground)

1st Tier Assessment

Arsenic — 26 samples exceeding SGV of 20mg/kg – Max = 195mg/kg

Cadmium — 4 samples exceeding SGV of 1mg/kg – Max = 2.2mg/kg

1.1mg/kg	2005 TP06 at 1.5m depth
2.0mg/kg	2005 TP08 at 2.0m depth
2.0mg/kg	2009 TP142 at 3.0m depth
2.2mg/kg	2009 TP140 at 0.5m depth

Nickel — 1 sample exceeding SGV of 50mg/kg – Max = 56mg/kg

56mg/kg	2008 TP21 at 1.0m depth

Sulphate (tot) — 22 samples exceeding SSV of 10,000mg/kg – Max = 60,100mg/kg

2nd Tier Assessment

Arsenic — Raw data follows Non-Normal Distribution – Three outliers suggested
But, Log data follows Normal Distribution – No outliers

US95 = 40.5mg/kg (SGV = 20mg/kg)

Widespread contamination – but no hotspots

Cadmium — Raw data follows Non-Normal Distribution – Three outliers suggested
Removing outliers – remainder of data follows Normal Distribution

Outliers	2.0mg/kg	2005 TP08 at 2.0m depth
	2.0mg/kg	2009 TP142 at 3.0m depth
	2.2mg/kg	2009 TP140 at 0.5m depth

With outliers	US95 = 0.91mg/kg (SGV = 1.0mg/kg)
Without outliers	US95 = 0.53mg/kg

But, Log data follows Normal Distribution – No outliers

US95 = 0.53mg/kg (SGV = 1.0mg/kg)

On inspection, data appears to be more Log-Normal – No outliers

No significant contamination – and no hotspots

Nickel — Raw data follows Normal Distribution – No outliers

US95 = 27.7mg/kg (SGV = 50mg/kg)

No significant contamination – and no hotspots

Sulphate (tot) — Raw data follows Non-Normal Distribution – Two outliers suggested
Removing outliers – raw data still follows Non-Normal Distribution
Log data also follows Non-Normal Distribution – No outliers

But on inspection raw data appears to be more Log-Normal

US95 = 17,167mg/kg (SSV = 10,000mg/kg)

Widespread contamination – but no hotspots

AREA 4 (Made Ground)

1st Tier Assessment

Arsenic — 30 samples exceeding SGV of 20mg/kg – Max = 160mg/kg

Sulphate (tot) — 13 samples exceeding SSV of 10,000mg/kg – Max = 36,254mg/kg

TEM — 3 samples exceeding SSV of 500mg/kg – Max = 5,860mg/kg

2008 TP45 at 0.2m depth	TEM = 5,860mg/kg
2008 TP36 at 0.2m depth	TEM = 1,470mg/kg
2009 TP139 at 0.6m depth	TEM = 600mg/kg

Speciated TPH — Undertaken on all 3 samples

No elevated results in any of the samples

Speciated PAH — 2 samples with total PAH >15mg/kg – Max = 42mg/kg

Benzo(a)pyrene in both samples (GSSV = 1.3mg/kg)
2008 TP36 at 0.2m depth (5.0mg/kg)
2008 TP45 at 0.2m depth (1.5mg/kg)

Dibenz(ah)anthracene in one sample (GSSV = 0.67mg/kg)
2008 TP36 at 0.2m depth (0.7mg/kg)

2nd Tier Assessment

Arsenic — Raw data follows Non-Normal Distribution – Two outliers suggested
Removing outliers – raw data still follows Non-Normal Distribution
But, Log data follows Normal Distribution – No outliers

US95 = 26.2mg/kg (SGV = 20mg/kg)

Widespread contamination – but no hotspots

Sulphate (tot) — Raw data follows Non-Normal Distribution – Two outliers suggested
Removing outliers – raw data still follows Non-Normal Distribution
But, Log data follows Normal Distribution – No outliers

US95 = 4,982mg/kg (SSV = 10,000mg/kg)

No significant contamination – and no hotspots

TEM — Raw data follows Non-Normal Distribution – Three outliers suggested
Removing outliers – raw data still follows Non-Normal Distribution
Log data also follows Non-Normal Distribution – No outliers

On inspection data appears to be more Log-Normal
But based on judgement, consider three outliers as potential hotspots

Based on Non-Normal distribution of raw data

Outliers	5,860mg/kg	2008 TP45 at 0.2m depth
	1,470mg/kg	2008 TP36 at 0.2m depth
	600mg/kg	2009 TP139 at 0.6m depth

With outliers US95 = 698mg/kg (SSV = 500mg/kg)
Without outliers US95 = 172mg/kg

No significant contamination – but three possible outliers

2008 TP45 at 0.2m	No elevated TPH Elevated Benzo(a)pyrene
2008 TP36 at 0.2m	*No elevated TPH* Elevated Benzo(a)pyrene, Dibenz(ah)anthracene
2009 TP139 at 0.6m	No elevated TPH or PAH

PAH (tot)

Raw data follows Non-Normal Distribution – Three outliers suggested
Log data also follows Non-Normal Distribution – Three outliers suggested

Based on inspection, data follows a more Log-Normal Distribution – Three outliers

Based on Non-Normal Distribution of logarithmic data

Outliers	42mg/kg	2008 TP36 at 0.2m depth
	25mg/kg	2008 TP45 at 0.2m depth
	6.5mg/kg	2009 TP139 at 0.6m depth – not significant
With outliers	US95 = 6.0mg/kg (GSSV = 15mg/kg)	

No significant contamination – but two hotspots

Insufficient data to undertake proper statistical analysis of elevated PAH's in these outliers

Benzo(a)pyrene	2008 TP45 at 0.2m	2.7mg/kg (GSSV = 1.3mg/kg)
	2008 TP36 at 0.2m	5.0mg/kg
Dibenz(ah)anthracene	2008 TP36 at 0.2m	0.70mg/kg (GSSV = 0.67mg/kg)

Outliers are concluded to be hotspots.

AREA 5 (Made Ground)

1st Tier Assessment

Arsenic	60 samples exceeding SGV of 20mg/kg – Max = 256mg/kg
Cadmium	13 samples exceeding SGV of 1mg/kg – Max = 3.0mg/kg
Chromium	1 sample exceeding SGV of 130mg/kg – Max = 140mg/kg
Copper	7 samples exceeding SGV of 130mg/kg – Max = 328mg/kg
Nickel	5 samples exceeding SGV of 50mg/kg – Max = 76mg/kg
Zinc	1 sample exceeding SGV of 580mg/kg – Max = 1,706mg/kg
Sulphate (tot)	34 samples exceeding SSV of 10,000mg/kg – Max = 66,589mg/kg
Sulphide	4 samples exceeding SSV of 250mg/kg – Max = 550mg/kg
TEM	31 samples exceeding SSV of 500mg/kg – Max = 12,000mg/kg
PAH	20 samples exceeding GSSV of 15mg/kg – Max = 550mg/kg

Speciated analyses indicate elevated levels of:

Naphthalene	GSSV = 16.9mg/kg	Max = 35.5mg/kg (1 sample)
Benzo(a)anthracene	GSSV = 12.1mg/kg	Max = 86.9mg/kg (4 samples)
Benzo(b)fluoranthene	GSSV = 9.6mg/kg	Max = 79.2mg/kg (5 samples)
Benzo(k)fluoranthene	GSSV = 42.3mg/kg	Max = 49.0mg/kg (1 sample)
Benzo(a)pyrene	GSSV = 1.3mg/kg	Max = 71.1mg/kg (10 samples)
Dibenz(ah)anthracene	GSSV = 0.67mg/kg	Max = 6.44mg/kg (6 samples)

TPH — Speciated analyses carried out on 20 samples, with elevated levels of:

Aromatic C5-C7	GSSV = 0.1mg/kg	Max = 0.11mg/kg (1 sample)
Aliphatic C10-C12	GSSV = 85.2mg/kg	Max = 97mg/kg (1 sample)

2nd Tier Assessment

Arsenic — Raw data follows Non-Normal Distribution – Nine outliers suggested
Removing outliers – raw data still follows Non-Normal Distribution
But, Log data follows Normal Distribution – No outliers

US95 = 27.2mg/kg (SGV = 20mg/kg)

Widespread contamination – but no hotspots

Cadmium — Raw data follows Non-Normal Distribution – Two outliers suggested
Removing outliers – raw data still follows Non-Normal Distribution
Log data also follows Non-Normal Distribution – No outliers

Assume Non-Normal Distribution of raw data – Two outliers

Outliers	3.0mg/kg	2009 TP121 at 4.5m depth
	2.4mg/kg	2005 TP20 at 2.2m depth

With outliers US95 = 0.80mg/kg (SGV = 1.0mg/kg)
Without outliers US95 = 0.72mg/kg

No significant contamination – but two possible hotspots

Chromium

Raw data follows Non-Normal Distribution – Seven outliers suggested
Removing outliers – raw data still follows Non-Normal Distribution
Log data also follows Non-Normal Distribution – One outlier suggested

On inspection, data appears to be more Log-Normal – One outlier

Outlier 140mg/kg 2009 TP104 at 1.8m depth

With outlier US95 = 20.1mg/kg (SGV = 130mg/kg)
Without outlier US95 = 19.4mg/kg

No significant contamination – but one marginally elevated hotspot

Copper

Raw data follows Non-Normal Distribution – Eight outliers suggested
Removing outliers – raw data still follows Non-Normal Distribution
But Log data follows Normal Distribution – No outliers

US95 = 45.2mg/kg (SGV = 130mg/kg)

No significant contamination – and no hotspots

Nickel

Raw data follows Non-Normal Distribution – Three outliers suggested
Removing outliers – raw data follows Normal Distribution
Log data is also Non-Normal – No outliers

Assume Normal Distribution after removal of outliers – Three outliers

Outliers 76mg/kg 2008 TP58 at 2.8m depth
71mg/kg 2008 TP73 at 1.2m depth
65mg/kg 2008 TP69 at 3.0m depth

With outliers US95 = 30.0mg/kg (SGV = 50.0mg/kg)
Without outlier US95 = 24.7mg/kg

No significant contamination – but three hotspots

Zinc

Raw data follows Non-Normal Distribution – Eight outliers suggested
Removing outliers – raw data still follows Non-Normal Distribution
Log data is also Non-Normal – One outlier suggested

On inspection data appears to follow more of a Log-Normal Distribution – One outlier

Outlier 1,706mg/kg 2008 TP58 at 2.8m depth

With outlier US95 = 91.5mg/kg (SGV = 580mg/kg)
Without outlier US95 = 86.6mg/kg

No significant contamination – but one hotspot

Sulphate (tot)

Raw data follows Non-Normal Distribution – Two outliers suggested
Removing outliers – raw data still follows Non-Normal Distribution
Log data is also Non-Normal – No outliers

On inspection data appears to follow more of a Log-Normal Distribution – No outliers

US95 = 7,087mg/kg (SSV = 10,000mg/kg)

No significant contamination – and no hotspots

Sulphide

Raw data follows Non-Normal Distribution – 39 outliers suggested
Log data is also Non-Normal – No outliers

On inspection data appears to follow more of a Log-Normal Distribution – No outliers

US95 = 19.6mg/kg (SSV = 250mg/kg)

No significant contamination – and no hotspots

TEM

Raw data follows Non-Normal Distribution – 21 outliers suggested
Log data is also Non-Normal – No outliers

On inspection data appears to follow more of a Log-Normal Distribution – No outliers

US95 = 478mg/kg (SSV = 500mg/kg)

No significant contamination – and no hotspots – however refer below.

PAH (tot)

Raw data follows Non-Normal Distribution – Numerous outliers suggested
Log data also follows Non-Normal Distribution – No outliers suggested

Data heavily skewed by non-detects

On removal of non-detects data follows a Log-Normal Distribution – No outliers

US95 = 36.5mg/kg (GSSV = 15mg/kg)

Widespread contamination – but with no apparent hotspots

<u>Based on statistical analysis of speciated PAH's</u>

Naphthalene

Raw data follows Non-Normal Distribution – Two outliers suggested
Removing outliers – raw data follows Normal Distribution

Assuming raw data follows Normal Distribution

Outliers	35.5mg/kg	2008 TP72 at 1.0m depth
	5.6mg/kg	2005 TP20 at 2.2m depth
With outliers	US95 = 18.3mg/kg (GSSV = 16.9mg/kg)	
Without main outlier	US95 = 3.8mg/kg	

No significant contamination – but one hotspot

Benzo(a) anthracene

Raw data follows Non-Normal Distribution – One outlier suggested
Removing outliers – raw data follows Normal Distribution

Assuming raw data follows Normal Distribution

Outlier	86.9mg/kg	2008 TP72 at 1.0m depth

With outlier US95 = 47.9mg/kg (GSSV = 12.1mg/kg)
Without outlier US95 = 12.4mg/kg

Only slight contamination – but one hotspot

Benzo(b) fluoranthene

Raw data follows Non-Normal Distribution – One outlier suggested
Removing outliers – raw data follows Normal Distribution

Assuming raw data follows Normal Distribution

Outlier 79.2mg/kg 2008 TP72 at 1.0m depth

With outlier US95 = 46.0mg/kg (GSSV = 9.6mg/kg)
Without outlier US95 = 15.2mg/kg

Widespread contamination – and one hotspot

Benzo(k) fluoranthene

Raw data follows Non-Normal Distribution – One outlier suggested
Removing outliers – raw data still follows Non-Normal Distribution

Assuming raw data follows Normal Distribution

Outlier 49.0mg/kg 2008 TP72 at 1.0m depth

With outlier US95 = 27.6mg/kg (GSSV = 42.3mg/kg)
Without outlier US95 = 12.3mg/kg

No significant contamination – but one hotspot

Benzo(a) pyrene

Raw data follows Non-Normal Distribution – One outlier suggested
Removing outliers – raw data still follows Non-Normal Distribution
But, Log data follows Normal Distribution – No outliers

Based on Log-Normal Distribution

US95 = 14.5mg/kg (GSSV = 1.3mg/kg)

Widespread gross contamination – but with no apparent hotspots

Dibenz(ah) anthracene

Raw data follows Non-Normal Distribution – No outliers
But, Log data follows Normal Distribution – No outliers

Based on Log-Normal Distribution

US95 = 2.84mg/kg (GSSV = 0.67mg/kg)

Widespread contamination – but with no apparent hotspots

<u>Based on statistical analysis of speciated TPH's</u>

Aromatic C5-C7

Raw data follows Non-Normal Distribution – Two outliers suggested
But Log data follows Normal Distribution – One outlier

Based on Log-Normal Distribution

Outlier 0.11mg/kg 2008 TP66 at 0.2m depth

With outlier US95 = 0.04mg/kg (GSSV = 0.10mg/kg)
Without outlier US95 = 0.03mg/kg

No significant contamination – but one very marginal hotspot

Aliphatic C10-C12

Raw data follows Non-Normal Distribution – Two outliers suggested
But Log data follows Normal Distribution – No outliers

Based on Log-Normal Distribution

US95 = 38.0mg/kg (GSSV = 85.2mg/kg)

No significant contamination – and no hotspots

SUMMARY (Made Ground)

Area 1

Exceedances of arsenic, cadmium, TPH and total PAH.

No significant contamination, but

One cadmium outlier at depth (1.3mg/kg in 2005 BH08 at 4.0m depth) which is not considered to be a significant hotspot (GSSV = 1.0mg/kg).

One TPH outlier with slightly elevated aliphatic C10-C12 (88.0mg/kg in 2008 TP2 at 1.85m depth) which is not considered to be a significant hotspot (GSSV = 85.2mg/kg).

Area 2

Exceedances of arsenic, cadmium, copper, nickel, sulphate, TPH and PAH.

Widespread arsenic contamination – but no hotspots.

No significant TPH contamination, but

One TPH outlier with elevated aromatic C5-C7 (0.24mg/kg in 2009 TP135 at 1.2m depth) which is considered to be a hotspot (GSSV = 0.1mg/kg).

No significant PAH contamination, but

Two possible PAH outliers with elevated benzo(a)pyrene (1.9mg/kg in 2008 TP5 at 0.2m depth and 1.5mg/kg in 2008 TP5 at 1.1m depth) which are not considered to be significant hotspots (GSSV = 1.3mg/kg).

Area 3

Exceedances of arsenic, cadmium, nickel and sulphate.

Widespread arsenic and sulphate contamination – but no hotspots.

Area 4

Exceedances of arsenic, sulphate and PAH.

Widespread arsenic contamination – but no hotspots.

No significant PAH contamination, but

Two PAH outliers with elevated benzo(a)pyrene (5.0mg/kg in 2008 TP36 at 0.2m depth and 2.7mg/kg in 2008 TP45 at 0.2m depth) which are considered to be hotspots (GSSV = 1.3mg/kg).

One PAH outlier with elevated dibenz(ah)anthracene (0.7mg/kg in 2008 TP36 at 0.2m depth) which is not considered to be a significant hotspot (GSSV = 0.67mg.kg) – except that this location is a benzo(a)pyrene hotspot.

Area 5

Exceedances of arsenic, cadmium, chromium, copper, nickel, zinc, sulphate, sulphide, TPH and PAH.

Widespread arsenic contamination – but no hotspots.

No significant cadmium contamination, but

Two cadmium outliers (3.0mg/kg in 2009 TP121 at 4.5m depth and 2.4mg/kg in 2005 TP20 at 2.2m depth) which should be considered as possible hotspots (GSSV = 1.0mg/kg).

No significant chromium contamination, but

One chromium outlier (140mg/kg in 2009 TP104 at 1.8m depth) which is not considered to be a significant hotspot (GSSV = 130mg/kg).

No significant nickel contamination, but

Three nickel outliers (76mg/kg in 2008 TP58 at 2.8m depth, 71mg/kg in 2008 TP73 at 1.2m depth and 65mg/kg in 2008 TP69 at 3.0m depth) which are considered to be hotspots (GSSV = 50mg/kg).

No significant zinc contamination, but

One zinc outlier (1,706mg/kg in 2008 TP58 at 2.8m depth) which is considered to be a hotspot (GSSV = 580mg/kg).

Widespread PAH contamination, particularly of benzo(b)fluoranthene, benzo(a)pyrene and dibenz(ah)anthracene, with

One main outlier of naphthalene, benzo(a)anthracene, benzo(b)fluoranthene and benzo(k)fluoranthene (2008 TP72 at 1.0m depth) which is considered to be a significant hotspot.

No significant TPH contamination, but

One outlier of aromatic C5-C7 (0.11mg/kg in 2008 TP66 at 0.2m depth) which is not considered to be a significant hotspot (GSSV = 0.10mg/kg).

AREA 1 (Glacial Till)

1st Tier Assessment

Nickel — 1 sample exceeding SGV of 50mg/kg – Max = 52mg/kg

52mg/kg — 2009 TP125 at 2.5m depth

No other exceedances

2nd Tier Assessment

Nickel — Insufficient data to carry out statistical analysis, but sample exceeding SGV is only marginally elevated.

Not considered to be any widespread contamination – and no hotspots.

AREA 2 (Glacial Till)

1st Tier Assessment

Cadmium — 1 sample exceeding SGV of 1mg/kg – Max = 1.4mg/kg

1.4mg/kg — 2009 TP135 at 3.8m depth

TEM — 2 samples exceeding SSV of 500mg/kg – Max = 2,150mg/kg

2,150mg/kg — 2008 TP10 at 2.0m depth
Total PAH <5mg/kg (GSSV = 15mg/kg)
No speciated PAH
Speciated TPH – No elevated results

580mg/kg — 2009 TP134 at 2.0m depth
Total PAH of 77mg/kg (GSSV = 15mg/kg)
Speciated PAH – No elevated results
Speciated TPH – No elevated results

2nd Tier Assessment

Cadmium — Raw data follows Normal Distribution – No outliers

US95 = 0.82mg/kg (SGV = 1.0mg/kg)

No significant contamination – and no hotspots

TEM — Log data follows Normal Distribution – No outliers

US95 = 216mg/kg (SSV = 500mg/kg)

No significant contamination – and no hotspots

AREA 3 (Glacial Till)

1st Tier Assessment

Arsenic — 2 samples exceeding SGV of 20mg/kg – Max = 43mg/kg

43mg/kg	2008 TP26 at 3.0m depth
33mg/kg	2008 TP18 at 2.0m depth

TEM — 1 sample exceeding SSV of 500mg/kg – Max = 840mg/kg

840mg/kg	2008 TP26 at 3.0m depth Total PAH of 50mg/kg (GSSV = 15mg/kg) Speciated PAH – elevated benzo(a)pyrene Speciated TPH – No elevated results

Benzo(a) pyrene — 1 sample exceeds GSSV of 1.3mg/kg – Max = 4.0mg/kg

4.0mg/kg	2008 TP26 at 3.0m depth

2nd Tier Assessment

Arsenic — Raw data follows Non-Normal Distribution – No outliers
Log data also follows Non-Normal Distribution – No outliers

Based on inspection, log data more closely follows Normal Distribution

US95 = 30.9mg/kg (SGV = 20mg/kg)

Marginal levels of contamination – but no hotspots

TEM — Log data follows Normal Distribution – No outliers

US95 = 247mg/kg (SSV = 500mg/kg)

No significant contamination – and no hotspots

Benzo(a) Pyrene — Insufficient data to carry out statistical analysis

Maximum value test of single sample suggests possible hotspot

AREA 4 (Glacial Till)

1st Tier Assessment

Arsenic — 1 sample exceeding SGV of 20mg/kg – Max = 37mg/kg

37mg/kg	2005 TP03 at 3.2m depth

2nd Tier Assessment

Arsenic — Log data follows Normal Distribution – No outliers

US95 = 10.1mg/kg (SGV = 20mg/kg)

No significant contamination – and no hotspots

AREA 5 (Glacial Till)

1st Tier Assessment

No exceedances

2nd Tier Assessment

No significant contamination – and no hotspots

SUMMARY (Glacial Till)

Area 1 One exceedance of nickel.

Insufficient data for statistical analysis of nickel, but sample is only marginally elevated.

No significant contamination or any hotspots.

Area 2 Exceedances of cadmium and TEM, but no elevated TPH or PAH.

No significant contamination or any hotspots.

Area 3 Exceedances of arsenic, TEM, total PAH (benzo(a)pyrene).

Marginal levels of arsenic contamination – but no hotspots.

Insufficient data for statistical analysis of speciated PAH's, but one possible hotspot of benzo(a)pyrene.

Area 4 One exceedance of arsenic.

No significant contamination or hotspots.

Area 5 No exceedances.

No significant contamination or hotspots.