EAWML30093
Mill Services Site
Site Condition Report (SCR)

Application for Permit Variation for an Extension of Licensed Area under The Environmental Permitting (England and Wales) Regulations 2010

CELSA Manufacturing (UK) Ltd.
Cardiff, South Wales, UK

July 2010

Document No R-010-0003 Celsa Minerals Extension Area SCR

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DOCUMENT CHANGE HISTORY

Revision	Date	By	Authorised
00	09/07/10	Steve Rowan/Sharon Abram	Steve Rowan
01	14/7/10	Sharon Abram	Steve Rowan

Contents

Annex B – Historical Maps

Annex C – Trial Pit Logs

Annex D – Analytical Results

1 Introduction

1.1 Background to the EP Application

This document has been prepared by CELSA Manufacturing (UK) Ltd. (CELSA) and its environmental consultants, Earth and Marine Environmental Limited (EAME) in support of an Environmental Permit (EP) application as required under the *Environmental Permitting (England and Wales) Regulations 2010*.

The Application relates to the extension of the storage area used for processed Electric Arc Furnace (EAF) slag which is presently licensed under a Waste Management Licence (Environmental Permit) – EAWML300093. This area, known as the "Mill Services Site" is used to store and weather EAF slag which is a useful by-product of the EAF process and which when weathered can be sold as a useful mineral aggregate.

CELSA already holds an Environmental Permit for physical treatment of slag, including its slag storage and weathering yard, but to improve operational efficiency and allow flexible working area, CELSA wishes to extend this operation on to a small area of land adjacent to the existing licensed slag storage area.

The extension area (and indeed the whole area) is built of reclaimed blast furnace steel works slag (from historic works in the area unrelated to CELSA). There is the potential for the historic blast furnace slag (which can be problematic from a contamination perspective) from the modern EAF slag (which is generall benign environmentally).

The document represents the Site Condition Report (SCR) submitted as part of the application package to the Environment Agency relating to this extension area and relates to the assessment of the site condition (baseline conditions) on this additional land parcel.

EAME was commissioned by CELSA to undertake the production of the SCR in accordance with the Environment Agency's (EA's) Guidance Document H5 Site Condition Reports Guidance and Templates (Version 080328) http://www.environment-agency.gov.uk/epr.

2 Site ConditionReport Template

This section has been compiled in accordance with the EA Guidance Document H5 Site Condition Reports Guidance and Templates (Version 080328).

Where additional space has been required to describe the required information section references have been included.

Name of Installation	CELSA Manufacturing (UK) Ltd

Permit Number	N/A

Date and Version of SCR	This Document may be referred to by its unique reference number R-010-0003 Celsa Minerals Extension Area SCR revision 00, dated 7th July 2010

1. Location of Installation	
Installation Address	CELSA Manufacturing (UK) Ltd – Minerals Site Rover Way Cardiff
National Grid Reference (approximate)	321484, 175990
Supporting Information	Plan showing location of installation (Ref. Annex A – Figure 1 Site Location) Plan showing installation boundary (Ref. Annex A – Figure 2 Installation Boundary and Layout Plan)

2. Condition of Land at Permit Issue	
Environmental setting including: • geology • hydrogeology • surface waters	Please refer to Section 3 of this report.
Pollution history including: • pollution incidents that may have affected land • historical land-uses and associated contaminants • any visual/olfactory evidence of existing contamination • evidence of damage to pollution prevention measures	Please refer to Section 3 of this report.

2. Condition of Land at Permit Issue	
Evidence of historic contamination, for example historical site investigation, assessment, remediation and verification reports (where available)	Please refer to Section 3 of this report.
Baseline reference data	Please refer to Sections 4 of this report.
Supporting Information	Please refer to Sections 3 and 4, and Annexes A to D and of this report for: • Source information identifying environmental setting and pollution incidents • Historical Ordnance Survey plans • Site reconnaissance • Historical investigation/assessment/remediation/verification reports • Baseline reference data

3. Permitted Activities	
Permitted Activities	The permitted activity is the storage and weathering of waste materials (EAF slag) associated with the CELSA steel manufacturing.
Non-permitted activities undertaken at the installation	There are no other activities at the facility that is the subject of this Site Condition Report.

Dangerous substances used and produced by the permitted activities
Please refer to Section 6 of this report for full details but there are no dangerous substances associated with the application site.

Supporting Information	Plan showing installation layout (Ref. Annex A –Figure 2 Installation Boundary and Layout Plan) Plan showing layout of site. (Ref. Annex A –Figure 3 Environmental Receptors) List of substances used/produced (Section 6) Assessment of whether any is a 'dangerous substance' (Section 6)

3 Location of the Installation

The site is located in the Tremorfa area of Cardiff, at approximate National Grid Reference (site centred) ST 21173, 76108 (Figure 1). The site elevation is only a few metres above sea level and land in the vicinity is generally flat lying (other than some landscaping/spoil mounds from earthworks in recent years). It should be noted that this entire area is artificial and was built up by reclamation of the salt marshes using blast furnace and other steel making slag and residues from the East Moors Steel Works (not associated with CELSA and long closed down). The Severn Estuary is located approximately 50m to the east of the site.

Surrounding land uses are detailed in Table 3.1.

Table 3.1: Surrounding Land Uses

Direction	Description	Company Name	Distance
To the North	Open undeveloped land	N/A	Adjacent to site
To the South	Wastewater treatment works	Dŵr Cymru	Adjacent to the south of the site
To the East	MX Centre Motor Cross motor cycle track	Cardiff City Council	Adjacent to site
	Severn Estuary	N/A	50m east
To the West	CELSA existing slag processing facility	CELSA Manufacturing (UK) Ltd.	Adjacent to west of site
	CELSA Tremorfa Steel Works	CELSA Manufacturing (UK) Ltd.	300m west across Rover Way

The site, which is owned by CELSA, is used as an extension to the existing slag processing facility adjacent to the west. The size of the subject site is approximately 16,000m^2 (c. 4 acres). The site is used for the temporary storage of slag from the local CELSA steel manufacturing facilities. Once the slag is weathered it is sold to the aggregates and construction industry as a useful mineral aggregate. There are no other activities on the subject site.

The site, as is the case for the wider surrounding area, is located on reclaimed land. Land reclamation was undertaken principally in the 1950s and 60s. The materials used to reclaim the land comprised blast furnace slag and other wastes from steel manufacturing at the East Moors steel works. The entire area is effectively a continuous stratum of blast furnace slag and steel making residues to several metres depth. The East Moors steel works closed down and was demolished many decades ago and was unassociated with the CELSA steel making operations that now exist in the area.

Plans showing the location of installation and the installation boundary are provided in Annex A (Figure 1 Site Location and Figure 2 Installation Boundary and Layout Plan).

3.1 Site Operations

The subject site comprises an open unsurfaced area of land on which stockpiles of slag are temporarily stored.

Various items of plant are used for the transfer of slag on and off the site. This plant, when not in use, is stored on the adjacent slag processing site and not the subject site. Refuelling facilities for plant are not present on the subject site.

Chemical and waste storage is not undertaken on the subject site.

The only material on the site is managed stockpiles of weathering slag.

3.2 Geology

According to the BGS 1:50,000 Cardiff solid and drift map (Sheet 263) for the area, the site is underlain by Made Ground, which is further underlain by solid deposits of the Mercia Mudstone Group. The Mercia Mudstone comprises a red structureless mudstone with occasional siltstones and is of substantial thickness. Carboniferous Millstone Grit underlies the Mercia Mudstone at depth.

3.3 Hydrogeology

The Mercia Mudstone is a non-aquifer of negligible permeability and would inhibit the downward migration of mobile contaminants (if present) within the shallow groundwater into deeper aquifers. The Millstone Grit is classified as a minor aquifer, known as a permeable formation, which may be used in the local area for small industrial and agricultural abstractions.

The Environment Agency Groundwater Vulnerability map of the area (1:100,000; Sheet 36, Gwent, South & Mid Glamorgan) confirms that the underlying geology is classified as a non-aquifer.

A non-aquifer is a rock formation which is regarded as containing insignificant quantities of groundwater. However, some non-aquifers can yield water in sufficient quantities for domestic use and supply base flow to rivers. There is likely to be perched groundwater present within the made ground, which is likely to be relatively permeable.

According to a publicly available third-party environmental database there are no licensed groundwater abstractions within the vicinity of the site (note that this information has been gleaned from the Tremorfa Steel Works Error! Reference source not found. produced by Enviros Aspinwall on behalf of ASW, report reference Error**! Reference source not found.**, August 2001). However, since this date CELSA has obtained a license for the abstraction of groundwater, for dust suppression purposes, from a borehole located at the adjacent Mill Services site (groundwater abstraction license reference 21/57/25/78).

The site is not located within an EA designated groundwater Source Protection Zone.

It is important to note that there may also be private (unlicensed) abstractions (that are generally of smaller scale) although these are not listed within the publically available environmental database.

The site is considered to be situated in an area of low sensitivity with respect to groundwater resources due to the underlying non-aquifer and substantial made ground presence. The absence of sensitive licensed groundwater and abstractions for public water supply located in the immediate vicinity of the site reduces the sensitivity of these resources to potential contamination. However, shallow groundwater may be present beneath the site, and this could provide a pathway for mobile contaminants (if present) to migrate onto the site from off-site sources, or away from the site onto third-party land. Furthermore, shallow groundwater is likely to be in hydraulic continuity with surrounding surface water features, most notably the Severn Estuary located c. 50m to the east of the site.

3.4 Hydrology

The nearest surface water course is the Severn Estuary, located approximately 50m east of the site. This surface water body has not been graded under the Environment Agency's General Quality Assessment (GQA) Scheme. The estuarine waters are not assessed for bathing water quality.

Surface water from the site percolates directly into the unsurfaced ground of the site. Given the close proximity of the estuary it is likely that the groundwater at the site is in hydraulic continuity with the estuary and that the surface water runoff will ultimately discharge into the Severn Estuary.

There is one licensed surface water abstraction within 2km of the site. This is for CELSAs Rod and Bar Mill facility, approximately 2km to the southwest of the site (surface water abstraction license 21/57/25/0048).

According to a publicly available third-party environmental database fifteen discharge consents have been granted within 1km of the site (*note that this information has been gleaned from the Tremorfa Steel Works Error! Reference source not found. produced by Enviros Aspinwall on behalf of ASW, report reference Error**! Reference source not found.**, August 2001*). The nearest consented discharges are located at CELSA's Tremorfa facility to the west of the site. CELSA holds two discharge consents for trade effluent discharges, specifically:

- for the discharge of cooling water from the Section Mill (discharge consent number EE147F, originally issued 1981); and
- for the discharge of re-circulated billet water and cooling water from the cooling water circuit at the new Melt Shop (discharge consent reference number TE147G, originally issued 2007).

According to the Environment Agency web site, the site is not located within an Environment Agency designated flood zone.

3.5 Protected Habitats

The Multi-Agency Geographic Information for the Countryside (MAGIC) website (www.magic.gov.uk) was consulted to identify any protected habitats within a 2 km radius of the installation. The website was queried for the following information:

- RAMSAR sites;

- Special Protection Areas (SPAs);
- Special Areas of Conservation (SACs);
- Sites of Special Scientific Interest (SSSIs);
- Local Nature Reserves (LNRs); and
- National Nature Reserves.

According to the MAGIC database the Severn Estuary, located c. 50m to the east of the site, is designated as a:

- Special Area of Conservation (SAC);
- Special Protection Area (SPA);
- Site of Special Scientific Interest (SSSI); and
- RAMSAR site

The Severn Estuary is important due to its immense tidal range which affects both the physical environment and the biological communities present in the estuary, for its unusual estuarine communities, reduced species diversity and high productivity. The high tidal range leads to strong tidal streams and high turbidity, producing communities characteristic of the extreme physical conditions of liquid mud and tide-swept sand and rock.

The estuary is particularly important for the run of migratory fish between the sea and rivers via the estuary. Species using the estuary include salmon Salmo solar, sea trout S. trutta, sea lamprey Petromyzon marinus, river lamprey Lampetra fluviatilis, allis shad A losa alosa, twaite shad A. fallax and eel Anguilla anguilla. The population of the sea lamprey and twaite shad are considered to be larger than in any other UK estuary. The rare and endangered allis shad is now only an occasional visitor although formerly a substantial spawning population was present.

The estuary is particularly important for migratory birds during passage periods in spring and autumn. These large bird populations are supported by the rich food resources available in the tidal flats and nearby freshwater wetlands, and regularly supports in winter over 20,000 waterfowl. The estuary regularly supports, during the same period, internationally important populations of five species of waterfowl, as well as notable nationally important wintering populations of bird species.

The estuary as an SCA is designated for its estuary environment, atlantic salt meadows, intertidal mudflats and sandflats covered by seawater at low tide, for the presence of Sea lamprey and reefs, and for its Sandbanks which are slightly covered by sea water all the time.

Additionally, the Gwent Levels – Rumney and Peterstone are classified as a SSSI. The designation of this SSSI is primarily as a representative of grazing marsh/reen habitat.

There are no other such designated sites within 2 km of the site.

3.6 Pollution Incidents at the Site

Reportedly there have been no pollution incidents at the site whilst the site has been in CELSA's ownership.

From historical maps and information provided by CELSA representatives it is known that the site was reclaimed from the Severn Estuary in the 1960s. Reclamation materials comprised blast furnace slag and other steel manufacturing waste materials from local steel manufacturing facilities, hence historic pollution due to the nature of the fill materials is likely to be present.

There have been no manufacturing or similarly potentially contaminative activities on the subject site.

3.7 Environmental Database

The following information was gleaned from the *Land and Water Quality Assessment* chapter (undertaken by ENVIRON, report reference 63CC7493) of the 2004 Environmental Statement (ES) for the development of the new CELSA Melt Shop on CELSA's Tremorfa steel works site (located approximately 450m to the west of the subject site). Information reported in the ES was received from CCC Environmental Health Department and a third party environmental database (SiteScope) at that time. In addition information has been gleaned from the *Tremorfa Steel Works Error! Reference source not found.* produced by Enviros Aspinwall on behalf of ASW, report reference Error**! Reference source not found.**, August 2001. EAME considers that there are unlikely to have been any significant changes to this information since these dates. Other than upgrade (construction) works at the Dwr Cymru treatment centre and the construction of a new meltshop on the Tremorfa site, adjacent the activities in the area remain largely unchanged during the permit history of CELSA's oeprations:

- ***Landfills*** - according to the database there are two current landfill sites within 2km. Both sites are operated by Cardiff County Council and are located greater than 1.5km from the site. Both sites are licensed to accept hazardous waste. There have been 37 former landfill licenses within a 2km radius of the site. The nearest landfill site was located on the subject site. ASW (the previous operators of Tremorfa) are believed to have operated this landfill site for the licensed disposal of non-hazardous waste and 'difficult' types of waste. There have also been several other operators disposing of similar and inert types of waste in the area. It is understood from discussions with Colin Laskey of CELSA that when the site was operated by GKN and later ASW (which was formed from GKN in 1981) they reclaimed part of the foreshore with blast furnace slag and foundry wastes and the references in the database to site landfills may refer to this.

- ***Discharge Consents*** - There appear to be no discharge consents associated with the subject site, however there are 15 licensed discharge consents within 2km. The nearest consents are located approximately 300m west of the site. The operator, CELSA Manufacturing (UK) Limited, is licensed for the discharge of cooling water from the Section Mill, and for the discharge of re-circulated billet water and cooling water from the cooling water circuit at the

new Melt Shop; both the Section Mill and the new Melt Shop are located on CELSA's Tremorfa facility to the west of the site.

- ***Pollution Incidents*** - There are twelve recorded pollution incidents within 2km, however none appear to be attributable to the subject site. The nearest incident occurred more than 500m north east of the site. The incident was classified as a Category 3 (minor incident) where crude sewage was released into the Severn Tunnel Spring.

- ***Prosecutions & Enforcements*** - According to the database there have been no notices served on the site.

- ***Planning Hazardous Substance Consents*** - there are no Planning Hazardous Substance consents for the site.

- **COMAH Sites –** the site is not designated as a COMAH facility.

- **Waste Management Sites** - There are a number of licensed (permitted) waste management facilities in the vicinity of the site. The nearest of these is for the adjacent physical treatment site operated by CELSA.

Linesearch

The Linesearch database lists pipelines owned and/or operated by the following pipeline operators: Esso Petroleum Company Limited, Mainline Pipelines Limited, BPA, Government Pipelines & Storage System, Total Pipeline Operations, ConocoPhillips (UK) Ltd, Manchester Jetline Limited, Shell UK Ltd, Sabic UK Petrochemicals (formerly Huntsman), BP TSEP, BT GEO Network, E-on UK Plc, BP Exploration Purbeck Southampton Pipeline, ConocoPhillips Ltd Humber Refinery and Scottish Power Generation Ltd.

According to the database there are no records of underground pipelines on the site or within 500m of the centre of the site.

3.8 Historical Land-uses and Associated Contaminants

Information on site history was provided by reference to published historical ordnance survey maps. A number of historical maps were examined as part of the environmental review.

From the earliest map of 1880 the site comprised of mud flats. By the mid to late 1960s the site had been reclaimed with waste materials (which from anecdotal information the reclamation materials are known to have comprised blast furnace slag and other steel manufacturing waste materials from the surrounding steel manufacturing works and comprised mainly blast furnace slag); the site, and immediate surrounding area, which had also been reclaimed, is annotated on historical maps as being a 'disused tip'. The site since it was reclaimed has remained undeveloped to the present day.

The material used for reclamation was blast furnace slag and associated steel making wastes from the primary steel making process (i.e. manufacture of raw steel from iron ore, coke, lime, etc). The blast furnace slags and residues from this process are quite different from those associated with EAF manufacture which is the electrical melting of sorted and quality controlled scrap metal.

The blast furnace slag and primary steel making wastes are typically high in concentrations of heavy metals, sulphates and other impurities from the inefficient primary steel making processes. The principal environmental concern with this material is the leaching of heavy metals into water and the generation of inhalable dust containing these heavy metals.

3.9 Visual/Olfactory Evidence of Existing Contamination

During the site surveillance, carried out on 20th June 2010, no visual and/or olfactory evidence of significant contamination was identified. The area is characterised by a layer of EAF slag over the surface but evidence of any contaminative activities.

3.10 Evidence of Damage to Pollution Prevention Measures

The site is used solely for the temporary storage of slag from the local CELSA steel manufacturing facilities. A pollution risk from the activity is the generation of dust from the slag; this tends to be generated during dry and windy weather conditions. CELSA, as is currently undertaken at the adjacent Mill Services site for physical treatment, including slag processing, will ensure that the stockpiled slag is regularly sprayed with water, using a water bowser, to minimise the risk of dust generation during times when there is risk of dust generation. There are no other pollution control measures at the site; none are considered warranted.

CELSA operates an ISO14001 certified Environmental Management System within which there are procedures to ensure the control of potentially polluting activities at CELSA's sites; additionally CELSA personnel undergo training in pollution prevention techniques.

Primary and Secondary Containment

There are no Underground Storage Tanks (USTs) or Above Ground Storage Tanks (ASTs) in use on the site.

The use and storage of potentially hazardous materials at the site is not planned by CELSA.

Additionally, CELSA does not plan to store any waste materials at the site other than EAF slag.

Tertiary Containment

The site is not surfaced with hardstanding. The site surface is comprised of compacted slag from steel processing activities. Surface water runoff drains directly into the ground. There are no oil/water interceptors at the site. The site does not have any active surface water discharge consents.

CELSA does not plan to store environmentally hazardous materials at the site, hence there is no risk of such hazardous materials contaminating surface water runoff.

Environmental Management System

The site operates a formally certified Environmental Management System (EMS) that meets the requirements of the ISO 14001:2004 standard.

3.11 Evidence of Historic Contamination

No historic site investigation, assessment, remediation and verification reports are available for the site.

The Site

From the earliest map of 1880 the site was comprised of mud flats. By the mid to late 1960s the site had been reclaimed with waste materials (which from anecdotal information the reclamation materials are known to have comprised blast furnace slag and other steel manufacturing waste materials from the surrounding steel manufacturing works); the site, and immediate surrounding area which had also been reclaimed, is annotated on historical maps as being a 'disused tip'. The site since it was reclaimed has remained undeveloped to the present day.

Surrounding Area

The following notable potentially contaminative activities have been identified as having taken place in the immediate surrounding area:

- Reclamation of the site and adjacent land during the 1960s with primary steelworks slag.
- CELSA's Tremorfa Steel Works, with associated railway lines, (350m west), 1960s – present day.
- Sewage treatment works (adjacent to the south).
- CELSA's Mill Services site (adjacent to the west), 1960s – present day.

Potential contaminants from these activities could include metals, hydrocarbons, polyaromatic hydrocarbons, solvents, paints, etc.

The above activities represent potential off-site sources of contamination that (if present) could potentially migrate beneath the site. The potential for off-site contamination (if present) to migrate beneath the site would be dependent on the underlying geological conditions.

4 Baseline Reference Data

4.1 Introduction

No previous investigations have been undertaken at the subject site and therefore, the overall objective of the intrusive investigation was to establish the existing environmental condition of the site; provide information relating to the extent and nature of contamination (if present) in both disturbed and natural soils (if encountered) across the site; and provide information on the quality of the shallow groundwater beneath the site (if encountered) in order to provide baseline data.

The intrusive investigation covered the entire site area. The investigation strategy and findings are summarised in the following sections of this SCR.

4.2 Investigation Strategy

The investigation comprised the following:

- the excavation of six (6) trial pits (TP1-TP6) to depths 4.0m (TP4) using a JCB-type mechanical excavator in order to permit discrete sampling of soils and to enable the visual assessment of the material in order to ascertain whether any suspect materials (e.g. stained soils, odorous soils or asbestos) were present or if indeed, the material was uncontaminated soil and vegetation as stated. The trial pits following excavation and sampling were backfilled to ground level with the excavated material.
- the collection of ten (10) surface samples from various locations across the site;
- the logging and sampling of soil samples at regular intervals throughout the soil profile; and
- submission of selected soil samples to an accredited independent laboratory for the analysis of a range of contaminants, which are likely to be associated with the former activities and ground conditions on the site.

Rationale for Sampling

Given that the site is located on reclaimed land, the reclamation materials for which are known to comprise of blast furnace slag from historical local primary steel manufacturing works, a degree of contamination is considered likely to be present at the site.

Therefore, sampling locations were positioned to provide representative coverage across the site. Restrictions were imposed due to the presence of perimeter mounds and the plant movements from the minerals yard activities. Additionally, the present of slag stockpiles restricted access to certain areas of the site. The rationale behind the locations was to provide general coverage of the site.

Table 4.1: Sampling Location & Rationale	
Sample Location	**Rationale**
TP1	• To provide spatial coverage of the site's north eastern boundary.
TP2	• To provide spatial coverage of the site's eastern boundary.
TP 3	• To provide spatial coverage of the site's eastern boundary.
TP 4	• To provide spatial coverage of the site's south eastern boundary.
TP 5	• To provide spatial coverage of the site's north eastern boundary.
TP 6	• To provide spatial coverage of the site's southern boundary.
S1	• To provide spatial coverage of the site's north eastern boundary.
S2	• To provide spatial coverage of the site's eastern boundary.
S3	• To provide spatial coverage of the site's south eastern boundary.
S4	• To provide spatial coverage of the site's southern boundary.
S5	• To provide spatial coverage of the site's central eastern area.
S6	• To provide spatial coverage of the site's northern area.
S7	• To provide spatial coverage of the site's central area.
S8	• To provide spatial coverage of the site's south western area.
S9	• To provide spatial coverage of the site's north western area.
S10	• To provide spatial coverage of the site's western area.

The sampling location plan associated with the intrusive investigation is presented in Figure 4 Sample Location Plan.

The S samples represent surface samples from the immediate site surface, the trial pits (TP) were multiple depth samples.

4.3 Field Observations

Ground Conditions

- Made Ground was encountered at each of the sampling locations (including surface samples). In all samples taken at the surface the Made Ground comprised light grey granular dust (from recent stockpiled slag material). Made Ground directly below this shallow dust (from approximately 10cm below ground level (bgl)) generally comprised dark grey/brown ashy granular fill material, with small amounts of rubble, fragments of clinker and slag, metal fragments and occasional refractory rubble. The depth of made ground was not proven in the exploratory sampling locations, with the maximum excavation depth being 4.0m bgl (TP4). No biodegradable or putrescible material was observed within the made ground.
- Natural strata was not encountered in any of the sample locations.

Groundwater

During the excavation of the trial pit locations, groundwater was not encountered. The excavated material was noted to be dry.

Field Evidence of Contamination

No significant or widespread field evidence of contamination was observed during the excavation of the trial pits. No staining was observed and there was no olfactory evidence of potential contamination.

There were however substantial ash and slag deposits from blast furnace operations in all locations

4.4 Chemical Analysis

The analytical strategy was designed to provide an assessment of the presence of potential contaminants arising from historical as well as current activities at the site and also to provide general characterisation of the site. The soil samples collected during the investigation were submitted to a UKAS and NAMAS accredited laboratory (i2) for analysis, which generally comprised the following:

- pH;
- total sulphur
- monohydric phenols;
- speciated polyaromatic hydrocarbons (PAHs);
- calcium;
- a range of metals (arsenic, cadmium, total chromium, copper, iron, lead, manganese, mercury, nickel, silicon, selenium, tin, zinc, magnesium); and
- total petroleum hydrocarbons (TPH).

Selected soil samples were also submitted for leachate analysis for:

- sulphate as SO_4;
- total sulphur;
- a range of dissolved heavy metals (arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, tin, zinc and magnesium);
- calcium; and
- silicon.

Full analytical certificates are presented in *Annex D*.

Soil Analysis

A total of twenty (20) soil samples (from the six (6) trial pit locations) and a total of ten (10) surface soil samples taken from across the site were submitted for laboratory analysis.

The results of the trial pit soil chemical analyses are summarised in *Table 4.2* and for the surface soil samples in *Table 4.3* below, and an initial 'screening' assessment has been undertaken by comparison of the soil analytical results with published guidance criteria. The Environment Agency (EA) has recently released updated UK Soil Guideline Values (SGVs) which were developed by the Contaminated Land Exposure Assessment model (CLEA) and produced for the EA and the Department of Environment, Food and Rural Affairs (DEFRA). This guidelines and the following guideline criteria, which is widely referred to by consultants, Regulatory Authorities and other professionals within the industry, has been used as a screening method:

- The Chartered Institute of Environmental Health (CIEH) (whose members include the Local Authority Environmental Officers involved with contaminated land matters) in partnership with Land Quality Management Limited have produced a set of Generic Assessment Criteria (GAC) for 31 contaminants (derived using the CLEA UK model). It is anticipated that these 'look up tables' will be applied by the Local Authorities as an initial screening criteria in order to assess contaminated land. This was updated in 2009 to take on board changes in UK legislation.

4.4.1.1 Trial Pit Soil Analysis

A total of twenty soil samples were obtained from the six trial pits excavated during this intrusive investigation.

Table 4.2: Summary of Trial Pit Soil Chemical Analytical Results

Determinand	No. Samples Analysed	Range of Concentrations Detected (Max. Sample Ref.)	Guideline Criteria
pH	20	9.6 – 11.3 (TP5 0.3m)	NG
Total sulphur	5	2,300 – 3,700 (TP2 0.8m, TP5 1.5m)	NG
Monohydric phenols	5	<4.0	1,100,000 *
Arsenic	20	<1.0 – 35.0 (TP2 0.8m)	640~
Cadmium	20	3.8 – 75.0 (TP4 0.2m)	348 *
Chromium	20	220.0 – 2,600 (TP1 0.2m)	30,400 *
Mercury	20	<0.3 – 16.0 (TP2 1.6m)	26~
Copper	20	140.0 – 870.0 (TP1 0.8m)	71,700 *
Iron	5	160,000 – 250,000 (TP5 1.5m)	NG
Lead	20	230.0 – 2,500 (TP4 0.2m)	NG
Manganese	5	4,400 – 6,300 (TP1 0.2m)	NG
Magnesium	20	3,300 – 78,000 (TP4 3.3m)	NG
Nickel	20	43.0 - 260 (TP4 4.0m)	1,800~
Zinc	20	510.0 – 22,000 (TP4 0.2m)	665,000 *
Selenium	5	<1.0	13,000~

Table 4.2: Summary of Trial Pit Soil Chemical Analytical Results			
Determinand	**No. Samples Analysed**	**Range of Concentrations Detected (Max. Sample Ref.)**	**Guideline Criteria**
Tin	5	27.0 – 73.0 (TP5 1.5m)	NG
Silicon	5	290.0 – 500.0 (TP2 0.8m)	NG
Calcium	5	140,000 – 210,000 (TP2 0.8m)	NG
Total TPH	5	180.0 – 1,200 (TP1 0.8m)	500+
Speciated PAHs			
Naphthalene	5	0.25 – 1.1 (TP4 3.3m)	200 #
Acenaphthene	5	0.1 – 1.5 (TP4 3.3m)	85,000 #
Acenaphthylene	5	<0.05 – 0.7 (TP1 0.8m)	84,000 #
Anthracene	5	0.31 – 6.3 (TP4 3.3m)	530,000 #
Benzo (a) Anthracene	5	<0.2 – 4.6 (TP1 0.8m)	90 #
Benzo (a) Pyrene	5	0.15 – 4.2 (TP1 0.8m)	14 #
Benzo (b) Flouranthene	5	0.35 – 4.6 (TP1 0.8m)	100 #
Benzo (g,h,i) Perylene	5	0.13 – 4.3 (TP1 0.8m)	650 #
Benzo (k) Fluoranthene	5	0.66 – 7.3 (TP1 0.8m)	140 #
Chrysene	5	0.12 – 5.5 (TP1 0.8m)	140 #
Dibenzo (a, h) Anthracene	5	<0.05 – 1.3 (TP1 0.8m)	13 #
Fluoranthene	5	0.49 – 6.3 (TP1 0.8m)	23,000 #
Fluorene	5	0.16 – 2.4 (TP4 3.3m)	64,000 #
Indeno (1,2,3-cd) Pyrene	5	0.13 – 4.3 (TP1 0.8m)	60 #
Phenanthrene	5	0.44 – 10.0 (TP4 3.3m)	22,000 #
Pyrene	5	0.4 – 6.3 (TP1 0.8m)	54,000 #
Speciated EPA-16 PAHs	5	4.2 – 55.0 (TP1: 0.8m)	NG
Asbestos screen	5	None detected	N/A

All results expressed in mg/kg except for pH and where indicated.

* CIEH GAC guidelines at 6% SOM

CIEH GAC guidelines at 1% SOM

+ Waste Acceptance Criteria for Inert Soils

~ EA Soil Guideline Value

NG = No Guideline

ND = Not detected above Analytical Detection Limit

- = Not relevant

pH: The soil samples analysed ranged between pH 9.3 – pH 11.2, indicating alkaline conditions.

Metals: At the current time there are only guideline values available for arsenic, cadmium, chromium, mercury, copper, nickel, zinc and selenium. When compared with the guidelines, the maximum concentrations of the metals are well below the relevant guidelines for industrial/commercial use, and as such are not considered significant.

Phenols: Monohydric phenol was not detected above the analytical detection limit in any of the five samples analysed.

Total Petroleum Hydrocarbons (TPH C10 – C40): Five samples were submitted for TPH (C10 – C40) analysis. The maximum total hydrocarbon concentration of 1,200 mg/kg was recorded within a sample taken from TP1: 0.8m bgl. Although, there are no direct guidelines that can be used for comparison, the Waste Acceptance Criteria (WAC) for Inert Soil (500mg/kg) provides some indication of the degree of hydrocarbon contaminant present. Three of the five samples were found to be elevated above 500mg/kg (TP1: 0.2m bgl 680mg/kg, TP1: 0.8m bgl 1,200mg/kg, and TP5: 1.5m bgl 520mg/kg).

Total Sulphur: Sulphur was detected in all 5 samples submitted for sulphur analysis, with concentrations ranging from 2,300 – 3,700mg/kg. There is no guideline available for comparison, however, the concentrations are not considered to be significantly elevated.

Polycyclic Aromatic Compounds (PAHs): Total PAH concentrations were recorded above the analytical detection limit for all of the five samples submitted for analysis. The maximum concentration was recorded in TP1 (0.8m bgl), which recorded a concentration of 55 mg/kg (sum of EPA 16 priority compounds). No individual PAH concentrations were detected above the assessment criteria where applicable.

Asbestos Screen: Asbestos screening was undertaken on five samples of the shallow soils from across the site. No asbestos was detected in any of the soil samples.

Overall, the soil analytical results were generally found to contain low concentrations of contaminants below the relevant guideline criteria, where available. Elevated TPH concentrations (above the Waste Acceptance Criteria of 500 mg/kg for inert waste) were recorded in three samples taken from the made ground.

4.4.1.2 Surface Soil Samples

Ten surface soil samples were submitted for analysis, the results of which are detailed in Table 4.3 below:

Table 4.3: Summary of Surface Soil Chemical Analytical Results			
Determinand	**No. Samples Analysed**	**Range of Concentrations Detected (Max. Sample Ref.)**	**Guideline Criteria**
pH	10	8.9 – 11.2 (S6 & S9)	NG
Total sulphur	5	1,100 – 2,300 (S10)	NG
Monohydric phenols	3	<4.0	1,100,000 *
Arsenic	10	<1	640~
Cadmium	10	4.0 – 23.0 (S6)	348 *
Chromium	10	1,500 – 2,700 (S8)	30,400 *
Mercury	10	<1.0	26~
Copper	10	400 – 650 (S5)	71,700 *
Iron	10	230,000 – 300,000 (S5)	NG
Lead	10	110 – 600 (S6)	NG
Manganese	10	6,900 – 8,200 (S3)	NG
Magnesium	10	48,000 – 82,000 (S7)	NG
Nickel	10	60.0 – 110 (S3, S5 & S7)	1,800~
Zinc	10	880 – 7,300 (S6)	665,000 *
Selenium	10	<1.0	13,000~
Tin	10	31.0 – 34.0 (S3, S5 & S7)	NG
Silicon	10	91.0 – 810 (S3)	NG
Calcium	10	220,000 – 310,000 (S7)	NG
Total TPH	3	340 (S3)	500+
Speciated PAHs			
Naphthalene	3	<0.05 – 0.23 (S3)	200 #
Acenaphthene	3	<0.05 – 0.15 (S3)	85,000 #
Acenaphthylene	3	<0.05 – 0.26 (S3)	84,000 #
Anthracene	3	0.12 – 0.73 (S3)	530,000 #
Benzo (a) Anthracene	**3**	**<0.2 – 0.35 (S3)**	**90 #**
Benzo (a) Pyrene	3	<0.1 – 0.37 (S3)	14 #
Benzo (b) Flouranthene	3	<0.1 – 0.38 (S3)	100 #
Benzo (g,h,i) Perylene	3	<0.05 – 0.34 (S3)	650 #
Benzo (k) Fluoranthene	3	<0.05 – 0.3 (S3)	140 #
Chrysene	3	<0.05 – 0.29 (S3)	140 #
Dibenzo (a, h) Anthracene	3	<0.05 – 0.13 (S3)	13 #

Table 4.3: Summary of Surface Soil Chemical Analytical Results			
Determinand	**No. Samples Analysed**	**Range of Concentrations Detected (Max. Sample Ref.)**	**Guideline Criteria**
Fluoranthene	3	0.2 – 0.75 (S3)	23,000 #
Fluorene	3	0.08 – 0.31 (S3)	64,000 #
Indeno (1,2,3-cd) Pyrene	3	<0.05 – 0.34 (S3)	60 #
Phenanthrene	3	0.39 – 1.2 (S3)	22,000 #
Pyrene	3	0.13 – 0.56 (S3)	54,000 #
Asbestos screen	5	None detected	N/A

All results expressed in mg/kg except for pH and where indicated.

* CIEH GAC guidelines at 6% SOM

CIEH GAC guidelines at 1% SOM

~ Soil Guideline Values

+ Waste Acceptance Criteria for Inert Soils

NG = No Guideline

ND = Not detected above Analytical Detection Limit

- = Not relevant

pH: The range of soil samples analysed ranged between pH 8.9 – pH 11.2, indicating alkaline conditions.

Metals: A total of ten samples were submitted for metal analysis. At the current time there are only guideline values available for arsenic, cadmium, chromium, mercury, copper, nickel, zinc and selenium. When compared with the guidelines, the maximum concentrations of the metals are well below the relevant guidelines for industrial/commercial use.

Total Sulphur: Sulphur was detected in all five samples submitted for analysis. There is no guideline available for comparison, however, the concentrations are not considered to be significantly elevated.

Phenols: Monohydric phenol was not detected above the analytical detection limit in any of the three samples analysed.

Total Petroleum Hydrocarbons (TPH C10 – C40): All three samples submitted for TPH analysis within the carbon chain C10 – C40 contained detectable levels of TPH (i.e. exceeding the analytical detection limit), with a maximum concentration of 340mg/kg being detected in S3. Using the 500mg/kg value from the Waste Acceptance Criteria for Inert Waste none of the samples recorded concentrations above this value.

Polycyclic Aromatic Compounds (PAHs): Total PAH concentrations were recorded above the analytical detection limit in two of the three samples submitted for analysis. The maximum detected in S3, which recorded a concentration of 6.8 mg/kg (sum of EPA 16 priority compounds). The concentrations detected are not considered to be significantly elevated; in addition, no individual PAH concentrations were detected above the assessment criteria where applicable.

Asbestos Screen: Asbestos screening was undertaken on five samples of the shallow soils from across the site. No asbestos was detected in any of the soil samples.

Overall, the surface soil analytical results were generally found to contain low concentrations of contaminants, many being below the relevant guideline criteria, where available.

4.4.1.3 Leachability Analysis of Soil Samples

Leaching tests were undertaken on five trial pit soil samples (TP1: 0.2m bgl, TP2: 0.8m bgl; TP3: 1.1m bgl; TP4: 4.4m bgl and TP5: 1.5m bgl) and on five surface soil samples (S1, S3, S5, S7 and S10) in accordance with the test method detailed in the National Rivers Authority (NRA) Interim Guidance Note issued in 1994, entitled Leaching Tests for the Assessment of Contaminated Land. These tests involve passing a sample of laboratory prepared water through the soil samples under controlled conditions and analysing the leachate for substances that might have been leached from the soil samples. The analysis is used to assess the potential for leaching of contaminants from soil into groundwater and watercourses, and the potential mobility of the contaminants identified within the soil to enter the groundwater phase.

In the absence of relevant published water assessment criteria, the potential risks to human health and controlled water from surface and groundwater have been assessed using commonly accepted UK guidelines including the Water Supply (Water Quality) Regulations 2000 and Environmental Quality Standards (EQS). For those determinants included in the analytical suite which do not have a corresponding UK screening criteria derived from the above sources, reference will be made to international guidance such as the World Health Organisation Guidelines for Drinking Water Quality (1984) and the US Environment Protection Agency Region 9 Preliminary Remediation Goals (October 2008).

4.4.1.4 Leachability of Trial Pit Soil Samples

The analytical results of the leachate analysis for the soil samples from the trial pits are presented in Table 4.4 below.

Table 4.4: Trial Pit Soil Samples Leachability Results

Determinand	No. Samples Analysed	Range of Concentrations Detected (Max. Sample Ref.)	Guideline Criteria
Sulphur as SO_4	5	9,900 – 52,000 (TP1: 0.2m)	NG
Total sulphur	5	3,300 – 17,000 (TP1: 0.2m)	NG
Arsenic	5	<10	10*

Table 4.4: Trial Pit Soil Samples Leachability Results			
Determinand	**No. Samples Analysed**	**Range of Concentrations Detected (Max. Sample Ref.)**	**Guideline Criteria**
Cadmium	5	<0.5	5*
Chromium	5	4.6 – 52 (TP4: 3.3m)	50*
Mercury	5	<1.5	1.0#
Copper	5	15 – 23 (TP1: 0.2m)	2000*
Iron	5	<0.2 – 0.5 (TP1: 0.2m)	200*
Lead	5	<5.0 – 5.5 (TP4: 3.3m)	25*
Manganese	5	<1.0 – 88 (TP1: 0.2m)	50*
Magnesium	5	<0.1 – 0.6 (TP1: 0.2m)	NG
Nickel	5	<1.0 – 1.5 (TP1: 0.2m & TP3: 1.1m)	20*
Zinc	5	<1.0 – 33 (TP1: 0.2m)	5000#
Selenium	5	<10	10*
Tin	5	<5.0 – 5.7 (TP3: 1.1m)	NG
Silicon	5	1,100 – 4,800 (TP3: 1.1m)	NG
Calcium	5	9.7 – 85 (TP4: 3.3m)	NG

All results expressed in µg/l except where indicated.

* DWQ = Drinking Water Quality Guideline – *Water Supply (Water Quality) Regulations 2000*

Environmental Quality Standards (EQS) – *Directive on Priority Substances (Directive 2008/105/EC)*

NG = No Guideline

- = Not relevant

Metal concentrations were generally found to either be below the analytical detection limits or guideline criteria (where available). One exception was manganese in TP1: 0.2m, which was detected slightly above the guideline value of 50µg/l at a concentration of 88µg/l.

Sulphate as SO4 – Sulphate concentrations ranged from 3,300µg/l (TP4 3.3m) to 17,000 µg/l (TP1 0.2m). There are no guideline values for sulphate as SO4, however the concentrations indicate that sulphate is available in a leachable form within the made ground.

Total sulphur – Sulphur concentrations ranged from 9,900 µg/l (TP4 3.3m) to 52,000 µg/l (TP1 0.2m) There are no guideline values for total sulphur, however the concentrations indicate that sulphur is available in a leachable form within the made ground.

Calcium - Calcium concentrations ranged from 9.7mg/l (TP3 1.1m) to 85.0mg/l (TP4 3.3m). There are no guideline values calcium, however the concentrations indicate that calcium is not available in a leachable form within the made ground.

4.4.1.4 Leachability of the Surface Soil Samples

The analytical results of the leachate analysis for the soil samples frokm the trial pits are presented in Table 4.5 below.

Table 4.5: Surface Soil Samples Leachability Results

Determinand	No. Samples Analysed	Range of Concentrations Detected (Max. Sample Ref.)	Guideline Criteria
Sulphur as SO_4	5	11,000 – 84,000 (S3)	NG
Total sulphur	5	3,700 – 28,000 (S3)	NG
Arsenic	5	<10	10*
Cadmium	5	<0.5	5*
Chromium	5	2.8 – 7.0 (S7)	50*
Mercury	5	<1.5	1.0#
Copper	5	15 – 19 (S5 &S10)	2000*
Iron	5	<0.2	200*
Lead	5	<5.0	25*
Manganese	5	1.0 – 31 (S3)	50*
Magnesium	5	<0.1 – 5.2 (S1)	NG
Nickel	5	1.0 – 1.7 (S3)	20*
Zinc	5	<1.0 – 35 (S3)	5000#
Selenium	5	<10	10*
Tin	5	<5.0 – 5.6 (S3)	NG
Silicon	5	6,200 – 17,000 (S10)	NG
Calcium	5	15 – 31 (S10)	NG

All results expressed in µg/l except where indicated.

DWQ = Drinking Water Quality Guideline – *Water Supply (Water Quality) Regulations 2000*

Environmental Quality Standards (EQS) – *Directive on Priority Substances (Directive 2008/105/EC)*

NG = No Guideline

- = Not relevant

Metal concentrations were generally either be below the analytical detection limits or guideline criteria (where available).

Sulphate as SO4 – Sulphate concentrations ranged from 11,000 µg/l (S3) to 84,000 µg/l (S10). There are no guideline values for sulphate as SO4, however the concentrations indicate that sulphate is available in a leachable form within the made ground.

Total sulphur – Sulphur concentrations ranged from 3,700 µg/l (S3) to 28,000 µg/l (S10). There are no guideline values for total sulphur, however the concentrations indicate that sulphur is available in a leachable form within the made ground.

Calcium - Calcium concentrations ranged from 15mg/l (S3) tot 31mg/l (S10). There are no guideline values for calcium, however the concentrations indicate that calcium is not available in a leachable form within the made ground.

Overall, the leachate results for trial pit and surface soil samples show that under laboratory conditions the metals and calcium within the made ground horizon are not in a readily soluble form and are in the main below relevant guideline values, where available, and do not to represent a significant risk to groundwater and surface water resources. Sulphate as SO4 and sulphur do appear to be present in more readily soluble forms, however given the absence of shallow groundwater the risk to groundwater resources is reduced, additionally there are no adjacent surface water resources to the site which could be impacted by any contaminated surface water runoff.

4.4.1.5 Groundwater Analysis

Groundwater was not encountered during the intrusive investigation. No groundwater analysis was undertaken.

5 Qualitative Risk Assessment

5.1 Introduction

The desk study data identified a number of potential sources of contamination from historical and current site usage. In order to quantify the environmental risks and provide information of the quality of the soils and shallow groundwater beneath the site in order to provide baseline data an intrusive investigation was undertaken at the site.

5.2 Sources of Contamination

- Desk study data has identified that the site is located in an industrial/commercial setting, with the site itself having been reclaimed in the 1960s, the reclamation materials for which comprised blast furnace slag and other steel manufacturing waste materials from local steel manufacturing works. Prior to reclamation the site comprised of mud flats. Development of the immediate surrounding area, including the near-by CELSA Tremorfa steel works, commenced in the 1960s, however, the historical map evidence indicates that the subject site itself remained undeveloped until its present day.

- CELSA utilises the site for the temporary storage (stockpiles) of slag from the local CELSA steel manufacturing facilities, prior to processing which is undertaken on the adjacent main slag processing site.

- Given the site's potentially contaminative history, having been reclaimed using blast furnace slag and other steel manufacturing waste materials, an intrusive investigation was undertaken to establish the existing environmental condition of the site and provide information relating to the extent and nature of contamination (if present) across the site in order to provide baseline data.

- Groundwater was not encountered at the site during the site investigation.

- The levels of contamination detected within the soils are not considered to represent a significant source of contamination.

Whilst no other exceedances were encountered during the intrusive investigation, it should be noted that the presence of slag stockpiles limited the site area available for intrusive investigation, hence the potential for un-investigated areas of the site to contain contaminants above guideline criteria cannot be ruled out. The presence of unidentified contamination is however considered to be limited given the relatively homogeneous nature of fill materials used to reclaim this site and the immediate surrounding area.

5.3 Receptors

The following receptors have been identified:

- site workers (i.e. current and future employees located at the site);

- groundworkers (i.e. any future construction workers, maintenance workers or other personnel who may be exposed to contaminated soil or groundwater);

- groundwater (however the site is located on a non aquifer, which is not considered to be a sensitive water resource although is likely to be in hydraulic continuity with the near-by Severn Estuary. Additionally, groundwater was not encountered during the intrusive investigation); and

- third party land (i.e. the possibility of contamination migrating off-site onto third party land in the form of contaminated groundwater).

5.4 Pollutant Linkages

The following potential pollutant linkages have been identified at the site:

- migration of contaminants to the wider aquifer.

Risks to construction workers or maintenance workers should be manageable by standard health and safety procedures.

A conceptual model for the site, presenting the identified sources of contamination, pathways and receptors is detailed in *Table 6.1* below.

Table 5.1: Conceptual Model

Source	**Pathway**	**Receptor**	**Pollutant Linkage Assessment**
Hot spots of hydrocarbons detected in the made ground.	Ingestion, inhalation, direct contact	**Human (current and future)** Site users: Ingestion and contact – **Low Risk** Inhalation (vapours) – **Low Risk** Only localized hydrocarbon hot spots were detected, the majority at depth.	No pollutant linkage identified from current use of the site in relation to direct contact with soil and groundwater contamination or inhalation of vapour.
Elevated concentrations of leachable sulphate and sulpur detected	Groundwater and surface water	**Controlled Waters** Groundwater (on-site) –**Low Risk** Groundwater (off-site) – **Low Risk** (groundwater not encountered during intrusive investigation) Surface waters – **Low Risk**	Whilst elevated concentrations of leachable sulphate and sulphur were detected in made ground soil samples, groundwater was not encountered during the intrusive investigation. Additionally, there are no surface water courses adjacent to the site.

In terms of the potential for contamination to migrate off-site onto third party land or onto the site from off-site sources, significantly elevated concentrations of contaminants have not been identified in soils or groundwater on the site boundaries, hence the potential for such migration is considered low.

5.5 Environmental Receptor Summary

The key environmental receptors located around the proposed installation are described in *Table 4.1*. The location of the various receptors is also shown in *Figure 3*.

Table 5.2: Summary of receptors

Receptor	Description
Specially protected parts of the environment (*i.e.* designated habitats such as RAMSAR, SAC, SPA, SSSI, LNR)	According to the Countryside Council for Wales database the Severn Estuary is designated as a RAMSAR site, SAC, SPA, and SSSI. The Gwent Levels – Rumney and Peterstone are classified as a SSSI.
Single houses or groups of houses (estates, villages etc)	According to the current ordnance survey mapping the closest residential properties are located c. 700 metres north west of the site.
Schools, hospitals, factories, shops etc.	According to the current ordnance survey mapping (1:10,000, 2008) the nearest school is located c. 650m to the north west (Willows Mixed High School). No hospitals are located within 2 km of the site. The site is located within an industrial zone and hence it is surrounded by various types of industrial land use.
Footpaths, recreation areas such as playing fields and playgrounds	According to the current ordnance survey mapping there is one recreational area or public parks within 500 metres of the site: Pengam Green – c. 500m north. Additionally, MX Motor Cross motorcycle track is located adjacent to the east of the site.
Fields and allotments used for growing food	According to current on-line ordnance survey mapping there are no allotments within 1 km of the site. However, there are houses with gardens, which are possibly used for growing fruit and vegetables c. 700m to the north west of the site.
Rivers and streams	According to the current ordnance survey mapping the nearest surface water course is the Severn Estuary located approximately 50m east of the site.
Historic buildings, listed buildings, archaeological sites	According to the publically available on-line COFLEIN database for the National Monuments Record of Wales. there are no protected structures/sites within 500 metres of the site.

Table 5.2: Summary of receptors	
Receptor	**Description**
Water abstraction points	There is one licensed groundwater abstraction for an abstraction borehole located on the adjacent CELSA Mill Services site. The abstracted water is for industrial use for dust suppression. There are no surface water abstractions for sensitive usage located in the immediate vicinity of the site. The nearest surface water abstraction is at licensed to CELSA for the abstraction of surface water at CELSA's Rod and Bar Mill c. 2km south west.
The sensitivity of the groundwater	The site is considered to be situated in an area of low sensitivity with respect to groundwater resources due to the underlying non-aquifer. According to an EA the site is not situated within a groundwater Source Protection (SPZ).
Sensitive land uses – e.g. commercial fish farms, farmland	No additional sensitive land uses have been identified.
Coastal/estuarine areas	The Severn Estuary is located c. 50m to the east of the site.
Drainage systems/sewers	There are no surface water or trade effluent discharges from the site, nor are any planned. Surface water runoff drains directly into the unsurfaced ground at the site. Given the close proximity of the estuary it is likely that the groundwater at the site is in hydraulic continuity with the estuary and that the surface water runoff will ultimately discharge into the Severn Estuary. There are no oil/water interceptors on the site.

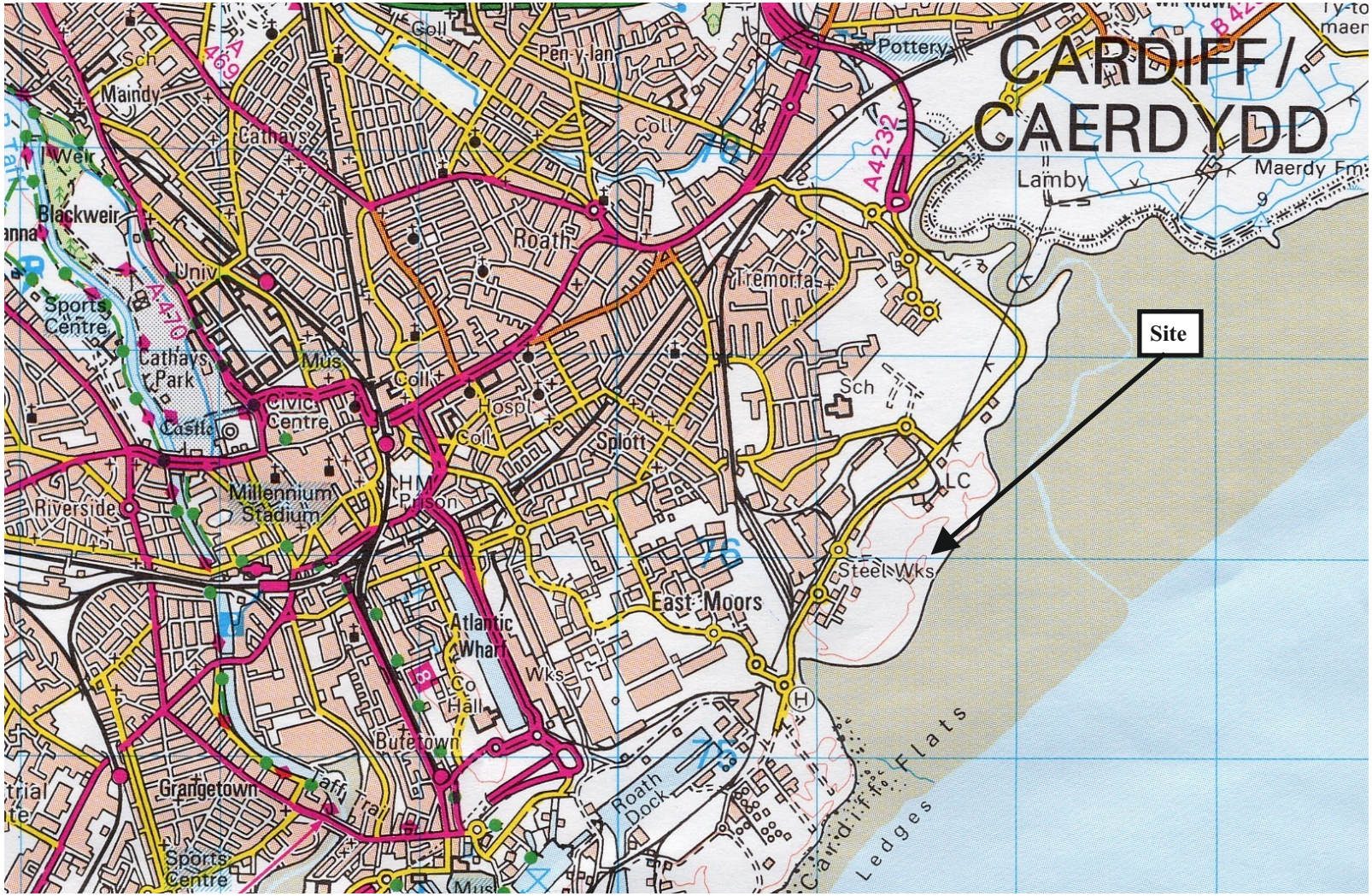
6 Dangerous Substances Associated with Permitted Activities

The permitted operations will not encompass the use, storage, treatment and/or disposal of environmentally hazardous materials. The only material in use at the site is the slag which will be stockpiled at the site prior to processing on the adjacent slag processing site, also operated by CELSA.

The management and control of slag storage and processing is included in CELSA's formally certified ISO14001 Environmental Management System, which includes procedures for the handling and management of the slag during storage and processing activities.

The made ground in the main does not contain significantly elevated concentrations of contaminants. The potential for the leaching of metals and other potential contaminants from the made ground is considered to be relatively limited, as can be seen by the site investigation analytical leachate results.

Annex A: Figures



EAME
Earth & Marine Environmental Ltd

Earth and Marine Environmental Limited
6 Bell Yard, London WC2A 2JR
Tel. +44 (0)20 7067 2930
Fax +44 (0)20 7067 2940

Figure 1: Site Location Plan

Client	**Celsa Manufacturing (UK) Ltd**		
Scale	**NTS**	Date	**July 2010**
Project No	**010-0003**	Drawn by	**SA**

Key:

Site Boundary

EAME
Earth & Marine Environmental Ltd

Earth and Marine Environmental Limited
6 Bell Yard, London WC2A 2JR
Tel. +44 (0)20 7067 2930
Fax +44 (0)20 7067 2940

Figure 2: Site Boundary and Layout Plan

Client	**Celsa Manufacturing (UK) Ltd**		
Scale	**NTS**	Date	**July 2010**
Project No	**010-0003**	Drawn by	**SA**

Earth and Marine Environmental Limited
6 Bell Yard, London WC2A 2JR
Tel. +44 (0)20 7067 2930
Fax +44 (0)20 7067 2940

Figure 3: Sensitive Receptors Within 500m

Client	**Celsa Manufacturing (UK) Ltd**		
Scale	**NTS**	Date	**July 2010**
Project No	**010-0003**	Drawn by	**SA**

Key:

- Site Boundary
- Surface Soil Samples
- Trial Pits

EAME
Earth & Marine Environmental Ltd

Earth and Marine Environmental Limited
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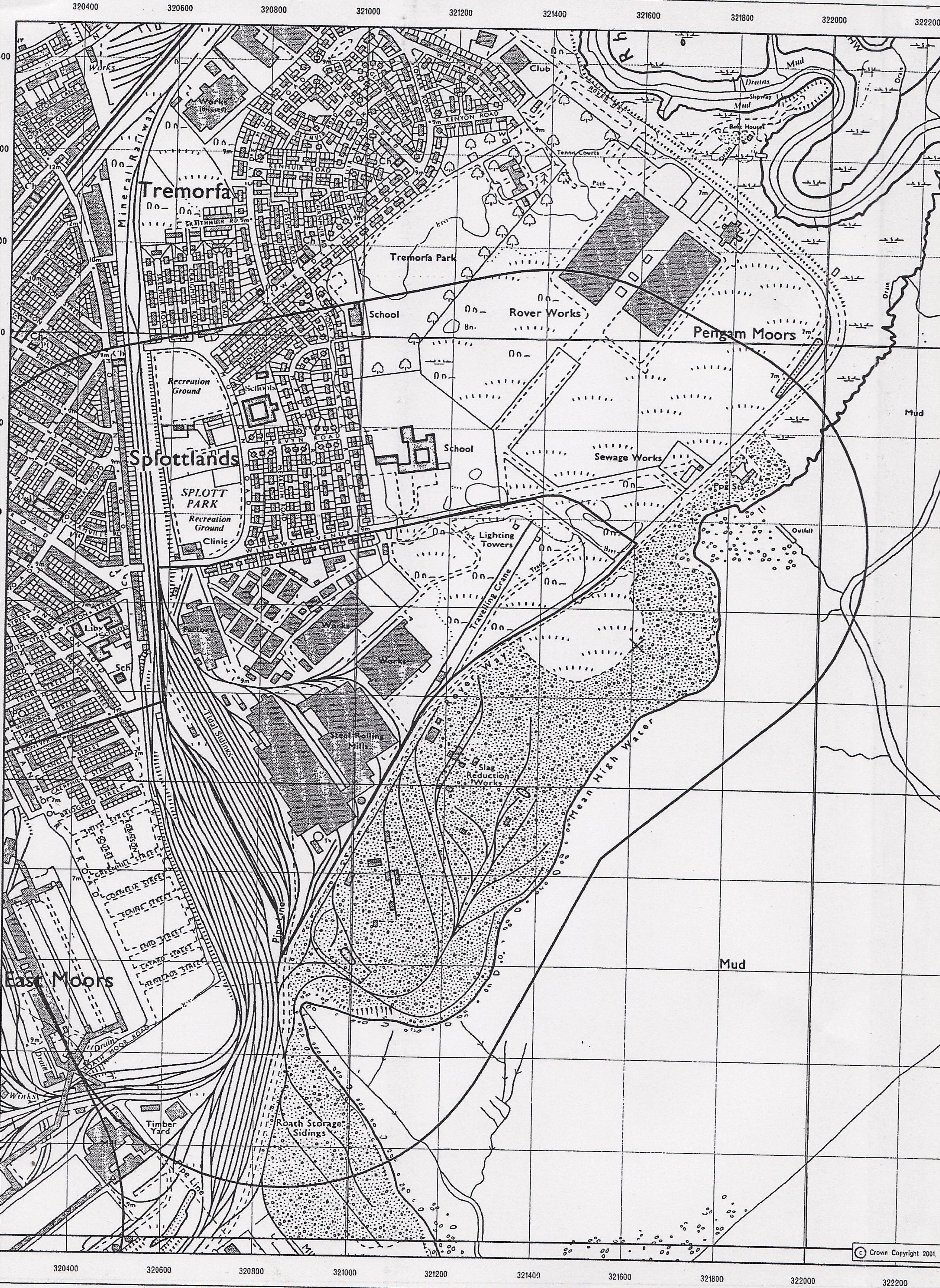
Fax +44 (0)20 7067 2940

Figure 4: Sample Location Plan

Client	**Celsa Manufacturing (UK) Ltd**		
Scale	**NTS**	Date	**July 2010**
Project No	**010-0003**	Drawn by	**SA**

Annex B: Historical Map (undated, circa late 1960s)


Tremorfa
Tremorfa Park
Rover Works
Pengam Moors
School
Splottlands
SPLOTT PARK
Recreation Ground
Clinic
Sewage Works
Lighting Towers
Travelling Crane
Works
Factory
Steel Rolling Mills
Slag Reduction Works
Mean High Water
Tidal Sidings
Pipe Line
Mud
East Moors
Timber Yard
Roath Storage Sidings
Mineral Railway
Club
Tennis Courts
Path
Boat House
Slipway
Drains
Outfall
Mill
Sch
KENYON ROAD
320400
320600
320800
321000
321200
321400
321600
321800
322000
322200
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Annex C: Trial Pit Logs

TRIAL PIT LOG

Trial Pit:	TP1	**Project:**	Slag Processing Extension Site
Sheet:	1 of 6	**Job Number:**	010-0003
Date:	20th July 2010	**Site Location:**	Tremorfa, Cardiff
Weather:	Dry, mild, sunny, intermittent cloud	**Logged By:**	SPR

Lab Tests	Soil Gas (ppm)		SAMPLES			STRATA				
	PID	FID	Depth (m)	Type	No.	Depth (m)	Water Levels	Strata Depth (m)		Description
			0.2	pH, S, phenols, PAHS, Metals, Ca, Mg, TPH, ACM				0.00	0.10	MADE GROUND: surface material (light grey granular dust)
								0.10	2.0	MADE GROUND (dark brown/grey ashy granular fill with occasional fragments of refractory rubble, slag, and clinker).
						-0.5-				
			0.8	pH, phenols, PAHS, Metals, ACM						
						-1.0-				
						-1.5-				
			1.9	pH, phenols, PAHS, Metals, TPH						
						-2.0-				
						-2.5-				
						-3.0-				
										End @ 2.0m

Key:	--τ-- Water Ingress; Gen - General Suite; S - Sulphur; VOC – Volatile Organic Compound PCB - Total PCBs; PAH - Total PAHs; Asb - Asbestos; L – Leachate Test TPH – Total Petroleum Hydrocarbon; W - Water; SVOC – Semi Volatile Organic Compound Ca – calcium; Mg - magnesium
Remarks:	No groundwater encountered. Made ground was dry. No olfactory odours.
Note:	Information on this sheet applies to this location only and should not be extrapolated to other areas of the site.

TRIAL PIT LOG

Trial Pit:	TP2	**Project:**	Slag Processing Extension Site
Sheet:	2 of 6	**Job Number:**	010-0003
Date:	20th July 2010	**Site Location:**	Tremorfa, Cardiff
Weather:	Dry, mild, sunny, intermittent cloud	**Logged By:**	SPR

Lab Tests	Soil Gas (ppm)		SAMPLES			STRATA				
	PID	FID	Depth (m)	Type	No.	Depth (m)	Water Levels	Strata Depth (m)		Description
			0.2	pH, Metals				0.00	0.15	MADE GROUND: surface material (light grey granular dust with occasional slag fragments)
								0.15	1.6	MADE GROUND (dark brown/grey ashy granular fill with occasional fragments of refractory rubble, metal, slag, and clinker. From 1.6m fill matrix becomes finer with larger fragments of refractory rubble).
						-0.5-				
			0.8	pH, S, Metals, Ca, Mg						
						-1.0-				
						-1.5-				
			1.6	pH, Metals						
			1.7	pH, Metals						
						-2.0-				
						-2.5-				
						-3.0-				
										End @ 2.0m

Key:	--τ-- Water Ingress	Gen - General Suite	MO - Mineral Oil	VOC – Volatile Organic Compound
	PCB - Total PCBs	PAH - Total PAHs	Asb - Asbestos	L – Leachate Test
	TPH – Total Petroleum Hydrocarbon		W - Water	SVOC – Semi Volatile Organic Compound
Remarks:	No groundwater encountered. Made ground was dry. No olfactory odours.			
Note:	Information on this sheet applies to this location only and should not be extrapolated to other areas of the site.			

TRIAL PIT LOG

Trial Pit:	TP3	**Project:**	Slag Processing Extension Site
Sheet:	3 of 6	**Job Number:**	010-0003
Date:	20th July 2010	**Site Location:**	Tremorfa, Cardiff
Weather:	Dry, mild, sunny, intermittent cloud	**Logged By:**	SPR

Lab Tests	Soil Gas (ppm)		SAMPLES			STRATA				
	PID	**FID**	**Depth (m)**	**Type**	**No.**	**Depth (m)**	**Water Levels**	**Strata Depth (m)**		**Description**
								0.00	0.10	MADE GROUND: surface material (light grey granular dust)
								0.10	1.1	MADE GROUND (dark brown/grey ashy granular fill with occasional fragments of refractory rubble, metal, slag, and clinker).
						-0.5-				
						-1.0-				
			1.1	pH, S, Metals, Ca, Mg				1.1	1.5	MADE GROUND (fine brown granular fill with occasional fragments of refractory rubble, metal, slag, and clinker. Within fill are grey hard compacted layers of dust. Base of trial pit comprised a layer of hard compacted dust).
			1.4	pH, Metals						
						-1.5-				
			1.5	pH, Metals						
						-2.0-				
						-2.5-				
						-3.0-				
										End @ 1.5m

Key:	--τ-- Water Ingress	Gen - General Suite	MO - Mineral Oil	VOC – Volatile Organic Compound
	PCB - Total PCBs	PAH - Total PAHs	Asb - Asbestos	L – Leachate Test
	TPH – Total Petroleum Hydrocarbon		W - Water	SVOC – Semi Volatile Organic Compound
Remarks:	No groundwater encountered. Made ground was dry. No olfactory odours.			
Note:	Information on this sheet applies to this location only and should not be extrapolated to other areas of the site.			

TRIAL PIT LOG

Trial Pit:	TP4	**Project:**	Slag Processing Extension Site
Sheet:	4 of 6	**Job Number:**	010-0003
Date:	20th July 2010	**Site Location:**	Tremorfa, Cardiff
Weather:	Dry, mild, sunny, intermittent cloud	**Logged By:**	SPR

Lab Tests	Soil Gas (ppm)		SAMPLES			STRATA				
	PID	FID	Depth (m)	Type	No.	Depth (m)	Water Levels	Strata Depth (m)		Description
			0.2	pH, Metals				0.00	0.15	MADE GROUND: surface material (light grey granular dust)
								0.15	2.8	MADE GROUND (dark brown/grey ashy granular fill with occasional fragments of refractory rubble, metal, slag, and clinker).
						-0.5-				
						-1.0-				
			1.1	pH, Metals						
						-1.5-				
						-2.0-				
			2.4	pH, Metals						
						-2.5-				
								2.8	4.0	MADE GROUND (blue/grey coarser slag ash matrix with occasional fragments of refractory rubble, metal, slag, and clinker)
						-3.0-				
			3.3	pH, Phenols, Metals, Ca, Mg, PAHs, ACM, TPH						
			4.0	pH, Metals		4.0				End @ 4.0m

Key:	--τ-- Water Ingress	Gen - General Suite	MO - Mineral Oil	VOC – Volatile Organic Compound
	PCB - Total PCBs	PAH - Total PAHs	Asb - Asbestos	L – Leachate Test
	TPH – Total Petroleum Hydrocarbon		W - Water	SVOC – Semi Volatile Organic Compound
Remarks:	No groundwater encountered. Made ground was dry. No olfactory odours.			
Note:	Information on this sheet applies to this location only and should not be extrapolated to other areas of the site.			

TRIAL PIT LOG

Trial Pit:	TP5	**Project:**	Slag Processing Extension Site
Sheet:	5 of 6	**Job Number:**	010-0003
Date:	20th July 2010	**Site Location:**	Tremorfa, Cardiff
Weather:	Dry, mild, sunny, intermittent cloud	**Logged By:**	SPR

Lab Tests	Soil Gas (ppm)		SAMPLES			STRATA				
	PID	**FID**	**Depth (m)**	**Type**	**No.**	**Depth (m)**	**Water Levels**	**Strata Depth (m)**		**Description**
			0.3	pH, Metals				0.00	0.10	MADE GROUND: surface material (light grey granular dust)
								0.10	1.5	MADE GROUND (dark brown/grey ashy granular fill with occasional fragments of refractory rubble, slag, and clinker).
						-0.5-				
			1.0	pH, Metals		-1.0-				
			1.5	pH, Metals, Ca, Mg, Phenols, PAHs, TPH, ACM		-1.5-				
						-2.0-				
						-2.5-				
						-3.0-				
										End @ 1.5m

Key:	--τ-- Water Ingress	Gen - General Suite	MO - Mineral Oil	VOC – Volatile Organic Compound
	PCB - Total PCBs	PAH - Total PAHs	Asb - Asbestos	L – Leachate Test
	TPH – Total Petroleum Hydrocarbon		W - Water	SVOC – Semi Volatile Organic Compound
Remarks:	No groundwater encountered. Made ground was dry. No olfactory odours.			
Note:	Information on this sheet applies to this location only and should not be extrapolated to other areas of the site.			

TRIAL PIT LOG

Trial Pit:	TP6	**Project:**	Slag Processing Extension Site
Sheet:	6 of 6	**Job Number:**	010-0003
Date:	20th July 2010	**Site Location:**	Tremorfa, Cardiff
Weather:	Dry, mild, sunny, intermittent cloud	**Logged By:**	SPR

Lab Tests	Soil Gas (ppm)		SAMPLES			STRATA				
	PID	**FID**	**Depth (m)**	**Type**	**No.**	**Depth (m)**	**Water Levels**	**Strata Depth (m)**		**Description**
								0.00	0.10	MADE GROUND: surface material (light grey granular dust)
			0.3	pH, Metals				0.10	2.2	MADEGROUND (dark brown/grey ashy granular fill with occasional fragments of refractory rubble, slag, and clinker).
						-0.5-				
			1.0			-1.0-				
			1.5			-1.5-				
						-2.0-				
			2.2	pH, Metals, ACM						
						-2.5-				
						-3.0-				
										End @ 2.2m

Key:	--τ-- Water Ingress	Gen - General Suite	MO - Mineral Oil	VOC – Volatile Organic Compound
	PCB - Total PCBs	PAH - Total PAHs	Asb - Asbestos	L – Leachate Test
	TPH – Total Petroleum Hydrocarbon		W - Water	SVOC – Semi Volatile Organic Compound
Remarks:	No groundwater encountered. Made ground was dry. No olfactory odours.			
Note:	Information on this sheet applies to this location only and should not be extrapolated to other areas of the site.			

Annex D: Analytical Results

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Analytical Report Number : 10-23290

Project / Site name:	CELSA SCR	**Samples received on:**	21/06/2010
Your job number:	010-0003	**Samples instructed on:**	21/06/2010
Your order number:		**Analysis completed by:**	23/06/2010
Report Issue Number:	1	**Report issued on:**	23/06/2010
Samples Analysed:	5 leachate samples - 20 soil samples		

Signed:

Dr Claire Stone
UK Quality Manager
For & on behalf of i2 Analytical Ltd.

Signed:

David Ashworth
UK Technical Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting

Analytical Report Number: 10-23290

Project / Site name: CELSA SCR

Lab Sample Number				149693	149694	149695	149696	149697
Sample Reference				TP1	TP1	TP1	TP2	TP2
Sample Number				TP1/1	TP1/2	TP1/3	TP2/1	TP2/2
Depth (m)				0.20	0.80	1.90	0.20	0.80
Date Sampled				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	15	5.7	33	29	32
Moisture Content	%	N/A	NONE	4.3	9.2	7.1	6.5	6.4
Total mass of sample received	kg	0.001	NONE	0.60	0.45	0.48	0.46	0.56
Fibrous Material (Screen)	P/A	N/A	NONE	Absent	Absent	N/A	N/A	N/A
General Inorganics								
pH	pH Units	N/A	MCERTS	11.1	10.7	10.3	9.7	10.1
Total Sulphur	mg/kg	100	NONE	2300	N/A	N/A	N/A	3700
Total Phenols								
Total Phenols (monohydric)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	N/A	N/A
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.25	0.84	0.52	N/A	N/A
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.70	0.21	N/A	N/A
Acenaphthene	mg/kg	0.05	MCERTS	0.10	0.33	0.22	N/A	N/A
Fluorene	mg/kg	0.05	MCERTS	0.19	0.34	0.16	N/A	N/A
Phenanthrene	mg/kg	0.05	MCERTS	0.82	3.1	1.4	N/A	N/A
Anthracene	mg/kg	0.05	MCERTS	0.31	1.0	0.41	N/A	N/A
Fluoranthene	mg/kg	0.1	MCERTS	0.49	6.3	2.4	N/A	N/A
Pyrene	mg/kg	0.05	MCERTS	0.40	6.3	2.7	N/A	N/A
Benzo(a)anthracene	mg/kg	0.2	MCERTS	< 0.20	4.6	1.8	N/A	N/A
Chrysene	mg/kg	0.05	MCERTS	0.12	5.5	2.4	N/A	N/A
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	0.35	4.6	2.1	N/A	N/A
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.66	7.3	2.7	N/A	N/A
Benzo(a)pyrene	mg/kg	0.1	MCERTS	0.15	4.2	1.3	N/A	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.13	4.3	1.3	N/A	N/A
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	1.3	0.38	N/A	N/A
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.13	4.3	1.5	N/A	N/A
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	4.2	55	22	N/A	N/A
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	14	3.6	25	35
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	7.4	23	6.7	4.4	19
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	2600	800	720	300	1100
Copper (aqua regia extractable)	mg/kg	1	MCERTS	630	870	240	280	480
Iron (aqua regia extractable)	mg/kg	40	ISO 17025	230000	N/A	N/A	N/A	160000
Lead (aqua regia extractable)	mg/kg	2	MCERTS	260	1100	290	240	770
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	6300	N/A	N/A	N/A	6200
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.5	< 0.3	< 0.3	1.5
Nickel (aqua regia extractable)	mg/kg	2	MCERTS	86	140	49	89	100
Silicon (aqua regia extractable)	mg/kg	10	NONE	430	N/A	N/A	N/A	500
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	N/A	N/A	N/A	< 1.0
Tin (aqua regia extractable)	mg/kg	1	MCERTS	34	N/A	N/A	N/A	59
Zinc (aqua regia extractable)	mg/kg	2	MCERTS	2600	3000	1000	1000	2500
Calcium (aqua regia extractable)	mg/kg	20	ISO 17025	210000	N/A	N/A	N/A	150000
Magnesium (aqua regia extractable)	mg/kg	20	ISO 17025	42000	N/A	N/A	N/A	61000
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	mg/kg	10	NONE	680	1200	180	N/A	N/A

Analytical Report Number: 10-23290

Project / Site name: CELSA SCR

Lab Sample Number				149698	149699	149700	149701	149702
Sample Reference				TP2	TP2	TP3	TP3	TP3
Sample Number				TP2/3	TP2/4	TP3/1	TP3/2	TP3/3
Depth (m)				1.60	1.70	1.10	1.40	1.50
Date Sampled				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	16	6.7	8.5	23	15
Moisture Content	%	N/A	NONE	8.2	8.2	9.6	7.2	7.6
Total mass of sample received	kg	0.001	NONE	0.52	0.47	0.48	0.55	0.52
Fibrous Material (Screen)	P/A	N/A	NONE	N/A	N/A	N/A	N/A	N/A
General Inorganics								
pH	pH Units	N/A	MCERTS	10.0	10.3	10.1	11.2	10.5
Total Sulphur	mg/kg	100	NONE	N/A	N/A	3300	N/A	N/A
Total Phenols								
Total Phenols (monohydric)	mg/kg	4	MCERTS	N/A	N/A	N/A	N/A	N/A
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Acenaphthylene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Acenaphthene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Fluorene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Phenanthrene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Anthracene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Fluoranthene	mg/kg	0.1	MCERTS	N/A	N/A	N/A	N/A	N/A
Pyrene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Benzo(a)anthracene	mg/kg	0.2	MCERTS	N/A	N/A	N/A	N/A	N/A
Chrysene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	N/A	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	mg/kg	0.1	MCERTS	N/A	N/A	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	N/A	N/A
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	N/A	N/A	N/A	N/A	N/A
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	33	24	21	3.1	22
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	16	11	7.7	14	17
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	920	610	520	1400	1100
Copper (aqua regia extractable)	mg/kg	1	MCERTS	340	270	360	670	360
Iron (aqua regia extractable)	mg/kg	40	ISO 17025	N/A	N/A	230000	N/A	N/A
Lead (aqua regia extractable)	mg/kg	2	MCERTS	740	510	490	810	540
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	N/A	N/A	4400	N/A	N/A
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	16	4.7	< 0.3	< 0.3	1.4
Nickel (aqua regia extractable)	mg/kg	2	MCERTS	90	65	94	140	87
Silicon (aqua regia extractable)	mg/kg	10	NONE	N/A	N/A	290	N/A	N/A
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	N/A	N/A	< 1.0	N/A	N/A
Tin (aqua regia extractable)	mg/kg	1	MCERTS	N/A	N/A	70	N/A	N/A
Zinc (aqua regia extractable)	mg/kg	2	MCERTS	2000	1600	1800	7300	2100
Calcium (aqua regia extractable)	mg/kg	20	ISO 17025	N/A	N/A	160000	N/A	N/A
Magnesium (aqua regia extractable)	mg/kg	20	ISO 17025	N/A	N/A	33000	N/A	N/A
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	mg/kg	10	NONE	N/A	N/A	N/A	N/A	N/A

Analytical Report Number: 10-23290

Project / Site name: CELSA SCR

Lab Sample Number				149703	149704	149705	149706	149707
Sample Reference				TP4	TP4	TP4	TP4	TP4
Sample Number				TP4/1	TP4/2	TP4/3	TP4/4	TP4/5
Depth (m)				0.20	1.10	2.40	3.30	4.00
Date Sampled				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	16	23	14	4.8	8.9
Moisture Content	%	N/A	NONE	11	8.3	9.1	8.0	8.0
Total mass of sample received	kg	0.001	NONE	0.48	0.52	0.53	0.53	0.52
Fibrous Material (Screen)	P/A	N/A	NONE	N/A	N/A	N/A	Absent	N/A
General Inorganics								
pH	pH Units	N/A	MCERTS	9.6	10.2	10.7	10.8	10.7
Total Sulphur	mg/kg	100	NONE	N/A	N/A	N/A	2600	N/A
Total Phenols								
Total Phenols (monohydric)	mg/kg	4	MCERTS	N/A	N/A	N/A	< 4.0	N/A
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	1.1	N/A
Acenaphthylene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	0.28	N/A
Acenaphthene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	1.5	N/A
Fluorene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	2.4	N/A
Phenanthrene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	10	N/A
Anthracene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	6.3	N/A
Fluoranthene	mg/kg	0.1	MCERTS	N/A	N/A	N/A	5.3	N/A
Pyrene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	3.9	N/A
Benzo(a)anthracene	mg/kg	0.2	MCERTS	N/A	N/A	N/A	1.5	N/A
Chrysene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	1.5	N/A
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	N/A	N/A	N/A	0.94	N/A
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	0.91	N/A
Benzo(a)pyrene	mg/kg	0.1	MCERTS	N/A	N/A	N/A	0.87	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	0.72	N/A
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	0.17	N/A
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	N/A	N/A	N/A	0.61	N/A
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	N/A	N/A	N/A	38	N/A
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	26	4.3	< 1.0	32
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	75	14	3.9	6.3	8.3
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	620	690	2300	1900	1300
Copper (aqua regia extractable)	mg/kg	1	MCERTS	620	330	240	250	650
Iron (aqua regia extractable)	mg/kg	40	ISO 17025	N/A	N/A	N/A	220000	N/A
Lead (aqua regia extractable)	mg/kg	2	MCERTS	2500	770	320	240	300
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	N/A	N/A	N/A	6200	N/A
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	2.7	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	2	MCERTS	220	96	160	52	260
Silicon (aqua regia extractable)	mg/kg	10	NONE	N/A	N/A	N/A	400	N/A
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	N/A	N/A	N/A	< 1.0	N/A
Tin (aqua regia extractable)	mg/kg	1	MCERTS	N/A	N/A	N/A	27	N/A
Zinc (aqua regia extractable)	mg/kg	2	MCERTS	22000	2700	510	760	700
Calcium (aqua regia extractable)	mg/kg	20	ISO 17025	N/A	N/A	N/A	170000	N/A
Magnesium (aqua regia extractable)	mg/kg	20	ISO 17025	N/A	N/A	N/A	78000	N/A
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	mg/kg	10	NONE	N/A	N/A	N/A	320	N/A

Analytical Report Number: 10-23290

Project / Site name: CELSA SCR

Lab Sample Number				149708	149709	149710	149711	149712
Sample Reference				TP5	TP5	TP5	TP6	TP6
Sample Number				TP5/1	TP5/2	TP5/3	TP6/1	TP6/2
Depth (m)				0.30	1.00	1.50	0.30	2.20
Date Sampled				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	15	20	17	14	17
Moisture Content	%	N/A	NONE	6.3	7.7	7.0	9.0	8.4
Total mass of sample received	kg	0.001	NONE	0.59	0.50	0.54	0.41	0.46
Fibrous Material (Screen)	P/A	N/A	NONE	N/A	N/A	Absent	N/A	Absent
General Inorganics								
pH	pH Units	N/A	MCERTS	11.3	10.7	10.6	10.6	10.4
Total Sulphur	mg/kg	100	NONE	N/A	N/A	3700	N/A	N/A
Total Phenols								
Total Phenols (monohydric)	mg/kg	4	MCERTS	N/A	N/A	< 4.0	N/A	N/A
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	N/A	N/A	0.57	N/A	N/A
Acenaphthylene	mg/kg	0.05	MCERTS	N/A	N/A	0.14	N/A	N/A
Acenaphthene	mg/kg	0.05	MCERTS	N/A	N/A	0.28	N/A	N/A
Fluorene	mg/kg	0.05	MCERTS	N/A	N/A	0.34	N/A	N/A
Phenanthrene	mg/kg	0.05	MCERTS	N/A	N/A	0.44	N/A	N/A
Anthracene	mg/kg	0.05	MCERTS	N/A	N/A	0.60	N/A	N/A
Fluoranthene	mg/kg	0.1	MCERTS	N/A	N/A	3.9	N/A	N/A
Pyrene	mg/kg	0.05	MCERTS	N/A	N/A	3.3	N/A	N/A
Benzo(a)anthracene	mg/kg	0.2	MCERTS	N/A	N/A	2.0	N/A	N/A
Chrysene	mg/kg	0.05	MCERTS	N/A	N/A	2.8	N/A	N/A
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	N/A	N/A	1.8	N/A	N/A
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	N/A	N/A	2.1	N/A	N/A
Benzo(a)pyrene	mg/kg	0.1	MCERTS	N/A	N/A	1.2	N/A	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	N/A	N/A	1.3	N/A	N/A
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	N/A	N/A	0.39	N/A	N/A
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	N/A	N/A	1.3	N/A	N/A
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	N/A	N/A	22	N/A	N/A
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	14	9.7	19	20
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	8.4	15	52	3.8	10
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	1900	1200	1500	300	220
Copper (aqua regia extractable)	mg/kg	1	MCERTS	700	280	460	170	140
Iron (aqua regia extractable)	mg/kg	40	ISO 17025	N/A	N/A	250000	N/A	N/A
Lead (aqua regia extractable)	mg/kg	2	MCERTS	360	520	470	230	350
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	N/A	N/A	6100	N/A	N/A
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	2	MCERTS	130	81	130	56	43
Silicon (aqua regia extractable)	mg/kg	10	NONE	N/A	N/A	310	N/A	N/A
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	N/A	N/A	< 1.0	N/A	N/A
Tin (aqua regia extractable)	mg/kg	1	MCERTS	N/A	N/A	73	N/A	N/A
Zinc (aqua regia extractable)	mg/kg	2	MCERTS	2700	2000	2000	930	2200
Calcium (aqua regia extractable)	mg/kg	20	ISO 17025	N/A	N/A	140000	N/A	N/A
Magnesium (aqua regia extractable)	mg/kg	20	ISO 17025	N/A	N/A	56000	N/A	N/A
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	mg/kg	10	NONE	N/A	N/A	520	N/A	N/A

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Lab Sample Number				149713	149714	149715	149716	149717
Sample Reference				TP1	TP2	TP3	TP4	TP5
Sample Number				TP1/1	TP2/2	TP3/1	TP4/4	TP5/3
Depth (m)				0.20	0.80	1.10	3.30	1.50
Date Sampled				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
Sulphate as SO_4	µg/l	100	NONE	52000	34000	31000	9900	43000
Total Sulphur	µg/l	1	NONE	17000	11000	10000	3300	14000
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Cadmium (dissolved)	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium (dissolved)	µg/l	1	ISO 17025	14	6.5	8.9	52	4.6
Copper (dissolved)	µg/l	3	ISO 17025	23	15	17	17	17
Iron (dissolved)	mg/l	0.2	ISO 17025	0.5	< 0.2	< 0.2	< 0.2	0.2
Lead (dissolved)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	5.5	< 5.0
Manganese (dissolved)	µg/l	1	ISO 17025	88	2.7	4.9	< 1.0	< 1.0
Mercury (dissolved)	µg/l	1.5	ISO 17025	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Nickel (dissolved)	µg/l	1	ISO 17025	1.5	< 1.0	1.5	< 1.0	< 1.0
Selenium (dissolved)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Tin (dissolved)	µg/l	5	NONE	< 5.0	< 5.0	5.7	< 5.0	< 5.0
Zinc (dissolved)	µg/l	1	ISO 17025	33	< 1.0	1.9	< 1.0	< 1.0
Calcium (dissolved)	mg/l	0.1	NONE	77	27	9.7	85	32
Magnesium (dissolved)	mg/l	0.1	NONE	0.6	< 0.1	< 0.1	0.4	< 0.1
Silicon (dissolved)	µg/l	50	NONE	1300	3500	4800	1100	2700

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* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and topsoil/loam soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 2 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
149693	TP1	TP1/1	0.20	Brown topsoil with stones.
149694	TP1	TP1/2	0.80	Brown topsoil with gravel and stones.
149695	TP1	TP1/3	1.90	Brown topsoil with gravel and stones.
149696	TP2	TP2/1	0.20	Brown topsoil with gravel and stones.
149697	TP2	TP2/2	0.80	Brown topsoil with gravel and stones.
149698	TP2	TP2/3	1.60	Brown topsoil with gravel and stones.
149699	TP2	TP2/4	1.70	Brown topsoil with gravel and stones.
149700	TP3	TP3/1	1.10	Brown topsoil with gravel and stones.
149701	TP3	TP3/2	1.40	Brown topsoil with stones.
149702	TP3	TP3/3	1.50	Brown topsoil with gravel and stones.
149703	TP4	TP4/1	0.20	Brown topsoil with gravel and stones.
149704	TP4	TP4/2	1.10	Brown topsoil with gravel and stones.
149705	TP4	TP4/3	2.40	Brown topsoil with stones.
149706	TP4	TP4/4	3.30	Brown topsoil with stones.
149707	TP4	TP4/5	4.00	Brown topsoil with stones.
149708	TP5	TP5/1	0.30	Brown topsoil with gravel and stones.
149709	TP5	TP5/2	1.00	Brown topsoil with stones.
149710	TP5	TP5/3	1.50	Brown topsoil with stones.
149711	TP6	TP6/1	0.30	Brown topsoil with gravel and stones.
149712	TP6	TP6/2	2.20	Brown topsoil with gravel and stones.

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Project / Site name: CELSA SCR

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L038-UK	D	ISO 17025
Exotic Metals Aqua Regia Extractable	for the Determination of Metals in Soil""	In-house method based on MEWAM 1986 Methods	L038-UK	D	NONE
Fibrous Material in soil screening	Visual screening of samples for fibrous material.	In-house method based on HSG 248	L050-UK	W	NONE
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-UK	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L038-UK	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L019-UK	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L006-UK	W	MCERTS
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L005-UK	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-UK	D	MCERTS
Stones content of soil	Stones not passing through a 2 mm sieve is determined gravimetrically and reported as a percentage of the dry weight. Sample results are not corrected for the stone content of the sample.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-UK	W	NONE
Total Sulphur in leachates	Determination of total sulphur in leachates by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-UK	W	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil""	L038-UK	D	NONE
TPH1 (Soil)	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method	L064-UK	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 10-23292

Project / Site name:	CELSA SCR	**Samples received on:**	21/06/2010
Your job number:	010-0003	**Samples instructed on:**	21/06/2010
Your order number:		**Analysis completed by:**	23/06/2010
Report Issue Number:	1	**Report issued on:**	23/06/2010
Samples Analysed:	15 soil samples		

Signed:

Dr Claire Stone
UK Quality Manager
For & on behalf of i2 Analytical Ltd.

Signed:

David Ashworth
UK Technical Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting

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Lab Sample Number				149720	149721	149722	149723	149724
Sample Reference				S1	S2	S3	S4	S5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	0.02	0.02	0.02	0.00	0.12
Total mass of sample received	kg	0.001	NONE	0.66	0.68	0.61	0.74	0.76
Fibrous Material (Screen)	P/A	N/A	NONE	Absent	N/A	N/A	Absent	N/A
General Inorganics								
pH	pH Units	N/A	MCERTS	9.2	9.2	8.9	9.6	10.0
Total Sulphur	mg/kg	100	NONE	2200	N/A	1100	N/A	2200
Total Phenols								
Total Phenols (monohydric)	mg/kg	4	MCERTS	N/A	N/A	< 4.0	N/A	N/A
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	N/A	N/A	0.23	N/A	N/A
Acenaphthylene	mg/kg	0.05	MCERTS	N/A	N/A	0.26	N/A	N/A
Acenaphthene	mg/kg	0.05	MCERTS	N/A	N/A	0.15	N/A	N/A
Fluorene	mg/kg	0.05	MCERTS	N/A	N/A	0.31	N/A	N/A
Phenanthrene	mg/kg	0.05	MCERTS	N/A	N/A	1.2	N/A	N/A
Anthracene	mg/kg	0.05	MCERTS	N/A	N/A	0.73	N/A	N/A
Fluoranthene	mg/kg	0.1	MCERTS	N/A	N/A	0.75	N/A	N/A
Pyrene	mg/kg	0.05	MCERTS	N/A	N/A	0.56	N/A	N/A
Benzo(a)anthracene	mg/kg	0.2	MCERTS	N/A	N/A	0.35	N/A	N/A
Chrysene	mg/kg	0.05	MCERTS	N/A	N/A	0.29	N/A	N/A
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	N/A	N/A	0.38	N/A	N/A
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	N/A	N/A	0.30	N/A	N/A
Benzo(a)pyrene	mg/kg	0.1	MCERTS	N/A	N/A	0.37	N/A	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	N/A	N/A	0.34	N/A	N/A
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	N/A	N/A	0.13	N/A	N/A
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	N/A	N/A	0.34	N/A	N/A
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	N/A	N/A	6.8	N/A	N/A
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	9.9	7.6	8.9	4.8	7.6
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	1700	1500	1600	1900	1700
Copper (aqua regia extractable)	mg/kg	1	MCERTS	520	400	600	420	650
Iron (aqua regia extractable)	mg/kg	40	ISO 17025	230000	N/A	280000	N/A	300000
Lead (aqua regia extractable)	mg/kg	2	MCERTS	280	210	450	150	240
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	7000	N/A	8200	N/A	8000
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	2	MCERTS	68	60	110	61	110
Silicon (aqua regia extractable)	mg/kg	10	NONE	180	N/A	810	N/A	98
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	N/A	< 1.0	N/A	< 1.0
Tin (aqua regia extractable)	mg/kg	1	MCERTS	31	N/A	34	N/A	34
Zinc (aqua regia extractable)	mg/kg	2	MCERTS	2200	1700	6900	1100	2100
Calcium (aqua regia extractable)	mg/kg	20	ISO 17025	290000	N/A	240000	N/A	240000
Magnesium (aqua regia extractable)	mg/kg	20	ISO 17025	51000	N/A	52000	N/A	51000
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	mg/kg	10	NONE	N/A	N/A	340	N/A	N/A

Analytical Report Number: 10-23292

Project / Site name: CELSA SCR

Lab Sample Number				149725	149726	149727	149728	149729
Sample Reference				S6	S7	S8	S9	S10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	0.12	0.02	0.02	0.26	0.16
Total mass of sample received	kg	0.001	NONE	0.66	0.67	0.79	0.67	0.75
Fibrous Material (Screen)	P/A	N/A	NONE	Absent	N/A	Absent	N/A	Absent
General Inorganics								
pH	pH Units	N/A	MCERTS	11.2	10.5	9.9	11.2	10.2
Total Sulphur	mg/kg	100	NONE	N/A	2100	N/A	N/A	2300
Total Phenols								
Total Phenols (monohydric)	mg/kg	4	MCERTS	N/A	< 4.0	N/A	< 4.0	N/A
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	N/A	0.06	N/A	< 0.05	N/A
Acenaphthylene	mg/kg	0.05	MCERTS	N/A	< 0.05	N/A	< 0.05	N/A
Acenaphthene	mg/kg	0.05	MCERTS	N/A	0.06	N/A	< 0.05	N/A
Fluorene	mg/kg	0.05	MCERTS	N/A	0.12	N/A	0.08	N/A
Phenanthrene	mg/kg	0.05	MCERTS	N/A	0.75	N/A	0.39	N/A
Anthracene	mg/kg	0.05	MCERTS	N/A	0.27	N/A	0.12	N/A
Fluoranthene	mg/kg	0.1	MCERTS	N/A	0.36	N/A	0.20	N/A
Pyrene	mg/kg	0.05	MCERTS	N/A	0.25	N/A	0.13	N/A
Benzo(a)anthracene	mg/kg	0.2	MCERTS	N/A	< 0.20	N/A	< 0.20	N/A
Chrysene	mg/kg	0.05	MCERTS	N/A	< 0.05	N/A	< 0.05	N/A
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	N/A	< 0.10	N/A	< 0.10	N/A
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	N/A	0.06	N/A	< 0.05	N/A
Benzo(a)pyrene	mg/kg	0.1	MCERTS	N/A	< 0.10	N/A	< 0.10	N/A
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	N/A	0.07	N/A	< 0.05	N/A
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	N/A	< 0.05	N/A	< 0.05	N/A
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	N/A	< 0.05	N/A	< 0.05	N/A
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	N/A	2.0	N/A	< 1.6	N/A
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	23	18	4.0	19	8.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	1700	1800	2700	1800	1800
Copper (aqua regia extractable)	mg/kg	1	MCERTS	620	590	510	550	630
Iron (aqua regia extractable)	mg/kg	40	ISO 17025	N/A	270000	N/A	N/A	260000
Lead (aqua regia extractable)	mg/kg	2	MCERTS	600	470	110	390	230
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	N/A	6900	N/A	N/A	7200
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	2	MCERTS	95	110	63	78	100
Silicon (aqua regia extractable)	mg/kg	10	NONE	N/A	91	N/A	N/A	130
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	N/A	< 1.0	N/A	N/A	< 1.0
Tin (aqua regia extractable)	mg/kg	1	MCERTS	N/A	34	N/A	N/A	32
Zinc (aqua regia extractable)	mg/kg	2	MCERTS	7300	5400	880	5000	1700
Calcium (aqua regia extractable)	mg/kg	20	ISO 17025	N/A	310000	N/A	N/A	220000
Magnesium (aqua regia extractable)	mg/kg	20	ISO 17025	N/A	82000	N/A	N/A	48000
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	mg/kg	10	NONE	N/A	110	N/A	190	N/A

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Lab Sample Number				149730	149731	149732	149733	149734
Sample Reference				S1	S3	S5	S7	S10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
Sulphate as SO_4	µg/l	100	NONE	70000	11000	61000	61000	84000
Total Sulphur	µg/l	1	NONE	23000	3700	20000	20000	28000
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Cadmium (dissolved)	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium (dissolved)	µg/l	1	ISO 17025	3.7	7.0	2.8	5.5	3.0
Copper (dissolved)	µg/l	3	ISO 17025	17	18	19	15	19
Iron (dissolved)	mg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Lead (dissolved)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Manganese (dissolved)	µg/l	1	ISO 17025	4.9	31	7.1	1.0	2.2
Mercury (dissolved)	µg/l	1.5	ISO 17025	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Nickel (dissolved)	µg/l	1	ISO 17025	< 1.0	1.7	< 1.0	< 1.0	< 1.0
Selenium (dissolved)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Tin (dissolved)	µg/l	5	NONE	< 5.0	5.6	5.1	< 5.0	< 5.0
Zinc (dissolved)	µg/l	1	ISO 17025	< 1.0	35	< 1.0	< 1.0	< 1.0
Calcium (dissolved)	mg/l	0.1	NONE	17	15	28	30	31
Magnesium (dissolved)	mg/l	0.1	NONE	5.2	2.2	< 0.1	0.7	0.2
Silicon (dissolved)	µg/l	50	NONE	12000	14000	13000	6200	17000

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* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and topsoil/loam soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 2 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
149720	S1	None Supplied	None Supplied	Grey rubble.
149721	S2	None Supplied	None Supplied	Grey rubble with vegetation.
149722	S3	None Supplied	None Supplied	Grey rubble.
149723	S4	None Supplied	None Supplied	Grey rubble.
149724	S5	None Supplied	None Supplied	Grey rubble.
149725	S6	None Supplied	None Supplied	Grey rubble.
149726	S7	None Supplied	None Supplied	Grey rubble.
149727	S8	None Supplied	None Supplied	Grey rubble.
149728	S9	None Supplied	None Supplied	Grey rubble.
149729	S10	None Supplied	None Supplied	Grey rubble.

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Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L038-UK	D	ISO 17025
Exotic Metals Aqua Regia Extractable	for the Determination of Metals in Soil""	In-house method based on MEWAM 1986 Methods	L038-UK	D	NONE
Fibrous Material in soil screening	Visual screening of samples for fibrous material.	In-house method based on HSG 248	L050-UK	W	NONE
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-UK	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L038-UK	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L019-UK	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L006-UK	W	MCERTS
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L005-UK	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-UK	D	MCERTS
Stones content of soil	Stones not passing through a 2 mm sieve is determined gravimetrically and reported as a percentage of the dry weight. Sample results are not corrected for the stone content of the sample.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-UK	W	NONE
Total Sulphur in leachates	Determination of total sulphur in leachates by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-UK	W	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil""	L038-UK	D	NONE
TPH1 (Soil)	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method	L064-UK	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.