

Morgan Sindall

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Cefn Saeson Comprehensive School

Ground Investigation Report





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Ground Investigation Report

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EXECUTIVE SUMMARY

The Site	The site is a 2.21ha parcel of land situated within Cefn Saeson Comprehensive School centered on NGR 277265, 196139. The approximate postcode for the site is SA11 3TA.
Background	This report relates to the proposed Phase 2 Development Area of the Cefn Saeson Comprehensive School Development (planning application ref: P2019/5028 approved with conditions 20th July 2019). The Phase 2 Development Area comprises the existing Cefn Saeson Comprehensive School with associated sports courts and car parking. Condition 9 of the aforementioned planning approval indicates the requirement for additional ground contamination assessment of the Phase 2 Development Area prior to redevelopment. This report provides desk based information in relation to the Phase 2 Development Area as well as details of the intrusive ground investigation works undertaken and subsequent contamination risk assessment in support of the discharge of Condition 9.
Geology	From a previous ground investigation (GI) undertaken by Tetra Tech (formerly WYG) in August 2019, the geology of the site is anticipated to consist of Made Ground over heterogeneous glacial deposits of clays, sands and gravels (Langland Till) underlain by the Brithdir Member of the Pennant Sandstone Formation.
Site Investigation	The previous August 2019 GI included two trial pits and two window sample boreholes in the Phase 2 Development Area. No groundwater monitoring wells were installed in the Phase 2 Development Area as part of this GI. Additional GI works in February 2021 consisted of five Window Sample positions to a maximum depth of 2.90m bgl with three groundwater monitoring installations. Further window sampling works were conducted in May 2021, with four additional Window Sample positions (WS201, WS202, WS203 and WS204) advanced to a maximum depth of 3.0m in the Upper Staff Car Park area, to determine the extent of hydrocarbon contamination previously identified within WS105 in February 2021. Tarmac cores of hard standing across the site area were also collected for coal tar testing purposes. Additional post demolition trial pitting was conducted in September and December 2021, focusing on areas of the school site formerly occupied by school buildings and areas of hard standing.
Ground Conditions	During all phased of ground investigation the following ground conditions were encountered in the Phase 2 Development Area: • Topsoil – in two locations to a maximum depth of 0.22m bgl described as reddish brown clayey sand. • Made Ground – in seven locations to a maximum depth of 2.50m bgl described ranging from dark brown to grey clay and brown gravel. • Glacial Till of highly heterogenous deposits of clay, sand and gravels: - Fine grained deposits in three locations to a maximum of 2.90m bgl (terminated depths) - Coarse grained deposits in seven locations to a maximum depth of 5.00m bgl • Brithdir Sandstone Member in one location to 2.50m bgl.

Ground Contamination Assessment	Material visibly contaminated with hydrocarbons was encountered in WS105 during the February 2021 investigation, and in the supplementary positions WS201, WS202, WS203 and WS204 advanced in May 2021. The results of the laboratory testing have indicated localised elevated pH, lead and hydrocarbons at WS105 and WS 204 in the south-east of the site in the location of an existing car park resulting in a low risk to current site users and a moderate risk to future site users. The presence of visible oily and olfactory contamination within made ground in WS105, and WS201 to WS204 is also thought to represent a moderate risk to controlled waters, in that it may impact perched shallow groundwater within the Glacial Till. The contamination is not thought to present a risk to deeper groundwater within the bedrock Brithdir Formation or local watercourses due to the presence of predominantly cohesive Glacial Till beneath the made ground identified in WS105, WS203 and WS204.. The results of the groundwater analysis following monitoring conducted in March 2021 indicated site wide marginally elevated concentrations of heavy metals and PAHs exceeding their relevant screening criteria. Further groundwater sampling has been conducted from monitoring installations WS203 and WS204; shallow groundwater within glacial till and made ground at these locations has been found to be impacted by aliphatic and aromatic hydrocarbons and heavy metals, detected in exceedance of the EQS. Groundwater and soils leachability testing conducted across the site, the presence of a significant thickness of Glacial Till, and the distance to local watercourses shows no evidence of significant pollution or likelihood of significant pollution, of controlled waters from the majority of Made Ground soils. Post demolition ground investigation was conducted within areas formerly covered by buildings to assess the potential for contamination (including ACM). Trace amounts of asbestos fibres were detected within one location, possibly derived from the demolition of the school building; however, analyses showed that less than 0.001% asbestos by volume was present within the sample. The presence of asbestos fibres in such low quantities presents a low risk to human health. Samples from beneath the footprint of the former school buildings were also screened against GACs. No exceedances against the GAC criteria were recorded. Risks to construction works can be mitigated through the use of standard good working practices and PPE. Tarmac hardstanding across the school site has been tested, and all tested samples have been found to be free of coal tar.
Conclusions and Recommendations	Based on the findings of the risk assessment the following recommendations have been made: • A proactive approach should be adopted across the site to identify any previously unidentified contamination; • A remediation strategy will be prepared, covering the remediation of the hydrocarbon contamination encountered within shallow made ground within the vicinity of WS105; • All movement of materials should be undertaken in conjunction with the Materials Management Plan (MMP). • A Waste Classification is required for any soils designated for off-site disposal to include Waste Assessment Criteria (WAC) testing.

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AOD	above Ordnance Datum
bgl	below ground level
BGS	British Geological Survey
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
C4SL	Category 4 Screening Levels
CIEH	Chartered Institute of Environmental Health
CLEA	Contaminated Land Exposure Assessment
CoC	Constituent of Concern
CSM	Conceptual Site Model
DEFRA	Department of Environment, food and Rural Affairs
DQRA	Detailed Quantitative Risk Assessment
DTS	Desktop Study
DRO	Diesel Range Organics
DWS	Drinking Water Standard
EA	Environment Agency (England)
EPH	Extractable Petroleum Hydrocarbons
EQS	Environmental Quality Standards
FOC	Fraction Organic Carbon
GPR	Ground Penetrating Radar
LOD	Limit of detection
LQM	Land Quality Management
NRW	Natural Resources Wales
OS	Ordnance Survey
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PPE	Personal Protection Equipment
ppm	parts per million
PRO	Petroleum Range Organics
SGV	Soil Guideline Values
SOM	Soil Organic Matter
SVOC	Semi-volatile organic compounds
TPH	Total Petroleum Hydrocarbon
TSV	Tier 1 Screening Values
VOC	Volatile Organic Carbon
VPH	Volatile Petroleum Hydrocarbons
AOD	above Ordnance Datum

1.0 INTRODUCTION

1.1 INSTRUCTION

Tetra Tech EPT Ltd was commissioned by Morgan Sindall (the client) to undertake an intrusive ground investigation at Cefn Saeson Comprehensive School for an area of the site known as Phase 2 (known hereafter as “the site”).

The report has been prepared to support the discharge of relevant pre-commencement conditions for Phase 2 proposed by Neath Port Talbot Council in respect of contamination attached to planning permission P2019/5028.

The location of the site is shown on Figure 1.

1.2 BACKGROUND

A planning application (ref: P2019/5028) for “*the demolition of existing school and construction of a new comprehensive school with car parking, accesses, sport facilities, external lighting, CCTV, landscaping, drainage works, changes to ground levels plus associated works*” at Cefn Saeson Comprehensive School was submitted to Neath Port Talbot council on 30th May 2019. The planning permission was approved on 20th July 2019 subject to a number of planning conditions. The planning permission includes a condition relating to ground contamination within the Phase 2 area of the site, namely:

Condition 9

No development shall commence on Phase 2 of the approved development as identified in the Construction Method Statement, until an assessment of the nature and extent of contamination affecting the application site has been submitted to and approved in writing by the Local Planning Authority. This assessment must be carried out by or under the direction of a suitable qualified competent person in accordance with BS10175(2011) and shall assess any contamination on the site, whether or not it originates on the site. The report of the finding shall include:

- (i) A desk top study to identify all previous uses at the site and potential contaminants associated with those uses and the impact from the contaminants on land and controlled water. The desk study shall establish a ‘conceptual site model’ which identified and assesses all identified potential source, pathway and receptor linkages;*
- (ii) An intrusive investigation to assess the extent, scale and nature of contamination which may be present, if identified as required by the desk top study;*
- (iii) An assessment of the potential risks to:*
 - Human health*
 - Groundwater and surface waters*
 - Adjoining land*
 - Property (existing or proposed) including buildings, crops, livestock, pets, woodland and services lines and pipes*
 - Ecological systems*
 - Archaeological site and ancient monuments;*
 - Any other identified receptors*
- (iv) An appraisal of remedial options, and justification for the preferred remedial options.*

Reason: To ensure that information provided for the assessment of the risk from land contamination to the future users of the land, neighbouring land, controlled waters, property and ecological systems is sufficient to enable a proper assessment, and to ensure compliance with Policies SP16 and EN8 of the Neath Port Talbot Local Development Plan.

Tetra Tech have previously completed a Phase 1 Geo-Environmental Assessment, Desk top Study in February 2019 (ref:A110444) and Ground Investigation Report in August 2019 (ref: A110444) which covers the Phase 2 Development Area and land to the south east (known as Phase 1 Development Area). This Ground Investigation Report includes relevant desk-based information from the February 2019 Desk Top Study which covers item (i) of Condition 9 above. This report then provides details of the intrusive ground investigation undertaken in the Phase 2 Development area (item (ii)) and provides a risk assessment of any identified contamination to human, environmental and ecological receptors (item (iii)).

1.3 BRIEF

The brief was to provide an intrusive ground investigation for the Phase 2 development area to provide further information on the ground conditions and enable a contaminated land risk assessment to discharge Condition 9 of the planning application P2019/5028 as detailed above.

The scope of work was designed based on information contained within the February 2019 Phase 1 Desk Top Study Assessment. It comprised the following elements:

- 5 No. window sample boreholes to a maximum depth of 5.00m bgl;
- Installation of 3 No. ground gas and groundwater monitoring wells;
- On-site inspection and logging of recovered samples;
- Representative soil samples taken and submitted for geotechnical classification testing;
- Representative soil samples submitted and tested for a suite of potential contaminants;
- 1 No. return visit to monitor ground gas and groundwater levels;
- Preparation of a Ground Investigation report.

1.3.1 May 2021 Window Sampling

In addition to the scope provided above, additional window sampling works were conducted in May 2021, with four additional Window Sample positions advanced to a maximum depth of 3.0m in the Upper Staff Car Park area, to determine the extent of hydrocarbon contamination identified within WS105 (advanced during the February SI works). Tarmac cores of hard standing across the site area were also collected for coal tar testing purposes.

Following completion of these additional window sampling works this GIR was updated to Version 2, with the additional Gi data informing a revised risk assessment and remediation strategy.

1.3.2 Post Demolition Ground Investigation

Demolition of the school buildings commenced in September 2021 which permitted ground investigation under the school buildings to be carried out. Additional trial pitting works were conducted in September and December 2021, with 10 trial pits (TP201 to TP210) excavated across areas of the site formerly occupied by the school buildings and hard standing. These areas of the site were inaccessible during the previous rounds of ground investigation.

Following completion of these additional trial pitting works, this GIR was updated to Version 3, with all ground investigation data carried forwards into a revised C552 Qualitative Risk Assessment.

Table 1-1 - Report Version History

Report Version	Date	Notes
Version 1	March 2021	Initial GIR.
Version 2	June 2021	Documented additional WS positions WS201 to WS204, and additional round of GW monitoring in May 2021 to inform remediation of upper staff car park area.
Version 3	January 2022	Documented additional post demolition GI (TP201 to TP210) to investigate previously inaccessible areas of the site

1.4 PROPOSED DEVELOPMENT

It is understood that the proposed 'Phase 2' development will involve demolition of the existing school and construction of the schools Multi Use Games Area with an access road/bus drop off point adjacent to the west boundary. The proposed development plan for the wider Cefn Saeson School is presented in Figure 3.

1.5 REPORT SCOPE

This report includes the following key elements:

- Full factual records of the site works carried out;
- Summary of the ground conditions encountered;
- In-Situ testing results;
- Environmental laboratory testing results;
- Interpretation of Environmental laboratory data, including a qualitative ground contamination risk assessment (compliant with CIRIA 552 (CIRIA, 2001) methodology);
- An executive summary of the report to allow a rapid, layman's overview.

1.6 LIMITATIONS

The recommendations and opinions expressed in this report are based on information obtained as part of the desk study, investigation or provided by others. Information provided from other sources is taken in good faith and Tetra Tech EPT cannot guarantee its accuracy.

This report is subject to the report conditions presented in Appendix A.

The information contained in this report is intended for the use of Morgan Sindall and Tetra Tech EPT can take no responsibility for the use of this information by any third party or for uses other than that described in this report or detailed within the terms of our engagement.

2.0 SUMMARY OF SITE INFORMATION

2.1 LOCATION

The site is located at Cefn Saeson Comprehensive School on Afan Valley Road, Castell-Nedd/Neath, SA11 3TA. The site is approximately 2.21ha in area and is centered on National Grid Reference (NGR) 277265, 196139. The approximate postcode of the site is SA11 3TA.

The site address is:

Cefn Saeson Comprehensive School,
Afan Valley Road,
Cimla,
Neath Port Talbot
SA11 3TA

A site location plan is presented in Figure 1.

2.2 SITE DESCRIPTION

The site is currently occupied by the active Cefn Saeson Comprehensive school site with buildings and hard standing car parking and paths in the north and west of the site and playing fields in the south east. Two sports courts (one all weather and one tarmac) are located in the north of the site.

2.3 SUMMARY OF PREVIOUS REPORTS

The following reports have been produced for the wider Cefn Saeson Comprehensive School development site and should be read in conjunction with this report.

- WYG¹ (February 2019), Phase 1 Geo-environmental Assessment Desk Top Study ref: A110444-1 (hereby referred to as WYG DTS February 2019); and
- WYG (August 2019) Ground Investigation Report ref: A110444-2 (hereby known as WYG GIR August 2019).
- WYG (August 2019) Geotechnical Design Report (GDR) Report ref: A110444-3 (hereby known as WYG GDR July 2019).

Relevant information from these reports has been extracted and summarised in the following sections.

2.3.1 WYG DTS February 2019

Morgan Sindall commissioned a Geo-environmental Desk Top Study assessment of the Cefn Saeson Comprehensive School site in February 2019 to provide a preliminary qualitative geotechnical and contamination risk assessment on the proposed redevelopment of the site.

2.3.1.1 Site Description

The site was noted to consist of the existing comprehensive school and multi-level grassed areas used as sport pitches along with 1no. concrete tennis court and 1no. all weather sports pitch in the north. The topography of the site was noted to decrease in elevation from the south to the western corner. During a site walkover no obvious signs of contamination were noted.

¹ Now Tetrattech

2.3.1.2 Geology, Hydrogeology and Hydrology

Ground conditions on site were anticipated to comprise Made Ground underlain by Till in the west and Head deposits in the east of the site, underlain by solid geology of the Brithdir Member with a coal seam out cropping south of the site. The Brithdir Member is designated as a Secondary A aquifer, the Till designated as a Secondary Undifferentiated aquifer and the Head deposits and an unproductive aquifer. Based on historical borehole logs groundwater was anticipated to be around 0.9m bgl. The Cefn Saeson Dingle water course was noted adjacent to the north east boundary running east to west, feeding into the Prewylfa Brook. Nant Gelli-Gaer was noted 200m south of the site running east to west feeding Crythan Brook.

2.3.1.3 Historical Mining

The site was noted to be within a Coal Mining Risk Reporting Area and a Development High Risk Area. A Coal Authority report was obtained but did not indicate the presence of past or present coal mining in the vicinity of the site.

2.3.1.4 Site History

The site is shown to have been a mixture of woodland and open pasture land until the construction of the site in the 1970s. Mapping from 1999 shows structural changes to the school and the construction of additional buildings. In the surrounding area, land is shown to have been predominantly woodland/open pasture until the construction of residential housing from 1935 west. Land to the east is shown to have remained predominantly agricultural.

2.3.1.5 Potential Contamination Sources

A preliminary ground contamination risk assessment was undertaken with the following potential pollutant linkages identified.

Table 2-1 – Summary of WYG DTS February 2019 CSM

Source	Receptor		
	Human Health	Building infrastructure	Controlled waters
General Contamination associated with Made Ground	V/L	V/L	L
General Contamination associated with Made Ground – Vapour risk	L	L	-
Asbestos within Made Ground	L	-	-
Potential hydrocarbon contamination from boiler houses and car parks	V/L	-	L
Potential hydrocarbon contamination from boiler houses and car parks - vapours	L	L	-
Off-site Made Ground from adjacent redevelopments	V/L	V/L	V/L

2.3.2 WYG GIR August 2019

Morgan Sindall commissioned an intrusive ground investigation and report of the Cefn Saeson Comprehensive School site in August 2019 to aid in the design of the new school. The GI was intended to obtain information relating to geotechnical and geo-environmental properties of the ground.

2.3.2.1 Ground Investigation Scope

A ground investigation was undertaken between December 2019 and January 2019 comprising 6no cable percussive boreholes to a maximum depth of 6.60m bgl, 8no machine excavated trial pit to a maximum depth of 2.80m bgl, 5no. windowless sample boreholes to a maximum depth of 5.00mbgl. In-situ testing (California Bearing Ratio and permeability testing) was undertaken at various locations across the site. Six return monitoring visits were undertaken for ground gas and groundwater monitoring and sampling.

Of the exploratory locations discussed above, 2no. trial pits (TP03 and TP04), 2no. window sample boreholes (WS03 and WS04) and 1no. CBR test location (CRB02) were undertaken within the Phase 2 development area.

2.3.2.2 Ground Conditions

The investigation encountered ground conditions of Topsoil (max. depth 0.3m bgl) or Made Ground of reworked soils (maximum 6.00m bgl) overlying glacial deposits (max. depth 6.30m bgl) overlying Brithdir Member (max. depth 6.60m bgl). With respect to the Phase 2 development area, the maximum depth of Made Ground encountered was 2.50m bgl at WS03 with bedrock encountered from a minimum depth of 1.75m bgl at TP04. Groundwater was encountered between 1.50m bgl and 3.70m bgl. In the Phase 2 development are groundwater was encountered between 1.80m and 2.40m bgl.

2.3.2.3 Monitoring

Subsequent monitoring found groundwater levels between a minimum of 0.09m bgl and 2.72m bgl both recorded at BH03 in different rounds. Groundwater sampling was undertaken using Low Flow methodology as described in the WYG GIR August 2019 report Section 4.3.2. Ground gas monitoring indicated maximum gas concentrations of 7.6% for carbon dioxide and 7.8% for methane with a maximum flow rate of 1.2l/hr.

2.3.2.4 Ground Contamination Assessment

Representative soil and groundwater samples were obtained during the GI and subsequent monitoring and tested for a range of contaminants. The results of the soil analysis were compared against screening values for a public open spaces end use to provide a conservative assessment. No contaminants of concern were noted exceeding their relevant screening values. The results of the groundwater analysis were compared against industry screening values for controlled waters. Elevated concentrations metals of Polyaromatic hydrocarbons (PAHs) and Total Petroleum Hydrocarbons (TPH) were noted at BH06 and BH03.

2.3.2.5 Ground gas Assessment

The results of the ground gas monitoring indicate a peak methane concentration of 7.8% at WS04 and peak carbon dioxide concentration of 7.6% at WS03 both located within the Phase 2 development area. Based on the available data the site was classified as Characteristic Situation 2 i.e. low risk but requiring basic gas protection measures for new developments.

2.3.2.6 Conceptual Site Model

Based on the information within the report the following sources were noted to have a **Low** risk to human health:

- Ground gases derived from organic content in re-worked Made Ground and Till;

- Radon

A **Low** risk was also identified to groundwater and surface water from elevated heavy metals, TPH and PAHS.

2.3.3 WYG Geotechnical Design Report July 2019

This report presents geotechnical design recommendations based upon site investigation data. Recommendations for foundations design, earth works, drainage and pavement design are presented.

Regarding earthworks, the geotechnical suitability for re-use of soils was assessed, and site won fill was considered to be acceptable for general earthworks purposes across the site, subject to appropriate compaction.

2.4 RADON

The BRE document 211 (Scivyer, 2015) mapping coverage for the site area was consulted and indicates that the site is located within an area where basic radon protection measures are required for new developments. However, the proposed development plan for the Phase 2 Development Area does not indicate the construction of any enclosed buildings or structures on site.

2.5 SUMMARY OF SITE HISTORY

The historical mapping obtained for the WYG DTS February 2019 was used to review the previous site use of the Phase 2 Development Area. Available historical mapping the Phase 2 Development area to have remained as agricultural/grass land from the earliest available mapping (1878) to mapping from 1949-1975. Much of the school in the mapping appears to be in the present-day layout. A chimney is identified in the central/south east of the site which is identified from the 1949-1975 to 1993 mapping.

3.0 PRELIMINARY CONCEPTUAL SITE MODEL

3.1 OVERVIEW

The information obtained from the previous reports has been evaluated to establish an initial qualitative risk assessment and conceptual site model for the Phase 2 development site based on the level of information following the initial desk based assessments and ground investigations.

The site has been considered with regard to current UK legislation and guidance, namely Part 2A of the Environmental Protection Act 1990 and the Contaminated Land (England) Regulations 2006, as amended, and in accordance with current UK good practice guidelines (for example BS10175:2011).

In general, ground contamination can occur through several causes, particularly from historical operations and activities. Contamination can result from either on-site sources or from on-site migration from off-site sources, leading to long term liabilities under recent legislation for any site owner.

For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- Source, i.e. a substance that is capable of causing pollution or harm;
- Pathway, i.e. a route by which the contaminant can reach a target; and
- Receptor (target), i.e. something which could be adversely affected by the contaminant.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

3.2 CONCEPTUAL SITE MODEL

The key source, pathways and receptor model is outlined below within the context of potential development of the site.

As the proposed development is for the construction of the MUGAs and associated bus drop-off point the following risk assessment is undertaken in the context of a public open space (park) end use scenario to provide a conservative approach.

3.2.1 Potential Sources of Contamination

The main potential sources of contamination on the site are summarised below:

- Potential for Made Ground on site associated with the initial development on the site (including any potential cut and fill) including the potential for asbestos containing materials (ACM);
- Potential for ground contamination associated with historic boiler house/ chimney and car parks on site.

Whilst the potential for ground gases within the Phase 2 development area (WS03 and WS04) has been highlighted by the previous GI report, there are no enclosed structures or spaces shown on the proposed development plan in Figure 3. Consequently, the potential for ground gas is not considered a significant source to the proposed development and is not included with the risk assessment.

3.2.2 Potential Contaminant Pathways

The following contaminant pathways are considered to potentially be active based on the current site use and proposed development:

Human Exposure Pathways

- Direct dermal contact or ingestion of soils, or inhalation of dust and/or vapours (i.e. human interaction with surface and sub-surface materials).

Environmental Pathways

- Leaching and horizontal or vertical migration through the unsaturated ground, either through permeable sub-surface materials and/or preferential pathways;
- Lateral and vertical migration of groundwater through permeable sub-surface materials and/ or preferential pathways;
- Leaching to surface water run-off/drainage;
- The migration and accumulation of gases or vapours through permeable sub-surface materials and/ or preferential pathways.

3.2.3 Potential Receptors at Risk

The following potential receptors have been identified:

Human Health

- Current site users of the school;
- Future site of the redeveloped school/ school playing fields;
- Site workers during the redevelopment of the site;
- Adjacent site users (Residential).

Wider Environment

- Secondary A Aquifer within the Brithdir Member;
- Surface waters i.e. Cefn Saeson Dingle and Nany Gelli-Gaer
- Plant uptake.

3.3 GROUND CONDITIONS RISK ASSESSMENT

The source, pathway, receptor linkages identified above are outlined and a qualitative risk assessment shown in the following tables.

The risk assessment considers the site within an area context and assesses potential risks to identified receptors in relation to the existing site setting and the proposed development. CIRIA C552 has been used to define the risk rating presented in the Qualitative Risk Assessment matrix, the methodology for which is presented in Appendix E.

Table 3-1 – CIRIA C552 Preliminary Qualitative Risk Assessment

This matrix is based on CIRIA C552 risk evaluation methodology, definitions for risk ratings is presented in Appendix D						
Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Potential risk management requirements
Potential for low quality Made Ground across the site associated with initial development	Direct dermal contact or ingestion of soils, or inhalation of dust and/or vapours	Current site users	Medium	Unlikely	Low	The previous GI has indicated the potential for reduced quality Made Ground across the Phase 2 Development Area (maximum depth 2.50m at WS03). Based on the current site use (predominantly hard standing) the risk to current site users is considered to be low. However, a ground investigation is recommended to confirm underlying ground conditions and to assess the nature and extent of potential contamination on site.
		Future site users		Low likelihood	Low/ Moderate	
		Construction workers		Low likelihood	Low/ Moderate	
	Leaching and vertical/ lateral migration of contaminants	Secondary A Aquifer (Brithdir member)	Medium	Low likelihood	Low/ Moderate	No groundwater monitoring wells were installed in the Phase 2 Development Area as part of the previous GI. However, as discussed above, the GI indicated the potential for reduced quality Made Ground to be present across the site along with the potential for a shallow groundwater table (1.80-2.40m bgl in the Phase 2 area). This results in a potential risk to shallow groundwater on site. However, in the absence of significant sources of contamination and presence of low permeability Glacial Till soils underlying the site, the risk to controlled waters is likely to be low. Notwithstanding this, groundwater monitoring is recommended as part of the ground investigation to assess the potential impact to environmental receptors.
		Surface waters		Unlikely	Low	

Potential for asbestos containing materials within Made Ground	Inhalation of fibres	Current site users	Medium	Unlikely	Low	The laboratory results of the previous GI did not indicate the presence of any asbestos containing materials within the Phase 2 Development Area of wider GI area. However, based on the age of the initial development and evidence of redevelopment on site the potential for asbestos containing material cannot be discounted. Based on the current site use (predominantly hard standing) the risk to current site users is considered to be low. However, testing is recommended as part of the ground investigation to assess the potential risk to future site users and construction workers.
		Future site users		Low likelihood	Low/ Moderate	
		Construction workers		Low likelihood	Low/ Moderate	
Potential for ground contamination associated with former boiler house/ chimney and car parks on site.	Direct dermal contact or ingestion of soils, or inhalation of dust and/or vapours	Current site users	Medium	Low likelihood	Low/ Moderate	The available historical mapping indicates a chimney located in the centre of the site. A record from a historical borehole logs indicates a boiler house in the approximate location of the chimney although anecdotal evidence suggests that the boiler house was gas fired.. Two car parks are located in the south of the site. These sources could pose a risk of hydrocarbon contamination to underlying soils Ground investigation in the areas of the former boiler house/ chimney and car parks is recommended to assess the nature of potential extent of contamination in these areas.
		Future site users		Low likelihood	Low/ Moderate	
		Construction workers		Low likelihood	Low/ Moderate	

	Leaching and vertical/ lateral migration of contaminants	Secondary A Aquifer (Brithdir member)	Medium	Low likelihood	Low/ Moderate	As described above, the historical mapping indicates the potential for hydrocarbon contamination to shallow sub-soils on site. Again, the previous GI has indicated a shallow groundwater table and consequently there is a low/moderate potential risk for the migration of contaminants from the soils to the shallow groundwater. It is recommended that groundwater monitoring wells are installed as part of the ground investigation to allow for the collection of groundwater samples and subsequent contamination assessment. The anticipated migration of contaminants through the low permeability glacial till to adjacent surface waters and underlying Coal Measures (Secondary A Aquifer) is considered to be low.
		Surface waters		Unlikely	Low	

4.0 SITE INVESTIGATION

Site investigation works were initially undertaken on 17th February 2021 & 23rd February 2021. One groundwater monitoring visit was undertaken on 2nd March 2021 following completion of the ground investigation.

An additional phase of site investigation was conducted on the 8th of May 2021, where four additional window sample positions were advanced in the upper staff car park surrounding WS105.

Post demolition trial pitting was conducted on the 29th of September and 2nd of December 2021, following clearance of previously inaccessible areas of the site.

Details of the fieldwork methods are given in the notes section at the end of this report.

4.1 SCOPE

Figure 0-2 shows the layout of the exploratory holes advanced during the site investigation. Exploratory hole logs including photographic plates are presented in Appendix B.

4.1.1 Further Ground Investigation - February 2021

The scope of the site investigation carried out in February 2021 included the following:

- Five Window Sample holes progressed to a maximum depth of 5m bgl.
- Installation of three ground gas and groundwater monitoring wells;
- On-site inspection and logging of recovered samples;
- Representative soil samples taken, submitted and tested for a suite of potential contaminants;
- One return visit to monitor ground gas and groundwater levels.

Ground gas monitoring was previously undertaken to support the construction of the school building in Phase 1. No building or enclosed spaces are to be constructed in Phase 2 and therefore, no further ground gas monitoring was required. In addition, no further geotechnical investigation and analysis was required.

The ground investigation was designed to provide an overall assessment of ground conditions and to address the sources outlined in Section 3.2. The rationale is summarised below:

- WS101: To target a current car park and the former boiler house/chimney in the centre of the site.
- WS102: To obtain information on ground conditions and assess contamination associated with Made Ground on site.
- WS103: To obtain information on I ground conditions and assess contamination associated with Made Ground on site.
- WS104: To obtain information on ground conditions and assess contamination associated with Made Ground on site.
- WS105: To target a current car park on site and obtain information on ground conditions on site.

Investigation beneath the building footprint was not possible during this phase of the investigation. The current school building is proposed to be demolished between August – December 2021. It is understood that further investigatory works will be undertaken during the demolition of the school building.

4.1.2 Additional Ground Investigation - May 2021

Additional ground investigation works were conducted on 8th of May 2021, within the upper staff car park area of the site where hydrocarbon contamination was encountered in WS105 (February 2021). This additional

phase of ground investigation was undertaken to determine the lateral and vertical extent of hydrocarbon contamination in this area of the site and included the following:

- Four Window Sample holes (WS201 to WS204), progressed to a maximum depth of 3m bgl, located in close proximity to WS105;
- Installation of two groundwater monitoring wells;
- On-site inspection and logging of recovered samples;
- Representative soil samples taken, submitted and tested for a suite of potential contaminants;
- One return visit to monitor groundwater levels and collect groundwater samples from WS101, WS203 and WS204;

4.1.3 Post Demolition Trial Pitting

Post demolition of the former school buildings, additional trial pitting works were conducted in September and December 2021, with 10 trial pits (TP201 to TP210) excavated across areas of the site formerly occupied by the school buildings and hard standing. These areas of the site were inaccessible during the previous rounds of ground investigation.

5.0 GROUND CONDITIONS ENCOUNTERED

5.1 STRATA ENCOUNTERED

The sequence of strata encountered beneath the site was as follows;

- Topsoil
- Made Ground
- Glacial Deposits

A summary of each stratum depth is provided in the tables below, with descriptions of each stratum detailed in the subsequent sections. Exploratory hole logs including photographic plates can also be seen in Appendix B.

Table 5-1 – Summary of Ground Conditions Encountered from August 2019 GI

Location	Depth to base of strata (m bgl)				
	Topsoil	Made Ground	Glacial Till Deposits		Brithdir Sandstone Member
			Fine grained	Coarse grained	
TP02	Ne	0.00-0.70	1.50-2.80	0.70-1.50*	Ne
TP03	Ne	0.00-0.20		0.20-2.00	2.00-2.50*
WS03	Ne	0.00-2.50	Ne	2.50-5.00*	Ne
WS04	Ne	0.00-1.40	Ne	1.40-3.45*	Ne

Ne denotes not encountered

**denotes base of strata not proven*

Table 5-2 – Summary of Ground Conditions Encountered from the February and May 2021 GI

Location	Depth to base of strata (m bgl)			
	Topsoil	Made Ground	Glacial Till Deposits	
			Fine grained	Coarse grained
WS101	Ne	0.00 – 0.22	Ne	0.22 – 1.40*
WS102	Ne	0.00 – 0.11*	Ne	Ne
WS103	0.00 – 0.45	Ne	0.45 – 1.90 *	Ne
WS104	0.00 – 0.10	Ne	1.20 – 2.90*	0.10 – 1.20*
WS105	Ne	0.00 – 1.00	Ne	1.00 – 2.00*
WS201	Ne	0.00 – 0.60**		
WS202	Ne	0.00 – 0.80**		
WS203	Ne	0.00 – 1.60	1.60 – 3.00*	Ne
WS204	Ne	0.00 – 0.60	0.60 – 3.00*	Ne

Ne denotes not encountered

**denotes base of strata not proven*

***Base of strata not proven – refusal of hand pitting and window sampling*

Table 5-3 - Post Demolition Trial Pitting, September and December 2021

Location	Depth to base of strata (m bgl)
	Made Ground
TP201	0.00 – 0.70*
TP202	0.00 – 1.10*
TP203	0.00 – 1.00*
TP204	0.00 – 1.50*
TP205	0.00 – 1.50*
TP206	0.00 – 0.50*
TP207	0.00 – 1.10*
TP208	0.00 – 1.20*
TP209	0.00 – 1.10*
TP210	0.00 – 1.40*

*denotes base of strata not proven

5.1.1 Topsoil

Topsoil encountered in two exploratory positions is described as a reddish-brown clayey sand with occasional cobbles of sub-rounded to rounded sandstone and frequent rootlets.

5.1.2 Made Ground

Made ground was encountered in all of the August 2019 positions ranging from dark brown gravelly silty sandy clay (maximum depth 0.40m) and grey sandy gravelly clay (maximum depth 2.50m) and brown silty sandy clayey gravel (maximum depth 1.40m). Made Ground was encountered in three of the five February 2021 positions and comprised asphalt and sub-base (WS101 and WS105), grey, dark grey and black sandy gravel (WS102 and WS105, WS201 to WS204) and concrete (WS105).

Made ground encountered in the upper staff car park area above Glacial Till in WS105, WS201, WS202, WS203 and WS204 was found to be visibly contaminated with hydrocarbons, with a strong hydrocarbon odour.

Made ground encountered across the areas formerly occupied by the school buildings was described as a heterogeneous mixture of clay, silt sand and gravel with anthropogenic materials such as brick, concrete and slag.

5.1.3 Glacial Deposits

Superficial glacial deposits were encountered in all locations as highly heterogeneous deposits of clays, sands and gravels. Superficial deposits encountered were typically stratified deposits with discontinuous stratified lenses with coarse horizons.

The poor sorting of the superficial deposits encountered suggests that the deposits encountered are potentially part of the Langland Till Member of the Brecknockshire Glacigenic Formation (The Geological Society, 2017).

5.1.4 Brithdir Member

The Brithdir Member was not encountered within any of the February/May intrusive locations, as the base of the Glacial Till was not proven. In the August 2019 ground investigation within the Phase 1 area of the site (new school building), the Brithdir Member was encountered at depths of 1.00mbgl to 6.30mbgl,

5.2 GROUNDWATER

Water was encountered in two of the August 2019 trial pits, four of the February 2021 exploratory positions, and in six of the September / December 2021 post demolition trial pits.

The groundwater levels are summarised in the table below:

Table 5-4 – Groundwater Levels

Location	Water Strike (m Bgl)	Water Level – 20 minutes (m Bgl)
TP02	2.40	Not stated
TP03	2.40	Not stated
WS102	0.10*	0.05
WS103	1.90	1.90
WS104	1.40	1.00
WS105	1.00	0.67
WS201	0.50	0.50
TP202	0.90	0.90
TP203	0.50	0.50
TP205	1.50	1.50
TP206	0.10	0.10
TP207	0.40	0.40
TP209	1.10	1.00

* It is assumed the 0.10m bgl water level in WS102 is surface runoff which infiltrated into the gravel ground surface.

5.3 OBSTRUCTIONS

Low strength concrete was encountered between 0.60mbgl and 1.00mbgl in WS105. Shallow refusal was also met in the two window sample locations WS201 and WS202.

5.4 VISUAL OR OLFACTORY EVIDENCE OF CONTAMINATION

Made Ground encountered in the upper staff car park area above Glacial Till in WS105, WS201, WS202, WS203 and WS204 was found to be visibly contaminated with hydrocarbons, with a strong hydrocarbon odour.

TP201, advanced during September 2021 in the location of the former boiler house found no evidence of hydrocarbon impact soils beneath the former plant room. No visible evidence of hydrocarbon impacted soils were noted beneath the remaining areas of the school, or beneath the slab of the building immediately to the north of the hydrocarbon impacted staff car park area.

6.0 LABORATORY TESTING

6.1 ENVIRONMENTAL TESTING

Environmental chemistry was investigated by specialist chemical analysis of selected soil samples carried out by ALS Environmental Laboratories, an approved supplier in accordance with the requirements of Tetra Tech quality system and UKAS and MCERTS accredited for a range of chemical analyses. The testing was scheduled by Tetra Tech and is summarised in Table 6-1 for soil samples. The test results are included in Appendix C.

Table 6-1 - Summary of Environmental Testing

Test suite	No.
<u>Soil Samples:</u> • Tetra Tech Suite C ○ Heavy metals including Chromium (Hexavalent), Boron (water soluble), Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium and Zinc; ○ Inorganics – including pH, Water soluble Sulphate as SO₄ (2:1 Extract), Cyanide (Easily liberatable- low level); ○ Speciated Petroleum Hydrocarbons (TPH CWG); ○ Speciated Polyaromatic Hydrocarbons (USEPA 16); ○ BTEX and MTBE; ○ Asbestos Screen; and, ○ Phenol.	28
<u>Soil Derived Leachate Samples</u> • Tetra Tech Leachate Suite C ○ Heavy metals including Antimony, Boron, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium and Zinc; ○ Inorganics – including pH, Sulphate, Chloride, Nitrite, Nitrate, Total Cyanide, Ammoniacal Nitrogen and NH₃ and NH₄ and Total Alkalinity ○ Speciated Petroleum Hydrocarbons (TPH CWG); ○ Speciated Polyaromatic Hydrocarbons (USEPA 16); ○ BTEX and MTBE; ○ Phenol.	5
<u>Groundwater Samples</u> <u>Tetra Tech Groundwater Suite C</u> ○ Heavy metals including Antimony, Boron, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium and Zinc; ○ Inorganics – including pH, Sulphate, Chloride, Nitrite, Nitrate, Total Cyanide, Ammoniacal Nitrogen and NH₃ and NH₄ and Total Alkalinity ○ Speciated Petroleum Hydrocarbons (TPH CWG); ○ Speciated Polyaromatic Hydrocarbons (USEPA 16); ○ BTEX and MTBE; Phenol.	6

In addition to the environmental testing detailed above, seven samples of tarmac surfaces across the school site were sampled and forwarded to Socotec for testing to determine their coal tar content. The location of the sampled areas are shown in Figure 6-1, below.

Figure 6-1 - Coal Tar Testing Locations



7.0 GROUNDWATER

7.1 GROUNDWATER MONITORING

Groundwater levels were monitored on one occasion following the completion of the ground investigation, on 2nd March 2021. A second round of monitoring was undertaken 28th of May 2021, following completion of the additional ground investigation in the Upper Staff Car Park.

The monitoring data is presented in Appendix D and summarised in Table 7-1 below.

Table 7-1- Summary of groundwater levels

Location	Base of borehole (m bgl)	Depth to water (m bgl)	
		02/03/2021	28/05/2021
WS101	1.28	0.65	0.59
WS103	1.70	1.20	1.14
WS104	2.60	0.82	0.78
WS203	1.92	-	0.81
WS204	2.20	-	1.61

8.0 GROUND CONTAMINATION ASSESSMENT – HUMAN HEALTH

8.1 INTRODUCTION

The UK Contaminated Land Regime (CLR) allows for a tiered approach to the assessment of ground contamination which is designed to allow increasingly site-specific assessment. In order to assess the potential risk posed by contaminants contained within the soils at the study area a generic quantitative risk assessment (gQRA) has been undertaken by comparing recorded concentrations of chemical constituents in soil with Generic Assessment Criteria (GAC) to identify whether, at the concentrations recorded, the presence of the constituent has the potential to adversely affect the health of site users (a Tier 1 assessment). GAC are set at levels where potential exposure is deemed to be within acceptable limits.

If the recorded concentrations of a particular constituent are below the GAC then the risk is generally considered to be acceptable and further assessment / or mitigation measures are not required. Where a substance is recorded at concentrations higher than GAC this does not necessarily indicate that a particular risk is present, however, it does typically signify the requirement to undertake further assessment in line with the UK tiered risk assessment framework.

8.2 ASSESSMENT CRITERIA

8.2.1 Ground Contamination Assessment – Human Health

8.2.1.1 Tier 1 reference criteria

Generic assessment criteria/screening values are derived by means of computer modelling using input parameters reflective of typical ground conditions, chemical fate and transport properties and typical receptors and exposure scenarios. In September 2014, the Department of Environment, Food and Rural Affairs (DEFRA) with Contaminated Land: In Real Environments (CL:AIRE) published Category 4 Screening Levels (C4SLs) for a limited number of contaminants for soil with 6% Soil Organic Matter (SOM) using the Contaminated Land Exposure Assessment (CLEA) Model. Contaminant concentrations below C4SLs are considered to pose an acceptably low risk. Where C4SLs have been published, these values have been used as Generic Assessment Criteria (GAC) and where not available, Suitable for Use Levels (S4ULs) GAC published by LQM and the CIEH in 2015 have been substituted. Where no published screening values are available Tetra Tech have derived their own values.

The following screening values for soils have been used which are the most up to date at the time of reporting:

- CL:AIRE published C4SL (DEFRA, 2014);
- CIEH/LQM published S4UL (LQM/CIEH, 2015);
- Tetra Tech internal Tier 1 Screening Criteria (issue 15) derived using the derivation tool CLEA version 1.06, in line with the current UK Contaminated Land Regime.

The Soil Screening Values used in the assessment of risks to human health from soil are based on generic land-use scenarios modelled over the operational life of the site. Consequently, short term (acute) exposure risks arising from activities which deviate from the assumed land-use scenario (i.e. risk to construction workers) are not considered by this assessment process. Similarly, issues of waste classification and management are not addressed by the UK CLR Framework.

The Soil Screening Values (SSVs) used as part of this assessment process (gQRA) have been developed specifically for a Public Open Space use. There is no specific land use assessment for the proposed end use, however given the proposed development predominantly comprises soft landscaping this assessment is considered to be suitably conservative for the proposed end users including young children.

8.2.2 Proposed End Use

Screening criteria have been developed for the following land use scenarios:

- Residential with plant uptake;
- Residential without plant uptake;
- Allotments;
- Public open space (park and residential);
- Commercial / Industrial.

The proposed development on site will consist of the demolition of the existing school and the development of a MUGA, as such the following screening assessment has been undertaken against a Public Open Spaces (Parks) end use scenario to provide a conservative assessment. There is no specific land use assessment for the proposed end use, however given the proposed development predominantly comprises soft landscaping this assessment is considered to be suitably conservative for the proposed end users including young children.

8.2.3 Soil Organic Matter

For organic contaminants, the generic soil screening values have been derived for a range of concentrations of soil organic matter (1%, 2.5%, 6%). In order to provide a conservative assessment the GAC derived for a 1% SOM have been adopted.

8.3 TIER 1 – SOIL SCREENING

8.3.1 February and May 2021 Investigations

A total of eighteen soil samples collected from across the site during the February 2021 GI and May 2021 supplementary GI and were submitted for chemical laboratory analysis. Full copies of laboratory certificates for all soil analysis are included in Appendix C. In addition, the results of the laboratory testing for TP02, TP03, WS03 and WS04 from the previous August 2019 GI, and are situated within the Phase 2 area, have been reviewed and included in the assessment below.

Comparison of the chemical analysis results with the generic assessment criteria for a public open space end use has identified the following exceedances, as detailed in Table 8-1.

Table 8-1 - Summary of Constituents of Concern

Constituent of Concern	No. of Samples	Min (mg/kg)	Max (mg/kg)	SSV	Exceedances	
					No. of exceedances	Location
pH	3	5.53	11.5	<5, >9	7	WS105, WS201, WS202, WS204
Arsenic	1	171	171	170	1	WS105
Lead	1	104	4,390	1,300	2	WS105 WS204

A summary table of all the data is also presented in Appendix C.

The laboratory results indicate elevated pH and elevated concentrations of Arsenic in WS105, and Lead in WS105 and WS204 in excess of their respective screening values. However, a review of the arsenic concentrations indicates that the concentration of 171mg/kg only marginally exceeds the screening value of 170mg/kg and therefore is not considered to pose a significant risk. The high pH values recorded in soils are

thought to be the result of inclusions of cement and concrete fragments within made ground, and are not thought to present a serious risk to end users.

It should be noted that the laboratory results indicate elevated concentrations of aromatic and aliphatic hydrocarbons at WS105, but below the screening criteria. Subsequent testing of soils from WS201 to WS204 in May 2021 also demonstrated elevated levels of aliphatic and aromatic hydrocarbons, again below the end use criteria; however, visible free product was noted within the positions WS201 to WS204. Anecdotal evidence suggests that the elevated TPH concentrations could be associated with the spills and leaks of vehicles from historic car servicing activities in this area of the site.

Total TPH concentrations within soils beneath this car park range up to 9,320mg/kg, with the majority comprised of aliphatic hydrocarbons falling between carbon bands C12 to C35 (e.g. diesel/lubricating oil) – results are summarized in Table 8-2 below.

The elevated concentrations of Lead, and hydrocarbon impacted soils are considered further in Section 10.

8.3.2 September and December 2021 Investigations

During the post demolition trial pitting, a total of 10 soil samples were collected from across formerly inaccessible areas beneath the school buildings, and were submitted for chemical laboratory analysis.

Comparison of the chemical analysis results with the generic assessment criteria for a public open space end use has identified no exceedances of the Generic Assessment Criteria.

8.4 TARMAC COAL TAR TESTING

Seven samples of tarmac hardstanding across the school site were collected and forwarded to Socotec for coal tar content testing. The laboratory certificates are appended in Appendix F, and the results are summarised in Figure 8-1 below.

Figure 8-1 - Coal Tar Testing Results Summary

Sample ID	Sample Location	Result (mg/kg)
C1	Upper Staff Car Park	< 8.00
C2	Lower Staff Car Park	< 8.00
C3	Extant bus drop off	< 8.00
C4	2G Pitch	< 8.00
Small Play Area	Small Play Area, north of site	< 8.00
Big Play Area	Big Play Area, north-east of site	< 8.00
2G Pitch	2G Pitch	< 8.00

On the basis of the coal tar content testing results, the tested hardstanding across the site does not contain coal tar binders. The reuse of this material within the development as general fill could be considered.

Table 8-2 - Summary of hydrocarbon impacted soils samples, WS105, WS201 to WS204

TPH band	Screening Value PoS - Park	WS105, 0.10m to 0.25m	WS105, 0.35m to 0.60m	WS105, 1.00m to 1.20m	WS201 0.25m to 0.65,	WS202 0.60m to 0.80m	WS203 1.30m to 1.80m	WS203 1.80m to 2.00m	WS204 0.30m to 0.60m	WS204 0.70m to 1.00m
Aliphatics >C5-C6	95000	<0.01	0.022	0.0108	0.112	0.0365	0.0336	<0.01	0.023	<0.01
Aliphatics >C6-C8	150000	<0.01	0.0854	0.048	2.72	0.0581	0.056	0.0655	0.411	<0.01
Aliphatics >C8-C10	14000	<0.01	2.46	1.72	25.7	0.398	1.91	0.0777	4.78	<0.01
Aliphatics >C10-C12	21000	<1	423	166	29.5	<1	17.5	<1	65.1	<1
Aliphatics >C12-C16	25000	<1	2930	1050	101	9.82	97.9	<1	674	<1
Aliphatics >C16-C21	450000	<1	3300	1080	96.8	14.7	112	<1	1250	<1
Aliphatics >C21-C35	450000	15.3	1010	224	32.8	15.3	38.4	<1	827	<1
Aliphatics >C35-C44	450000	68.5	90.1	9.28	15.5	11.4	1.55	<1	163	<1
Aromatics >EC5-EC7	190	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC7-EC8	87000	<0.01	0.011	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	7200	<0.01	1.64	1.15	17.1	0.264	1.28	0.0511	3.19	<0.01
Aromatics > EC10-EC12	9,200	<1	40.2	11	7.76	<1	1.97	<1	24.9	<1
Aromatics > EC12-EC16	10,000	<1	752	296	39.7	2.34	17.7	<1	198	<1
Aromatics > EC16-EC21	7,600	<1	659	217	15.9	2.42	28.2	<1	181	<1
Aromatics > EC21-EC35	7,800	20.6	122	17.1	9.33	12.8	16.8	<1	56.8	2.09
Aromatics >EC35-EC44	9,200	10.8	3.57	<1	3.42	2.16	5.55	<1	2.42	<1
Aromatics > EC40-EC44	10,000	2.77	<2	<1	<1	1.02	5.3	<1	<1	<1
Total Ali & Aro >C5-C44	N/A	116	9320	3080	397	72.3	341	<10	3450	<10

8.5 ASBESTOS

Since 2009, there have been laboratory improvements in the detection of asbestos and as such all samples of Made Ground and natural soils were subject to an asbestos screen. There is no published screening value for asbestos.

8.5.1 February and May 2021 Investigations

Eighteen samples were collected and analysed for the presence of asbestos containing materials. No asbestos fibres were detected in the soil samples submitted for laboratory analysis. In addition, no asbestos fibres were noted in any of the samples from the Phase 2 Development Area from the August 2019 GI.

8.5.2 September and December 2021 Investigations

During the post demolition trial pitting, a total of 10 soil samples were collected from across formerly inaccessible areas beneath the school buildings, and were analysed for the presence of asbestos containing materials.

Trace amounts of chrysotile and amosite asbestos fibres were detected within sample TP09, 0.20m to 0.60m. The remaining 9 samples were found not to contain asbestos.

Following the positive identification of asbestos within the sample from TP209, the sample was subject to full asbestos quantification analysis (PCOM plus gravimetric) to determine the total volume of asbestos present within the soil, as a percentage proportion of the total sample weight.

The results of the asbestos quantification indicate that the sample contained less than 0.001% asbestos by total weight. Whilst there is no published screening value for asbestos, such a result indicates that only trace amounts of asbestos are present. The presence of asbestos fibers in such low quantities presents a low risk to human health.

Table 8-3 - Summary of Positive Asbestos Identifications and Quantification

Sample	Depth (m bgl)	Asbestos ID	Comments	Quantification		
				Gravimetric (%)	PCOM (%)	Total (%)
TP209	0.20 - 0.60	Amosite (Brown) Chrysotile (White)	Free fibers and fiber bundles	<0.001	<0.001	<0.001

The area of the site where TP209 was advanced was undergoing fill of 1.0m of naturally occurring glacial till as part of the overall site cut and fill works to form a suitable platform for the new school playing fields.

To protect construction workers in undertaking activities in this area of the site, works within the vicinity of TP209 were halted whilst asbestos quantification was undertaken.

Following the receipt of the quantification results, Morgan Sindall were advised to undertake additional mitigation measures in the vicinity of TP209 to protect construction workers:

- Site workers were made aware that asbestos has been identified within this area.
- Minimisation of tracking across the area until filled.
- Provision of dust suppression across the area to minimise dust generation.
- Provision of protective PPE including FFP3 disposable masks where operatives were outside of vehicle cabs.
- A watching brief for any ACMs within this area of the site (no ACMs were identified).

9.0 GROUND CONTAMINATION ASSESSMENT – WIDER ENVIRONMENT

9.1 INTRODUCTION

The potential for contaminated groundwater on site to adversely affect controlled water receptors (groundwater and surface water bodies) has been assessed at this stage by direct comparison of analytical data from the Tetra Tech ground investigation with relevant Water Quality Standards (WQS).

Similarly, the potential for soil contamination to impact controlled waters has been assessed by comparing analytical data from soil derived leachate tests directly against WQS.

9.2 ASSESSMENT CRITERIA

This preliminary contamination assessment for the wider environment provides a generic qualitative risk assessment screening exercise using the screening targets outlined below to assess the risks identified in Section 4 and during the site investigation. This is required to determine whether ground conditions are impacting significantly upon controlled waters.

9.2.1 Ground Contamination Assessment – Wider Environment

The following sections consider the risk to the wider environment from potential contaminants within local groundwater beneath the site. Assessment of potential risk to the wider environment is important to ensure that ground conditions, or indeed current or historic activities/facilities associated with the site, are not impacting significantly on sensitive nearby habitats and/or water resources.

9.2.1.1 Controlled Waters Reference Criteria

A surface water drainage ditch is shown to extend along the site's eastern and northern boundary, draining agricultural fields present to the east and north of the site. Water in the ditch flows westwards along the site boundary before entering a culvert along the northern boundary and re-emerging as the 'Cefn Saeson Dingle' at the rear of the residential properties to the west of the site. The Cefn Saeson Dingle flows westwards within a small valley and joins the Preswylfa Brook approximately 900m to the west, north-west of the site. The drainage ditch is anticipated to be receiving surface water run-off only and is not expected to be receiving groundwater flow.

Groundwater at the site has been recorded within the Glacial Deposits. The Glacial Till deposits were found to comprise predominantly of clay rich soils and therefore, groundwater levels recorded are anticipated to be perched groundwater levels rather than representative of a continuous groundwater water table beneath the site. Groundwater within the Brithdir Member was not encountered during the ground investigation. The clay rich soils of the Glacial Till deposits will offer some protection to the quality of groundwater within the Brithdir Member, limiting vertical migration of contaminants from pollution sources located at surface level surrounding the site.

The site is not situated within a groundwater source protection zone and no licensed groundwater abstractions are present within 1km of the site. The Superficial Deposits and Brithdir Member are classified as Secondary A Aquifers by NRW.

In line with the above information, the results of chemical testing of water samples have been assessed against available Environmental Quality Standards (EQS) for freshwater; which are considered protective of surface water features beyond the site boundary. Where no EQS is available, the UK Drinking Water Standards (UKDWS) are used instead. The comparison of a concentration against a UKDWS is considered highly conservative but serves to provide an indication of the level of contamination (or otherwise) within groundwater beneath the site and offers protection to the quality of groundwater within the Secondary A Aquifers.

World Health Organisation (WHO) drinking water standards have been used to screen recorded TPH (Aromatic/Aliphatic) concentrations in the water samples. Tier 1 screening assessment against EQS and UKDWS allows for an initial assessment of the results, after which a more targeted assessment can be made based on the derived conceptual site model.

9.2.2 Bioavailability

For certain heavy metals (copper, zinc, manganese, nickel and lead) the bioavailability of the metal within the water can be calculated to generate a bespoke screening criteria based on other groundwater parameters. This assessment is undertaken utilising the Metal Bioavailability Assessment Tool (M-BAT) which was developed using the EQS_(bioavailable) developed in line with the Water Framework Directive.

In the case of copper, zinc, manganese and nickel the assessment takes into account the concentration of calcium, Dissolved Organic Carbon (DOC) and pH of the water sample. The assessment for lead only takes the DOC of the sample into account. A spreadsheet has been developed for the assessment by the UK Technical Advisory Group on the Water Framework Directive.

9.3 SOIL DERIVED LEACHATE METHODOLOGY

Soil derived leachate samples can be used to identify potentially mobile contamination within soil samples collected from the site. It should be noted that the laboratory test methodology indicates a potential mobility of contaminants and is usually considered to reflect a worst-case situation and unlikely to represent on-site conditions.

The laboratory preparation of leachate samples is likely to produce higher concentrations of leachable components than conditions encountered on site and as such the following assessment is considered to be inherently conservative in nature. Furthermore, the resulting data are screened against criteria intended to be protective of water bodies and drinking water supplies and are not intended to assess the potential significance of contaminant mobility.

9.3.1 February and May 2021 Investigations

The following table summarises the determinants which have been identified within soil derived leachate samples at concentrations in excess of the relevant WQS screening criteria from soil samples collected during February and May 2021.

Table 9-1 - Summary of Exceedances within Soil Derived Leachate Samples

Determinant	Units	Maximum	Minimum	Screening Value	Exceedances	
					No.	Location
Arsenic	ug/l	0.011	<0.0005	0.01	1	WS203
Aliphatic hydrocarbons C6-C8	ug/l	0.011	<0.01	0.01	1	WS203
Aliphatics C8-C10	ug/l	0.031	<0.01	0.01	1	WS203
Aliphatics C10-C12	ug/l	0.091	<0.01	0.01	1	WS203
Aromatics EC8-EC10	ug/l	0.02	<0.01	0.01	1	WS203
Aromatics EC10-EC12	ug/l	0.061	<0.01	0.01	1	WS203
Fluoranthene	ug/l	0.0171	0.0548	<0.000005	1	WS203

9.3.2 September and December 2021 Investigations

The following table summarises the determinants which have been identified within soil derived leachate samples at concentrations in excess of the relevant WQS screening criteria from soil samples collected during September and December 2021.

Table 9-2 - Summary of Exceedances within Soil Derived Leachate Samples

Determinant	Units	Maximum	Minimum	Screening Value	Exceedances	
					No.	Location
Copper	ug/l	10	<7	1	1	TP205
Zinc	ug/l	15	<3	10.9	2	TP205 TP207

The elevated concentrations of copper, zinc, TPH and PAHs derived from leachability testing are considered further within the risk assessment presented in Section 10.

TIER 1 SCREENING ASSESSMENT – GROUNDWATER

Three groundwater samples were obtained from the monitoring installations on the site in March 2021 and analysed for the suite of determinants outlined in Section 6.1. The results were screened against a suite of determinants outlined in Section 9.2.

A second round of groundwater sampling was conducted on the 28th of May 2021, with groundwater samples collected from installations WS101, WS203 and WS204.

The following table summarises the determinants which have been identified at concentrations in excess of the relevant WQS screening criteria.

Table 9-3 – Summary of Exceedances within Groundwater Samples

Determinant	Units	Maximum	Minimum	Screening Value	Exceedances	
					No.	Location
Arsenic	ug/l	29.5	2.29	10	2	WS203, WS204
Cadmium	ug/l	0.307	0.173	0.08	3	WS101, WS103, WS104
Copper	ug/l	1.31	7.93	1.00	2	WS103, WS104
Lead	ug/l	1.23	4.16	1.20	3	WS101, WS103, WS104
Nickel	ug/l	19.7	60.3	4.00	4	WS101, WS103, WS104
Zinc	ug/l	35.8	50.3	10.9	3	WS101, WS103, WS104
Aliphatics C6-C8	ug/l	10	<10	10	1	WS203
Aliphatics >C8-C10	ug/l	178	<10	10	2	WS203, WS204
Aliphatics >C10-C12	ug/l	872	<10	10	2	WS101, WS203, WS204
Aliphatics >C12-C16	ug/l	1770	<10	10	3	WS101, WS203, WS204

Aliphatics >C16-C21	ug/l	2100	<10	10	3	WS101, WS203, WS204
Aliphatics >C21-C35	ug/l	1640	<10	10	3	WS101, WS203, WS204
Aromatics >EC8-EC10	ug/l	119	<10	10	2	WS203
Aromatics >EC10-EC12	ug/l	581	<10	2	2	WS203, WS204
Aromatics >EC12-EC16	ug/l	183	<10	10	2	WS203, WS204
Aromatics >EC16-EC21	ug/l	427	<10	0.00017	2	WS203, WS204
Fluoranthene	ug/l	0.0171	0.838	0.0063	5	WS101, WS103, WS203, WS204
Benzo(b)fluoranthene	ug/l	0.0342	0.655	0.017	5	WS101, WS103, WS203, WS204
Benzo(k)fluoranthene	ug/l	0.0216	0.263	0.0127	4	WS101, WS203, WS204
Benzo(a)pyrene	ug/l	0.0139	0.273	0.00017	2	WS101, WS103
Benzo(g,h,i)perylene	ug/l	0.012	0.0252	0.0082	3	WS101, WS103

* Freshwater waters EQS 2015

Inland water EQS 2015

As can be seen in the table above, a range of heavy metals (arsenic cadmium, copper, lead, nickel and zinc) have been identified in excess of their relevant screening values in sampled boreholes on site and 5no. PAH compounds have been identified at concentrations in excess of the relevant screening criteria at WS101, WS103, WS203 and WS204.

Additionally, elevated levels of aliphatic hydrocarbons and aromatic hydrocarbons have been identified in WS203 and WS204, in the upper staff car park area.

As outlined in Section 9.2.2, the bioavailability of certain heavy metals can be taken into account within water samples. The M-BAT assessment tool has been used to determine a screening value taking into account the bioavailability of Copper, Lead, & Zinc within the groundwater sample and the results are presented in the following table.

Table 9-4 – M-BAT adjusted Screening Values for Heavy Metals – Groundwater

Determinant	Sample	Concentration (µg/l)	Screening Value (µg/l)	M-BAT Screening Value (µg/l)	Exceedances
Lead	WS101	1.23	1.20	0.35	WS104
	WS103	1.65		0.20	
	WS104	4.16		1.39	
Copper	WS103	7.93	1.00	0.26	None
	WS104	1.31		0.17	
Zinc	WS101	50.3	10.9	28.55	WS101, WS104
	WS103	38.9		10.70	
	WS104	35.8		20.50	

When bioavailability is taken into account, copper concentrations are no longer considered to pose a risk to the wider environment.

The elevated concentrations of arsenic, cadmium, nickel, lead, zinc, TPH and PAHs in groundwater are considered further within the risk assessment presented in Section 10.

10.0 CONCEPTUAL SITE MODEL AND PRELIMINARY GROUND CONTAMINATION RISK ASSESSMENT

10.1 OVERVIEW

The information presented in the previous sections of this report have been collated and evaluated to establish an initial qualitative risk assessment for the site. A conceptual model of the site has been generated based on information derived from this Phase 1 Geo-environmental Assessment, supplemented by information attained during the Tetra Tech site walkover.

The site has been considered with regard to current UK legislation and guidance, namely Part 2A of the Environmental Protection Act 1990 and the Contaminated Land (England) Regulations 2006, as amended, and in accordance with current UK good practice guidelines (for example BS10175:2011).

In general, ground contamination can occur through several causes, particularly from historical operations and activities. Contamination can result from either on-site sources or from on-site migration from off-site sources, leading to long term liabilities under recent legislation for any site owner.

For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- Source, i.e. a substance that is capable of causing pollution or harm;
- Pathway, i.e. a route by which the contaminant can reach a target; and
- Receptor (target), i.e. something which could be adversely affected by the contaminant.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

10.2 CURRENT SITE USAGE AND PROPOSED DEVELOPMENT

The site is currently utilised as a comprehensive school. The school buildings previously present across Phase 2 of the site have been demolished to provide space for the schools MUGA's, with an associated bus drop-off lane.; the MUGA's and drop off lane are currently undergoing construction as of January 2022.

10.3 CONCEPTUAL SITE MODEL

The key source, pathways and receptor model is outlined below within the context of potential development of the site.

As the proposed development is for a part of the school sports facilities, the following risk assessment is undertaken within the context of a Public Open Space (Parks) end use scenario with 1% SOM to provide a conservative approach.

10.3.1 Potential Sources of Contamination

The main potential sources of contamination on the site are associated with existing features as well as historical land uses on the site as summarised below.

On site Sources:

- Elevated pH, heavy metals and hydrocarbons within Made Ground and underlying soils at WS105, and WS201 to WS204 (Upper Staff Car Park);
- Potential ACM's, asbestos fibres or other contamination within Made Ground soils beneath extant school structures;

- Elevated heavy metals, TPH and PAHs in shallow groundwater on site.

10.3.2 Potential Contaminant Pathways

The following contaminant pathways are considered to potentially be active based on the current site use and proposed development:

Human Exposure Pathways

- Direct dermal contact or ingestion of soils, or inhalation of dust and/or vapours (i.e. human interaction with surface and sub-surface materials).

Environmental Pathways

- Leaching and horizontal or vertical migration through the unsaturated ground, either through permeable sub-surface materials and/or preferential pathways;
- Lateral and vertical migration of groundwater through permeable sub-surface materials and/ or preferential pathways;
- Leaching to surface water run-off/drainage;
- The migration and accumulation of gases or vapours through permeable sub-surface materials and/ or preferential pathways.

10.3.3 Potential Receptors at Risk

The following potential receptors have been identified:

Human Health

- Current site users (Students/Teachers);
- Future site users (Students/Teachers);
- Site workers during the redevelopment of the site; and
- Adjacent site users (residential)

Wider Environment

- Secondary A Aquifer within Brithdir Member;
- Surface waters – Unnamed stream to the north;
- Plant uptake;
- Building Infrastructure and supply pipes; and
- Adjacent Properties

10.4 GROUND CONDITIONS RISK ASSESSMENT

The source, pathway, receptor linkages identified in the previous section are outlined and a qualitative risk assessment shown in the following tables.

The risk assessment considers the site within an area context and assesses potential risks to identified receptors in relation to the existing site setting and the proposed development. CIRIA C552 has been used to define the risk rating presented in the Qualitative Risk Assessment matrix, the methodology for which is presented in Appendix E.

Table 10-1 – CIRIA C552 Qualitative Risk Assessment

This matrix is based on CIRIA C552 risk evaluation methodology, definitions for risk ratings is presented in Appendix D						
Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Potential risk management requirements
Elevated pH, Lead and hydrocarbons within Made Ground and underlying natural soils at WS105 and WS201 to WS204	Direct dermal contact or ingestion of soils, or inhalation of dust and/or vapours	Current Site Users	Medium	Unlikely	Low Risk	The laboratory results have indicated elevated pH in several samples although thought to relate to the inclusion of concrete and cement fragments within the Made Ground, and does not present a risk to end users.
		Future Site Users		Likely	Moderate Risk	Elevated contaminant concentrations of Zinc, Lead and hydrocarbons were initially identified in WS105, and subsequently within WS201 to WS204. This area of the site is used as a staff car park and as such, the risk to current site users is considered to be low owing to the presence of hardstanding across this area. However following the removal of hardstanding, if soils are reused on other areas of the site near the surface, elevated levels of arsenic and lead in exceedances of the GAC for a Public Open Space – Park end use present a moderate risk to future site end users.
		Site construction workers.		Likely	Moderate Risk	Whilst the concentrations of hydrocarbons encountered in WS105 and WS204 are below the GAC for a Public Open Space (Park) end use, the proposed development plan (Figure 3) indicates that the soils in this area are proposed for a “cut” up to 1.0m bgl to be re-used as “fill” elsewhere on site. The re-use of this material elsewhere on site without treatment is unlikely to be acceptable considering the sensitive end use of the site, and the potential for risk to controlled waters. A remediation strategy setting

						out a remedial options appraisal should be prepared for the site. Risks to construction workers can be mitigated through standard good working practice and the use of appropriate PPE.
	Leaching and vertical/lateral migration of contaminants	Groundwater	Medium	Low Likelihood	Low/Moderate Risk	The laboratory results have indicated elevated concentrations of TPH in soils within WS105 and WS201 to WS204, which has the potential to impact the underlying groundwater.
		Surface Water	Medium	Unlikely	Low Risk	An additional groundwater sampling round was conducted on 28th of May 2021, with samples collected from WS101, WS203 and WS204. Elevated levels of arsenic, PAH and TPH have been identified within shallow groundwater within the upper staff car park area. Leachability testing of soil samples collected from WS203 and WS204 demonstrated exceedances of EQS for Arsenic, Fluoranthene, and aliphatic and aromatic hydrocarbons in hydrocarbon impacted soils encountered in WS203. Leachability testing following the demolition of the school demonstrated exceedances of the EQS from leached eluate in soil samples collected from TP205 and TP207. Given the presence of superficial deposits of Glacial Till, migration to the underlying Secondary A aquifer of the Brithdir Member or local watercourses is considered unlikely. However, in the absence of remediation, hydrocarbon impacted soils present a long term risk to shallow groundwater within the Glacial Till.

Potential Asbestos in Made Ground	Inhalation of fibres	Current Site Users	Medium	Unlikely	Low Risk	No ACM was identified during this site investigation or previous August 2019, February 2021 and May 2021 GIs.
		Future Site Users		Unlikely	Low Risk	Following post demolition trial pitting conducted in September and December 2021, trace amounts of asbestos fibres were identified within one exploratory position located beneath the location of the former school building. Following asbestos quantification analysis, the sample was found to contain less than 0.001% asbestos by total weight.
		Site construction workers.		Unlikely	Low Risk	Whilst there is no published screening value for asbestos, such a result indicates that only trace amounts of asbestos are present. The presence of asbestos fibers in such low quantities presents a low risk to human health. Additionally, the soil sample was collected from an area which is being filled, and the sampled soils will be capped by 1.0m of clean glacial till derived soils from Phase 1 of the development. The remaining 9 exploratory positions advanced beneath the location of the former school buildings detected no asbestos, and screening of soil analyses for a range of common contaminants demonstrated no exceedance of the GAC. Mitigation measures including toolbox talks, dust suppression and PPE were emplaced to protect construction workers during the filling of the area in the vicinity of TP209.

Elevated concentrations of heavy metals and PAHs in shallow groundwater within glacial till	Leaching and vertical/lateral migration of contaminants	Groundwater	Medium	Likely	Moderate Risk	The laboratory results have shown elevated concentrations of heavy metals and PAHs in shallow groundwater within the Glacial Till at WS101, WS103 and WS104. The exceedances noted are predominantly marginally in nature compared to their respective screening values and are not considered to pose a significant risk to the wider groundwater body. Given the presence of superficial deposits of Glacial Till, migration to the underlying Secondary A aquifer of the Brithdir Member or local watercourses is considered unlikely. Leachability testing of soil samples collected from WS203 and WS204 demonstrated exceedances of EQS for Arsenic, Fluoranthene, and aliphatic and aromatic hydrocarbons in hydrocarbon impacted soils encountered in WS203. Shallow groundwater in the Upper Staff Car park is more heavily impacted, with higher recorded concentrations of TPH and PAH, indicating that shallow groundwater has been impacted in this area of the site.
		Surface Water	Medium	Unlikely	Low Risk	

11.0 INITIAL REMEDIATION OPTIONS APPRAISAL

This section of the report provides an initial options appraisal of remediation methods which may be suitable for use on the site.

With the exception of Made Ground in the vicinity of WS105 in the Upper Staff Car Park, site investigation has demonstrated that made ground across the remainder of the site does not exceed Generic Assessment Criteria Screening targets for a 'Public Open Space – Park' end use. Consequentially, the majority of Made Ground soil present on the site are considered to be suitable for retention and reuse on site.

Groundwater and soil leachability testing conducted across the site, the presence of a significant thickness of Glacial Till, and the distance to local watercourses shows no evidence of significant pollution or likelihood of significant pollution, of controlled waters from the majority of Made Ground soils.

The presence of a contamination source in the vicinity of WS105 has been identified by intrusive investigation and soil analysis. The presence of heavy metals in exceedance of the Generic Assessment Criteria for a 'Public Open Space – Park' end use, and the presence of visibly hydrocarbon impacted soils indicates that Made Ground is unsuitable for use at or close to the surface beneath the site. In the absence of mitigation or remediation this poses a potential risk from a direct exposure pathways to future site users.

Three potential remedial options which could be considered for the site are Cover Systems/Capping, Excavation and Disposal, or In Situ Treatment. A very brief overview of these options is included for review below; a detailed options appraisal and methodology for remediation will be laid out in the Remediation Strategy for the site.

11.1.1 Cover Systems / Capping

The presence of heavy metals and presentation of gross olfactory and visual hydrocarbon contamination in soils in the vicinity of WS105 presents a potential risk to controlled waters, indicating retention on site via methods such as cover systems or encapsulation under hard standing is not appropriate in this area of the site.

In the absence of the usage of cover systems/capping, two remediation methods which could potentially be utilized at the site are Excavation and Disposal, or Stabilisation.

11.1.2 Excavation

Site investigation has demonstrated that most hydrocarbon and heavy metal contaminated material located beneath the car park is visibly contaminated with hydrocarbons, and therefore removal of the material by visual and olfactory 'chasing out' will result in the removal of the soils of concern.

Made Ground would be excavated to the base of the impacted sub-base stratum and top of the unimpacted Glacial Till. Contamination visible in the sides of the excavation would also be 'chased out' laterally. This will be determined on site under the guidance of a geo environmental specialist based on visual and olfactory observations.

On completion of the excavation, visual and olfactory assessment of the material within the sides and base of the excavation should be undertaken and if any indication of hydrocarbon contamination is identified the excavation would need to be extended and a visual and olfactory assessment undertaken at the new limit of the excavation.

Excavated contaminated soils would need to be securely stockpiled and tested for waste classification prior to disposal; waste disposal cost and the sustainability associated with this method may be prohibitive.

11.1.3 Soil Treatment - Stabilisation

Soil treatment via stabilisation seeks to remediate impacted soils by immobilising contaminants via physical and chemical means, thereby removing the pathway between source and receptor.

Hydrocarbon impacted Made Ground would first be delineated through trial pitting in the vicinity of the suspected impacted area. Treatment process would involve the use of utilising a formulation designed to chemically immobilise the identified contaminants of concern (within the soils and associated groundwater). Cementitious materials would also be added to provide a degree of physical stabilisation.

Following treatments soil sampling would be conducted and screened against remediation criteria laid out in the remediation strategy. The use of insitu stabilization would need to consider that the soils will eventually be moved to another part of the site under an MMP as part of the site wide cut and fill works; soils which fail to meet the selected remedial criteria would also still require classification and disposal.

11.1.4 Summary

Of the three remediation options that have been appraised, two are considered viable for the site. Use of cover or capping systems to remediate the hydrocarbon and heavy metals contaminated soils in the Upper Staff Car Park area presents an ongoing risk to controlled waters, and is not considered appropriate.

Excavation and disposal of the contaminated soils is a potential option, as removal of the source will remove residual risk to both human health and controlled waters. However, the cost of disposal may be prohibitively expensive, depending on the waste classification of the material. Disposal of the material to landfill may also be considered to go against waste hierarchy principals.

Treatment of the soils in situ is an economic option; however, as the soils are located within an area of site which will be undergoing a reduced level dig, it must be ensured that the soils are suitable for movement. The feasibility of treating the materials to a standard protective of controlled water must also be considered.

12.0 CONCLUSIONS AND RECOMMENDATIONS

12.1 GROUND CONTAMINATION

12.1.1 Summary

Potential contaminative sources identified to be present within the site boundary and located off-site have been investigated during the site intrusive investigation. The findings have been used to assess whether a risk exists to the receptors (both human health and the wider environment) and whether further assessment is required.

Ground conditions typically comprise a limited thickness of Made Ground (maximum 1.0m thickness at WS105) underlain by superficial Till varying from gravels to clays. Bedrock was not encountered during this phase of ground investigation.

The majority of the site appears to be free from contamination which presents a risk to future end users or the wider environment; However, hydrocarbon and heavy metal impacted made ground soils beneath the Upper Staff Car Park area are considered to present a risk to controlled waters, and be unsuitable for retention on site in their current state due to gross visible hydrocarbon contamination.

12.1.2 Human Health

Within the context of the majority of the site, the qualitative risk assessment has identified a low risk to current site users and moderate to future site users with respect to the limited presence of elevated Lead, and hydrocarbons within Made Ground .

Whilst the hydrocarbon concentrations encountered at WS105 and WS 201 to WS204 are currently below the GAC for a public open space end use, soils in this area of the site are required to be cut as part of site earthworks. As the visibly hydrocarbon contaminated soils are unlikely to be suitable for reuse in their present state, a remediation strategy is required prior to the cut and reuse of the soils in this area.

Post demolition ground investigation was conducted within areas formerly covered by buildings to assess the potential for contamination (including ACM). Trace amounts of asbestos fibres were detected within one location, possibly derived from the demolition of the school building; however, analyses showed that less than 0.0015 asbestos by volume was present within the sample. The presence of asbestos fibres in such low quantities presents a low risk to human health. Samples from beneath the footprint of the former school buildings were also screened against GACs. No exceedances against the GAC criteria were recorded.

Risks to construction workers can be mitigated through the use of standard good working practices and the use of appropriate PPE.

12.1.3 Wider Environment

The risk assessment has also identified a low risk to groundwater and surface waters with respect to elevated heavy metals and PAHs in groundwater and moderate risk to shallow groundwater within Glacial Till from localised heavy metal, PAH and TPH contamination in the vicinity of WS105 and WS201 to WS204. Remediation of this area of the site should seek to break the pollutant linkage from soils to surface water / groundwater receptors.

12.2 RECOMMENDATIONS

Based on the findings of the risk assessment, the following recommendations have been made:

- A requirement for a remediation strategy for the remediation of soils in the vicinity of WS105, prior to the proposed cut and re-use of soils from this area. An initial Options appraisal is presented in Section 11.0 of this report.
- A proactive approach should be adopted across the site for identifying and assessing any previously unidentified contamination which may be encountered during the redevelopment on the site.
- The movement of any materials on site should be undertaken in conjunction with a Materials Management Plan in line with recommendation in the CL:AIRE Code of Practice to confirm all materials utilised on site and geotechnically and chemically suitable for re-use.
- Should any soils be designated for off-site disposal than a Waste Classification should be undertaken including Waste Assessment Criteria (WAC) testing on soils to identify a suitable waste disposal facility

13.0 NOTES

1. Standards

All boring operations, sampling of soils, *in situ* testing and geotechnical laboratory testing have been carried out in accordance with the recommendations of the British Standards BS 5930(2015)⁽¹⁾, BS 1377 (1990)⁽²⁾ and BS10175 (2001)⁽³⁾.

Soil and rock descriptions follow the recommendations of BS 593. Where descriptions or classifications are based on other documents (e.g. BS 8004 (1986) or CIRIA Project Report 11 (1993)), this is stated in the report text.

2. Site methods

Unless specifically stated otherwise, the following methods are used for exploratory holes.

- Holes described as cable percussive are bored using a light cable percussive rig. Standard penetration tests are carried out where appropriate, as shown in the logs. Disturbed and undisturbed samples are taken from the exploratory holes at the depths on the records.
- Window sampling generally uses the windowless sampling method, using a tracked Geotool.
- Dynamic probes are usually heavy dynamic probes, using the same tracked Geotool used for window sampling.

3. Definitions and abbreviations

The following terms are used in the exploratory hole logs

Samples

U	Undisturbed 102mm dia. sample
TW	Thin Walled undisturbed 102mm dia. sample
B	Bulk sample
D	Small disturbed sample
W	Water sample
CBR	California Bearing Ratio test or CBR value obtained from Mexiprobe test

In situ tests

S	Standard penetration test (SPT)
N	SPT N value (blows/300mm)
HP	Hand penetrometer – shear strength
SV	Hand shear vane – shear strength
VOC	Volatile organic compounds (ppm)
PID	Photo-ionisation detector – used to detect the presence of VOCs.

Core recovery and rock quality

TCR	Total core recovery (%)
SCR	Solid core recovery (%)
RQD	Rock quality designation (%)
FI	Fracture index
NR	No recovery
NI	Not intact

Rotary drilling sizes

Index letter	Nominal diameter (mm)	
	Borehole	Core
N	75	54
H	99	76
P	120	92
S	146	113

Water strikes

▽	Level of water strike
▼	Water level rose to this level (see Remarks at foot of log for details)

Depth means depth below existing ground level unless otherwise specified. Values specified in soil descriptions given in the exploratory hole logs are depths unless otherwise specified.

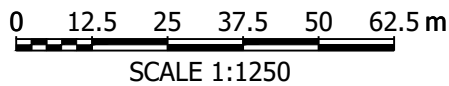
14.0 REFERENCES

- British Geological Survey. (2021). *GeoIndex*. Retrieved from <http://www.bgs.ac.uk/GeoIndex/>
- British Geological Survey. (2021). *GeoIndex*. Retrieved from <http://www.bgs.ac.uk/GeoIndex/>
- CIRIA. (2001). *Contaminated land risk assessment A guide to good practice*.
- CIRIA. (2007). *CIRIA C665, Assessing Risks Posed by Hazardous Ground Gases to Building*. London.
- CL:AIRE. (August 2018). *Technical Bulletin TB17. Ground Gas Monitoring and 'Worst-Case' Conditions*. CL:AIRE.
- DEFRA. (2021). *MAGIC*. Retrieved from Magic Map: <http://magic.defra.gov.uk/MagicMap.aspx>
- Environment Agency . (March 2017). *New Groundwater Vulnerability Mapping Methodology in England and Wales. Reference SC040016/R*. Environment Agency .
- Scivyer, C. (2015). *BRE 211. Radon: Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects). Fifth Edition*. . BRE.
- The Coal Authority. (2021). *Coal Authority Interactive Viewer*. Retrieved from <http://mapapps2.bgs.ac.uk/coalauthority/home.html>
- The Geological Society. (2017). *Engineering Geology and Geomorphology of Glaciated and Periglaciated Terrains*. London: The Geological Society.
- Zetica UXO. (2008). *Zetica UXO Risk Maps*. Retrieved from <https://zeticauxo.com/downloads-and-resources/risk-maps/>

FIGURES

Figure 0-1 – Site Location Plan

Figure 0-2 – Ground Investigation Location Plan



LEGEND:

 TP TRIAL PIT LOCATIONS (DECEMBER 2021)

 TP TRIAL PIT LOCATIONS (SEPTEMBER 2021)

 ADDITIONAL INVESTIGATION WINDOW SAMPLE HOLES (MAY 2021)

 WS WINDOW SAMPLE LOCATIONS (FEBRUARY 2021)

PREVIOUS SI LOCATIONS

 BH BOREHOLE LOCATIONS

 CBR CBR LOCATIONS

 TP TRIAL PIT LOCATIONS

 WS WINDOW SAMPLE LOCATIONS

R02	ADDITIONAL TRIAL PITS ADDED.	06.12.2021	PP	LH
R01	ADDITIONAL GI LOCATIONS ADDED.	04.10.2021	PP	LH
P01	PRELIMINARY FIRST ISSUE	26.05.2021	PP	AJ

Rev	Description	Date	Drawn	Checkd	Appr
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Client

MORGAN SINDALL CONSTRUCTION & INFRASTRUCTURE LTD

Project Name

CEFN SAESON COMPREHENSIVE SCHOOL

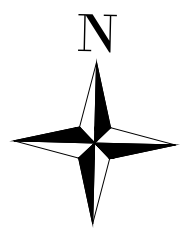
Sheet Title

SITE INVESTIGATION LAYOUT PLAN

TTE Project Number	Drawn By	Date	Checked By	Date	Approved By	Date	Scale @ A3	Suitability
784-B027006	PP	MAY '21	KW	MAY '21	AJ	MAY '21	As Shown	SD
Client Project Number	Originator	Volume/System Level/Location	Type/Code	Role	Number	Revision		
B027006	- TTE	- 00	- XX	- DR	- U	- 0002		R02

Figure 0-3 – Proposed Development Plan (WSP Drawing ref: 26W007-WSP-00-XX-DR-C-0100)

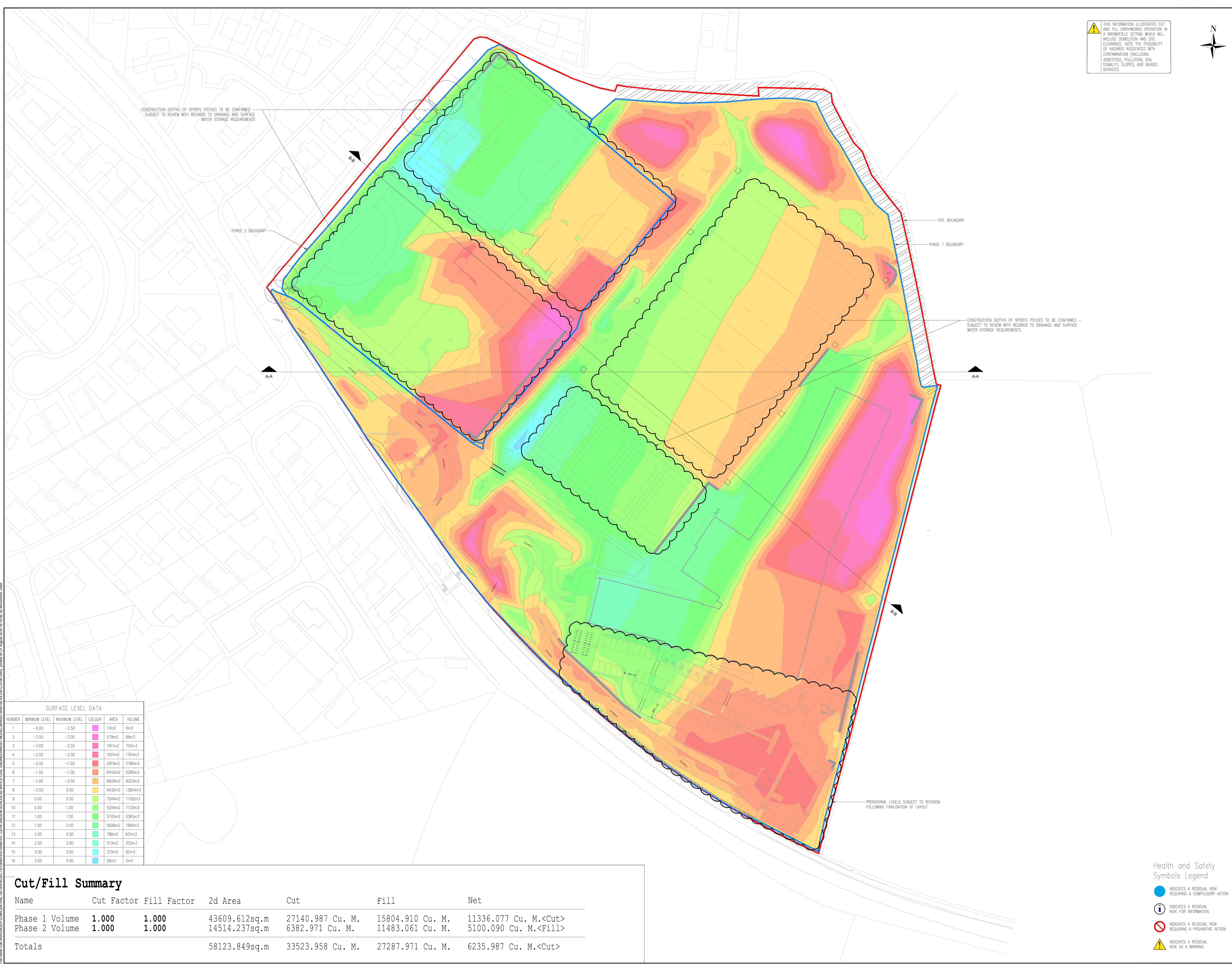
THIS INFORMATION ILLUSTRATES CUT AND FILL EARTHWORKS OPERATION IN A BROWNFIELD SETTING WHICH WILL INCLUDE DEMOLITION AND SITE CLEARANCE. NOTE THE POSSIBILITY OF HAZARDS ASSOCIATED WITH CONTAMINATION (INCLUDING ASBESTOS), POLLUTION, SOIL STABILITY, SLOPES, AND BURIED SERVICES.



DO NOT SCALE

- NOTES
1. ALL ELEVATIONS ARE IN METRES ABOVE ORDNANCE DATUM
 2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED
 3. THIS DRAWING IS NOT BE REPRODUCED IN ANY PART OR FORM WITHOUT CONSENT OF WSP UK LTD. ALL COPYRIGHT RESERVED
 4. REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE. LICENCE NO. 100048755. CROWN COPYRIGHT RESERVED
 5. THIS DRAWING IS BASED ON THE SITE LAYOUT PROVIDED BY THE ARCHITECT (POWELL DOBSON ARCHITECTS) - DRAWING PDA-A-00-XX-DR-90-0980 REVISION P07 DATED 29/05/2019
 6. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL RELEVANT DOCUMENTATION, DRAWINGS AND STANDARD DETAILS. ANY DISCREPANCIES OR CONFLICTS SHOULD BE REPORTED TO THE ENGINEER IN THE FIRST INSTANCE.
 7. THIS PLAN SHOWS A VOLUME COMPARISON BETWEEN THE FOLLOWING TWO SURFACES:
 - 7.1. THE PROPOSED FORMATION SURFACE (DESIGNED FOR THE PURPOSE OF THIS ANALYSIS ONLY - BASED ON THE CONSTRUCTION DEPTHS IN NOTE 8)
 - 7.2. THE EXISTING GROUND SURFACE
 8. THE FOLLOWING CONSTRUCTION DEPTHS HAVE BEEN ASSUMED IN MODELLING THE FORMATION PROFILE FOR THE PURPOSES OF THIS ANALYSIS:

8.1. BUILDING GROUND BEARING SLAB + SUB-BASE (PROVIDED BY WSP STRUCTURES)	350mm
8.2. BUILDING SUSPENDED SLAB (PROVIDED BY WSP STRUCTURES)	250mm
8.3. ACCESS ROAD (TYPE 1)	415mm
8.4. ACCESS ROAD (TYPE 2)	490mm
8.5. FOOTWAY (TYPE 1)	235mm
8.6. FOOTWAY (TYPE 2)	310mm
8.7. ATTENUATION BASINS (PROVIDED BY LANDSCAPE ARCHITECT)	300mm
8.8. SOFT LANDSCAPING	150mm
8.9. MUGA (PROVIDED BY MORGAN SINDALL)	315mm
8.10. 3G PITCH (PROVIDED BY MORGAN SINDALL)	380mm
8.11. HOCKEY PITCH (PROVIDED BY MORGAN SINDALL)	400mm
8.12. GRASS PITCH (PROVIDED BY MORGAN SINDALL)	220mm
 9. ALL OTHER POSSIBLE CONSTRUCTION MAKE-UPS (INCLUDING BUT NOT LIMITED TO THE DIFFERENCE BETWEEN PERMEABLE PAVING CONSTRUCTION AND ACCESS ROAD CONSTRUCTION, RAIN GARDENS, PLANTING BEDS ETC) HAVE NOT BEEN ACCOUNTED FOR.
 10. THE ABOVE CONSTRUCTION DEPTHS ARE BASED ON AN ASSUMPTION OF 5% MINIMUM CBR BEING ACHIEVED.
 11. NO REFERENCE HAS BEEN MADE TO AVAILABLE INTERPRETATIVE OR FACTUAL GROUND INVESTIGATION AND NO CONSIDERATION HAS BEEN MADE IN RELATION TO THE ACCEPTABILITY OF EXISTING EXCAVATED MATERIALS FOR REUSE IN FILL AREAS.
 12. NO ALLOWANCE IS CURRENTLY MADE FOR A TOPSOIL STRIP.
 13. THIS IS GEOMETRIC VOLUME ANALYSIS AND THEREFORE NO ALLOWANCE HAS BEEN FOR BULKING AND SHRINKING OF ANY MATERIAL OR SUITABILITY OF MATERIAL REUSE. CONTRACTOR TO CONSULT GROUND INVESTIGATION.
 14. NO ALLOWANCE HAS BEEN MADE FOR PIT, TRENCHES ARISING OR BACKFILLING WITH SELECTED MATERIAL FOR RETAINING STRUCTURE CONSTRUCTION.
 15. NO ALLOWANCE HAS BEEN MADE FOR REMOVAL OF HARD OR SOFT SPOT BELOW THE FORMATION PROFILE.
 16. THE PLAN CONTOURS REPRESENT THE ELEVATION DIFFERENCE BETWEEN THE TWO SURFACES, WITH POSITIVE AND NEGATIVE CONTOUR VALUES REPRESENTING AREAS OF FILL AND CUT RESPECTIVELY.



SURFACE LEVEL DATA					
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOR	AREA	VOLUME
1	-4.00	-3.50		13m2	0m3
2	-3.50	-3.00		579m2	89m3
3	-3.00	-2.50		1911m2	752m3
4	-2.50	-2.00		1931m2	1763m3
5	-2.00	-1.50		2919m2	2785m3
6	-1.50	-1.00		6542m2	5285m3
7	-1.00	-0.50		8828m2	9023m3
8	-0.50	0.00		9432m2	13824m3
9	0.00	0.50		7544m2	11162m3
10	0.50	1.00		5294m2	7733m3
11	1.00	1.50		5745m2	5365m3
12	1.50	2.00		5699m2	1980m3
13	2.00	2.50		786m2	601m3
14	2.50	3.00		513m2	356m3
15	3.00	3.50		372m2	92m3
16	3.50	4.00		26m2	2m3

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Phase 1 Volume	1.000	1.000	43609.612sq.m	27140.987 Cu. M.	15804.910 Cu. M.	11336.077 Cu. M.<Cut>
Phase 2 Volume	1.000	1.000	14514.237sq.m	6382.971 Cu. M.	11483.061 Cu. M.	5100.090 Cu. M.<Fill>
Totals			58123.849sq.m	33523.958 Cu. M.	27287.971 Cu. M.	6235.987 Cu. M.<Cut>

Health and Safety Symbols Legend

- INDICATES A RESIDUAL RISK REQUIRING A COMPULSORY ACTION
- INDICATES A RESIDUAL RISK FOR INFORMATION
- INDICATES A RESIDUAL RISK REQUIRING A PROHIBITIVE ACTION
- INDICATES A RESIDUAL RISK AS A WARNING

DRAWING STATUS FOR INFORMATION



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T+ 44 (0) 292 076 9200
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CLIENT: MORGAN SINDALL

ARCHITECT: POWELL DOBSON ARCHITECTS

PROJECT: CEFN SAESON

TITLE: INDICATIVE EARTHWORKS VOLUME ANALYSIS

SCALE AS 1:500	CHECKED AG	APPROVED JL
PROJECT NO. 70049143	DRAWN DWM	DATE August 19

DRAWING NO: 26W007-WSP-00-XX-DR-C-0100

REV C01

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APPENDICES

APPENDIX A – REPORT CONDITIONS

APPENDIX A - REPORT CONDITIONS

GROUND INVESTIGATION

This report is produced solely for the benefit of Morgan Sindall and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categoric assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to Tetra Tech. In time improved practices or amended legislation may necessitate a re-assessment.

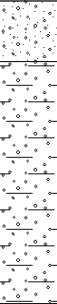
The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.

APPENDIX B – EXPLORATORY HOLE LOGS

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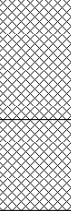
Tt TETRA TECH Project: Cefn Saeson Comprehensive School Location: Cimla Client: Morgan Sindall						Location Details						Status FINAL		Borehole Number WS104			
						Easting: 277321.34 Northing: 196156.16 Level: 144.89mAOD Depth: 2.90m Logger: GT Type: WS Inclination: °											
						Method, Plant and Crew						Diameter		Casing		Groundwater	
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks		Checked By: KW	Approved By: CBP
0.00	2.90	Dynamic Windowless Sampling							1.40	-	-	1.00	20			Start Date: 23/02/2021	Finish Date: 23/02/2021
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
												Depth (m)	Ref	Tests / Results			
Reddish brown, clayey SAND. Sand is fine to coarse. Frequent rootlets. (TOPSOIL)								0.10	144.79			0.30 - 0.45 0.30 - 0.45	BB1 ESES1				
Greyish brown, slightly silty sandy GRAVEL. Sand is medium to coarse. Gravel is medium to coarse, tabular, angular to subangular Sandstone. Occasional cobbles of subangular to subrounded Sandstone. (GLACIAL TILL)																	
Dark greyish brown, silty sandy GRAVEL. Sand is medium to coarse. Gravel is fine to coarse, medium sphericity, tabular, subrounded to subangular Sandstone. (GLACIAL TILL)								0.90	143.99			0.90 - 1.10 0.90 - 1.10	BB2 ESES2				
Dark greyish brown, sandy gravelly SILT. Sand is fine to coarse. Gravel is fine to coarse, medium sphericity, tabular, subangular to subrounded Sandstone. (GLACIAL TILL)								1.20	143.69			1.40 - 1.60 1.60 - 1.90	ESES3 BB3				
EOH at 2.90m - Window Sampler Refused								2.90	141.99								
Observations / Remarks							Sampling Runs						Hammer Information				
1. Inspection pit hand excavated to 1.2m bgl. 2. Groundwater strike at 1.20m bgl. 3. Upon completion borehole installed with 50mm HDPE standpipe to 2.90m bgl.							From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %				
							1.20	2.20	50	100							
							2.20	2.90	50	71							
													Project Number				
													B027006				

Tt TETRA TECH		Project: Cefn Saeson Comprehensive School		Location Details		Status		Borehole Number						
		Location: Cimla		Easting: 277268.07 Northing: 196065.44		FINAL		WS105						
		Client: Morgan Sindall		Level: 145.83mAOD Depth: 2.00m		Logger: GT Type: WS		Inclination: °						
Method, Plant and Crew				Diameter		Casing		Groundwater						
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks
0.00	2.00	Dynamic Windowless Sampling							1.00	-	-	0.67	20	
Strata Description						Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing			
											Depth (m)	Ref	Tests / Results	
ASPHALT							0.10	145.73			0.10 - 0.25	BB1	ESES1	
Reddish brown sandy GRAVEL. Sand is medium to coarse. Gravel is fine to medium, subangular to subrounded Sandstone/ Frequent cobbles of slag material. (MADE GROUND)							0.30	145.53			0.10 - 0.25			
Grey, medium to coarse low strength CONCRETE.							0.35	145.48			0.35 - 0.60	BB2	ESES2	
Black sandy GRAVEL. Sand is medium to coarse. Gravels are fine to coarse, medium sphericity, subrounded to subangular Coal Spoil. (MADE GROUND)											0.35 - 0.60			
Grey, medium to coarse low strength CONCRETE.							0.60	145.23						
Dark grey sandy GRAVEL. Sand is medium to coarse. Gravels are medium sphericity, subangular to rounded Sandstone. (GLACIAL TILL)							1.00	144.83			1.00 - 1.20	ESES3	ESES3	
Brown clayey GRAVEL. Gravel is medium to coarse, tabular, low sphericity Sandstone. (GLACIAL TILL)							1.20	144.63						
											1.80 - 2.00	ESES4	ESES4	
EOH at 2.00m - Window Sampler Refused							2.00	143.83						
Observations / Remarks						Sampling Runs						Hammer Information		
						From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %		
1. Inspection pit hand excavated to 1.2m bgl. 2. Groundwater strike at 1.00m bgl 3. Upon completion borehole backfilled with bentonite.						0.60	1.00	50	50					
						1.00	2.00	50	80					
						Project Number								
						B027006								

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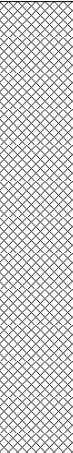
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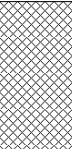
 Project: Cefn Saeson Comprehensive School Location: Cimla Client: Morgan Sindall						Location Details						Status DRAFT		Borehole Number WS204			
						Easting: 277273.24 Northing: 196060.86 Level: Depth: 3.00m Logger: Type: WLS Inclination: °								Sheet 1 of 1			
						Method, Plant and Crew					Diameter		Casing		Groundwater		
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By:		
															Approved By:		
Strata Description Medium strong dark grey MACADAM. Reddish brown sandy GRAVEL. Gravel is fine to medium sub angular of brick, concrete and mudstone (MADE GROUND). Dark grey slightly clayey sandy GRAVEL. Gravel is fine to coarse angular to sub angular of brick, slag, concrete and mudstone. Hydrocarbon staining from 0.30m to 0.60m bgl (MADE GROUND). <i>Hydrocarbon staining and odor from 0.30m to 0.70m bgl.</i> Firm dark grey slightly sandy gravelly CLAY. Gravel is fine to medium subrounded of sandstone (HYDROCARBON IMPACTED GLACIAL TILL). Firm light brown slightly sandy gravelly CLAY. Gravel is fine to medium subrounded of sandstone (GLACIAL TILL). EOH at 3.00m - Target depth reached.							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
												Depth (m)	Ref	Tests / Results			
								0.10				0.10 - 0.30	ES1				
								0.30				0.30 - 0.60	ES2				
								0.60				0.70 - 1.00	ES3				
	0.70																
	3.00				1.50 - 2.00	ES4											
Observations / Remarks							Sampling Runs					Hammer Information					
1. Inspection pit hand excavated to 1.2m bgl. 2. Strong hydrocarbon odor and staining from 0.30m bgl to 0.6m bgl. 3. Hole installed with groundwater monitoring installation.							From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %				
												Project Number B027006					

	Project: Cefn Saeson Comprehensive School		Location Details					Status		Pit Number		
	Location: Cimla		Easting:		Northing:			DRAFT		TP201		
	Client: Morgan Sindall		Level:		Depth: 0.70m							
			Logger: LH		Type: TP					Sheet 1 of 1		
Hole Information Pit Dimensions 2.00m 4.50m Orientation: ° Shoring: None Stability: Good Plant: PC 360 LC			Groundwater						Scale: 1:25			
			Strike (m)		Rose To (m)		After (mins)		Remarks		Checked By: PM	
											Approved By: CBP	
									Start Date: 27/09/2021			
									Finish Date: 27/09/2021			
Strata Description			Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing				
								Depth (m)	Ref	Tests / Results		
Light brown slightly clayey sandy angular to subrounded fine to coarse limestone, concrete and slag GRAVEL. (MADE GROUND)				0.40				0.00 - 0.40	ES			
Light grey slightly sandy angular and subangular fine to coarse concrete, asphalt and slag GRAVEL. Rare fragments of wood (up to 100mm). (MADE GROUND)				0.70				0.40 - 0.70	ES			
EOH at 0.70m - Refusal on hardstanding material.												
											1	
											2	
											3	
											4	
											5	
Observations / Remarks									Longcross Court, Cardiff, CF24 0AD 029 2082 9200			
1. Trial pit machine excavated to 0.70m bgl. 2. No groundwater was encountered. 3. Upon completion exploratory hole backfilled with arisings.												
									Project Number			
									B027006			

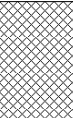
[illegible]

[illegible]

Tt TETRA TECH	Project: Cefn Saeson Comprehensive School		Location Details				Status		Pit Number			
	Location: Cimla		Easting:		Northing:		DRAFT		TP204			
	Client: Morgan Sindall		Level:		Depth: 1.50m							
			Logger: LH		Type: TP				Sheet 1 of 1			
Hole Information Pit Dimensions 1.90m 4.00m Orientation: ° Shoring: None Stability: Moderate to poor Plant: PC 360 LC			Groundwater						Scale: 1:25			
			Strike (m)		Rose To (m)		After (mins)		Remarks		Checked By: PM	
											Approved By: CBP	
									Start Date: 27/09/2021			
									Finish Date: 27/09/2021			
Strata Description			Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing				
								Depth (m)	Ref	Tests / Results		
Brown clayey sandy to very sandy angular to subrounded fine to coarse sandstone, concrete, asphalt, slag and rare brick GRAVEL with a low angular and subangular concrete cobble content. Rare fragments of metal (up to 500m), pipe (up to 200mm), wood (up to 70mm) and plastic (up to 50mm). (MADE GROUND)				1.50					0.00 - 0.70	ES		
EOH at 1.50m - Depth required reached.												

Tt TETRA TECH	Project: Cefn Saeson Comprehensive School		Location Details			Status		Pit Number		
	Location: Cimla		Easting: Northing:			DRAFT		TP205		
Client: Morgan Sindall		Level: Depth: 1.50m								
			Logger: LH Type: TP					Sheet 1 of 1		
Hole Information Pit Dimensions 1.80m 3.00m Orientation: ° Shoring: None Stability: Moderate to poor Plant: PC 360 LC			Groundwater					Scale: 1:25		
			Strike (m)		Rose To (m)		After (mins)		Remarks	
			1.50		1.50		20		Slight Seepage	Approved By: CBP
									Start Date: 27/09/2021	
									Finish Date: 27/09/2021	
Strata Description			Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing		
								Depth (m)	Ref	Tests / Results
Broken up asphalt over greyish brown clayey sandy angular to subrounded fine to coarse sandstone, limestone, concrete and asphalt GRAVEL. (MADE GROUND)				0.50				0.00 - 0.50	ES	
Dark greyish brown, light brown and orangish brown slightly gravelly clayey locally sandy SILT with a high subangular and subrounded sandstone and concrete cobble content. Gravel is angular to rounded fine to coarse sandstone and rare brick. Rare fragments of wood (up to 200mm) and plastic (up to 100mm). Frequent relict rootlets. (MADE GROUND)										
EOH at 1.50m - Depth required reached.				1.50						

[illegible]

	Project: Cefn Saeson Comprehensive School		Location Details				Status		Pit Number			
	Location: Cimla		Easting:		Northing:		DRAFT		TP207			
	Client: Morgan Sindall		Level:		Depth: 1.10m							
			Logger: LH		Type: TP				Sheet 1 of 1			
Hole Information Pit Dimensions 0.65m 1.80m Orientation: ° Shoring: None Stability: Good to moderate Plant: PC 360 LC			Groundwater						Scale: 1:25			
			Strike (m)		Rose To (m)		After (mins)		Remarks		Checked By: PM	
			0.40		0.40		20		Slight Seepage		Approved By: CBP	
									Start Date: 02/12/2021			
									Finish Date: 02/12/2021			
Strata Description			Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing				
								Depth (m)	Ref	Tests / Results		
Dark grey and brown slightly silty sandy angular and subangular fine to coarse concrete, slag, rare brick and limestone GRAVEL with a medium angular and subangular concrete cobble content.				0.40				0.00 - 0.40	ES			
(MADE GROUND)												
Firm to stiff grey mottled orangish brown slightly gravelly sandy CLAY with a low subangular and subrounded sandstone cobble content. Gravel is angular to subrounded fine to coarse sandstone, limestone, concrete and rare slag. Rare fragments of metal (up to 150mm). Faint hydrocarbon odour.												
(MADE GROUND)												
Stiff brown slightly gravelly silty CLAY with abundant pockets of orangish brown fine and medium sand (up to 20mm). Gravel is angular to rounded fine to coarse sandstone, rare concrete, brick and coal. Rare fragments of wood (up to 600mm).				0.60				0.40 - 0.60	ES			
(MADE GROUND)												
EOH at 1.10m - Sufficient samples taken.				1.10				0.60 - 1.10	ES			

Tt TETRA TECH	Project: Cefn Saeson Comprehensive School		Location Details				Status		Pit Number		
	Location: Cimla		Easting:		Northing:		DRAFT		TP208		
Client: Morgan Sindall		Level:		Depth: 1.20m							
		Logger: LH		Type: TP				Sheet 1 of 1			
Pit Dimensions 0.80m 2.30m		Hole Information		Groundwater				Scale: 1:25			
		Orientation: °		Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: PM			
		Shoring: None						Approved By: CBP			
		Stability: Good to moderate						Start Date: 02/12/2021			
		Plant: PC 360 LC						Finish Date: 02/12/2021			
Strata Description			Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing			
								Depth (m)	Ref	Tests / Results	
Dark greyish brown slightly silty sandy angular and subangular fine to coarse concrete, slag, rare brick and limestone GRAVEL with a medium angular and subangular concrete cobble content. Frequent pockets of black sandy silt (up to 100mm). Faint hydrocarbon odour. (MADE GROUND) Firm to stiff dark brown mottled dark grey slightly sandy slightly gravelly silty CLAY with rare pockets of orangish brown silt (up to 20mm). Gravel is angular to subrounded fine to coarse sandstone, rare slag and concrete. (MADE GROUND)				0.20					0.00 - 0.20	ES	
									0.80 - 1.00	ES	
EOH at 1.20m - Sufficient samples taken.				1.20							
Observations / Remarks			Longcross Court, Cardiff, CF24 0AD 029 2082 9200								
1. Trial pit machine excavated to 1.20m bgl. 2. No groundwater was encountered. 3. Upon completion exploratory hole backfilled with arisings.			Project Number B027006								

[illegible]

Tt TETRA TECH	Project: Cefn Saeson Comprehensive School	Location Details				Status	Pit Number		
	Location: Cimla	Easting:	Northing:			DRAFT	TP210		
Client: Morgan Sindall	Level:	Depth: 1.40m							
		Logger: LH	Type: TP			Sheet 1 of 1			
Pit Dimensions 1.00m 2.00m	Hole Information		Groundwater				Scale:	1:25	
	Orientation: ° Shoring: None Stability: Moderate to poor Plant: PC 360 LC	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By:	PM		
						Approved By:	CBP		
						Start Date:	02/12/2021		
						Finish Date:	02/12/2021		
Strata Description		Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing		
Grey, greyish brown and light brown slightly silty sandy angular and subangular fine to coarse concrete and slag GRAVEL with a low angular and subangular concrete boulder content and a low to medium angular and subangular concrete cobble content. Rare fragments of plastic and fabric (up to 40mm). Strong hydrocarbon odour.			0.60				Depth (m)	Ref	Tests / Results
(MADE GROUND)							0.20 - 0.60	ES	
Firm dark grey and brown mottled orangish brown slightly sandy slightly gravelly silty CLAY with a low subrounded sandstone cobble content. Gravel is angular to subrounded fine to coarse sandstone, rare concrete and slag. Rare rootlets.							0.60 - 0.65	ES	
(MADE GROUND)							0.80 - 1.00	ES	
Dark brown slightly gravelly sandy silty CLAY with rare pockets of yellowish orangish brown silt (up to 70mm). Gravel is angular to rounded fine to coarse sandstone, rare concrete and slag.			1.20				1.20 - 1.40	ES	
(MADE GROUND)			1.40						
EOH at 1.40m - Sufficient samples taken.									
				</					



Plate 1

WS101 0.00 - 1.40



Plate 2

WS01 0.00 - 1.40

Tetra Tech
5th Floor, Longcross Court
47 Newport Road
Cardiff
CF24 0AD

Tel: 029 20 829200
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Cefn Saeson

Morgan Sindall

Project No.:

B027006



Plate 3

WS101 - 0.00 - 1.40



Plate 4

WS101 1.20 - 1.40

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Plate 5

WS101 - Install headworks

Plate 6

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Project No.:

B027006

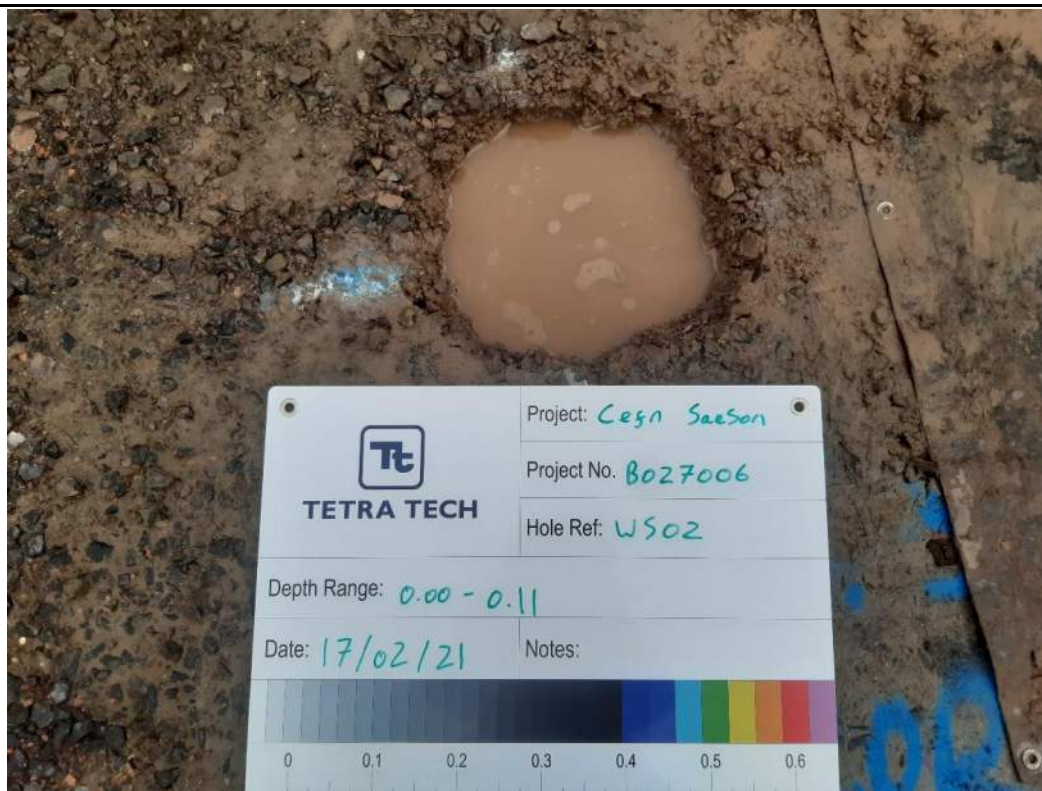


Plate 7

WS102 - 0.00 - 0.11



Plate 8

WS102 - 0.00 - 0.11

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Plate 9

WS103 - 0.00 - 1.2



Plate 10

WS103 - 0.00 - 1.2

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Plate 11

WS103 - 0.00 - 1.90

Plate 12

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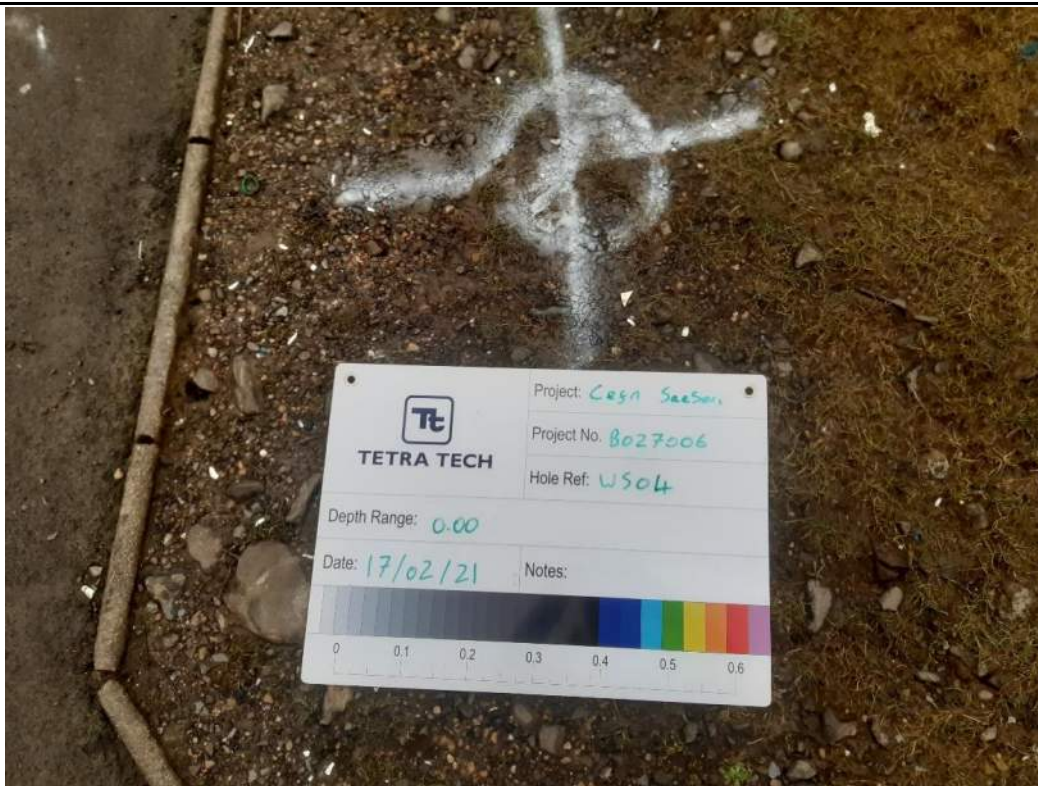


Plate 13

WS104 -Placement



Plate 14

WS104 - 0.00 - 2.90

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Plate 15

WS105 - 0.00 - 2.00



Plate 16

WS105 - 0.00 - 2.00

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Plate 17

WS201 Inspection Pit



Plate 18

WS201 Inspection pit

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01/02/2021



Plate 19

WS201 Inspection pit spoil



Plate 20

WS201 Heavily hydrocarbon impacted made ground, 0.45m to 0.60m

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Morgan Sindall

Project No.:

Aug-Sept 19



Plate 21 WS202 Inspection pit



Plate 22 WS202 Inspection pit

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Cardiff
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Project :-
Cefn Saeson

Morgan Sindall

Project No.:

Aug-Sept 19



Plate 23

WS202 Inspection pit spoil, hydrocarbon impacted below 0.60m.

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Plate 24

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TETRA TECH

Project :-
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Project No.:

Aug-Sept 19



Plate 25

WS203 Inspection pit spoil



Plate 26

WS203 1.2m - 2.0m

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Project No.:

Aug-Sept 19



Plate 27

WS204 Inspection Pit soil



Plate 28

WS204 0.30 - 1.00m

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Project No.:

Aug-Sept 19



Plate 29

WS204 0.30 - 1.00m



Plate 30

WS204 1.00 - 2.00

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Project :-
Cefn Saeson

Morgan Sindall

Project No.:

Aug-Sept 19

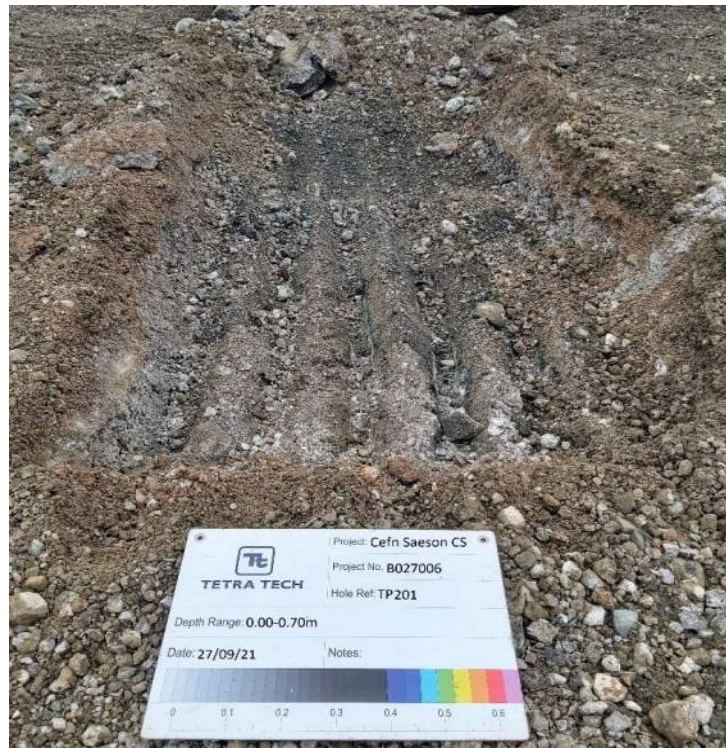


Plate 1

TP201 0.00-0.70m



Plate 2

TP201 Spoil

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Project No.: B027006

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Plate 3 TP202 0.00-1.10m



Plate 4 TP202 Spoil

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Plate 5

TP203 0.00-1.00m



Plate 6

TP203 Spoil

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Plate 7

TP204 0.00-1.50m



Plate 8

TP204 Spoil

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Plate 9

TP205 0.00-1.50m



Plate 10

TP205 Spoil

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Project No.: B027006

27/09/2021



Plate 11

TP206 0.00-0.50m and spoil

Plate 12

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27/09/2021



Plate 13

TP207 0.00-1.10m



Plate 14

TP207 Spoil

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Cefn Saeson CS

Morgan Sindall

Project No.: B027006

02/12/2021



Plate 15

TP208 0.00-1.20m



Plate 16

TP208 Spoil

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Project No.: B027006

02/12/2021



Plate 17 TP209 0.00-1.10m



Plate 18 TP209

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Project No.: B027006

02/12/2021



Plate 19

TP210 0.00-1.40m



Plate 20

TP210 Spoil

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Project :-

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Morgan Sindall

Project No.: B027006

02/12/2021



Plate 21

TP210 Spoil

Plate 22

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Project :-
Cefn Saeson CS

Morgan Sindall

Project No.: B027006

02/12/2021

APPENDIX C – CHEMICAL LABORATORY TEST RESULTS



Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528700

Fax: (01244) 528701

email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

Tetra Tech Europe
5th Floor
Longcross Court
47 Newport Road
Cardiff
CF24 0AD

Attention: Geraint Thomas

CERTIFICATE OF ANALYSIS

Date of report Generation:	09 April 2021
Customer:	Tetra Tech Europe
Sample Delivery Group (SDG):	210220-28
Your Reference:	B027006
Location:	Cefn saeson
Report No:	593427

This report has been revised and directly supersedes 588908 in its entirety.

We received 4 samples on Saturday February 20, 2021 and 3 of these samples were scheduled for analysis which was completed on Tuesday March 02, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 210220-28
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593427
Superseded Report: 588908

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
23765565	WS101	ESES1	0.25 - 0.45	17/02/2021
23765570	WS101	ESES2	1.00 - 1.20	17/02/2021
23765557	WS104	ESES1	0.30 - 0.45	17/02/2021
23765561	WS104	ESES2	0.90 - 1.10	17/02/2021

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 210220-28
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593427
Superseded Report: 588908

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water
Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend	Lab Sample No(s)		23765565	23765570	23765561
	Customer Sample Reference		WS101	WS101	WS104
Sample Types -	AGS Reference		ESES1	ESES2	ESES2
	Depth (m)		0.25 - 0.45	1.00 - 1.20	0.90 - 1.10
Sample Types -	Container		60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)
	Sample Type		S	S	S
Anions by Kone (soil)	All	NDPs: 0 Tests: 3	X	X	X
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 3	X	X	X
Boron Water Soluble	All	NDPs: 0 Tests: 3	X	X	X
Chromium III	All	NDPs: 0 Tests: 3	X	X	X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 3	X	X	X
EPH CWG GC (S)	All	NDPs: 0 Tests: 3	X	X	X
GRO by GC-FID (S)	All	NDPs: 0 Tests: 3	X	X	X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 3	X	X	X
Metals in solid samples by OES	All	NDPs: 0 Tests: 3	X	X	X
PAH by GCMS	All	NDPs: 0 Tests: 3	X	X	X
pH	All	NDPs: 0 Tests: 3	X	X	X
Phenols by HPLC (S)	All	NDPs: 0 Tests: 3	X	X	X
Sample description	All	NDPs: 0 Tests: 3	X	X	X
Total Organic Carbon	All	NDPs: 0 Tests: 3	X	X	X
TPH CWG GC (S)	All	NDPs: 0 Tests: 3	X	X	X



CERTIFICATE OF ANALYSIS

Validated

SDG: 210220-28
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593427
Superseded Report: 588908

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
 UNS - Unspecified Solid
 GW - Ground Water
 SW - Surface Water
 LE - Land Leachate
 PL - Prepared Leachate
 PR - Process Water
 SA - Saline Water
 TE - Trade Effluent
 TS - Treated Sewage
 US - Untreated Sewage
 RE - Recreational Water
 DW - Drinking Water
 Non-regulatory
 UNL - Unspecified Liquid
 SL - Sludge
 G - Gas
 OTH - Other

Lab Sample No(s)

Customer Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

VOC MS (S)

All

NDPs: 0
Tests: 3

23765565

WS101

ESES1

0.25 - 0.45

60g VOC (ALE215)
250g Amber Jar (ALE210)
1kg TUB with Handle (ALE260)

S

X

23765570

WS101

ESES2

1.00 - 1.20

60g VOC (ALE215)
250g Amber Jar (ALE210)
1kg TUB with Handle (ALE260)

S

X

23765561

WS104

ESES2

0.90 - 1.10

60g VOC (ALE215)
250g Amber Jar (ALE210)
1kg TUB with Handle (ALE260)

S

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 210220-28
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593427
Superseded Report: 588908

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
-----------	----------	------	-----------------	--------	-------------	--------	------------	-------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
23765565	WS101	0.25 - 0.45	Dark Brown	Loamy Sand	Stones	None
23765570	WS101	1.00 - 1.20	Dark Brown	Sandy Clay Loam	Stones	Vegetation
23765561	WS104	0.90 - 1.10	Dark Brown	Sandy Loam	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

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

SDG:	210220-28
Location:	Cefn saeson

Client Reference:B027006
Order Number: 7001060

Report Number: 593427
Superseded Report: 588908

[illegible]

SDG:	210220-28
Location:	Cefn saeson

Client Reference:B027006
Order Number: 7001060

Report Number: 593427
Superseded Report: 588908

Location: Cefn saeson

Order Number: 7001060

Superseded Report: 588908

TPH CWG (S)[illegible]



Report Number:	593427
Superseded Report:	588908

VOC MS (S)

Page 9 of 19



CERTIFICATE OF ANALYSIS

Validated

SDG: 210220-28
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593427
Superseded Report: 588908

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5& Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS101ESES1 0.25 - 0.45 SOLID 17/02/2021 00:00:00 20/02/2021 05:00:00 210220-28 23765565 TM048	26/02/2021	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS101ESES2 1.00 - 1.20 SOLID 17/02/2021 00:00:00 20/02/2021 05:00:00 210220-28 23765570 TM048	26/02/2021	Agnieszka Chelmonska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS104ESES2 0.90 - 1.10 SOLID 17/02/2021 00:00:00 20/02/2021 05:00:00 210220-28 23765561 TM048	26/02/2021	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 210220-28
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593427
Superseded Report: 588908

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM243		Mixed Anions In Soils By Kone
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 210220-28
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593427
Superseded Report: 588908

Test Completion Dates

Lab Sample No(s)	23765565	23765570	23765561
Customer Sample Ref.	WS101	WS101	WS104
AGS Ref.	ESES1	ESES2	ESES2
Depth	0.25 - 0.45	1.00 - 1.20	0.90 - 1.10
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)

Anions by Kone (soil)	26-Feb-2021	25-Feb-2021	26-Feb-2021
Asbestos ID in Solid Samples	26-Feb-2021	26-Feb-2021	26-Feb-2021
Boron Water Soluble	02-Mar-2021	02-Mar-2021	02-Mar-2021
Chromium III	26-Feb-2021	26-Feb-2021	26-Feb-2021
Cyanide Comp/Free/Total/Thiocyanate	25-Feb-2021	25-Feb-2021	25-Feb-2021
EPH CWG GC (S)	23-Feb-2021	24-Feb-2021	24-Feb-2021
GRO by GC-FID (S)	01-Mar-2021	01-Mar-2021	01-Mar-2021
Hexavalent Chromium (s)	25-Feb-2021	25-Feb-2021	25-Feb-2021
Metals in solid samples by OES	26-Feb-2021	26-Feb-2021	26-Feb-2021
PAH by GCMS	24-Feb-2021	26-Feb-2021	24-Feb-2021
pH	23-Feb-2021	23-Feb-2021	23-Feb-2021
Phenols by HPLC (S)	25-Feb-2021	25-Feb-2021	25-Feb-2021
Sample description	21-Feb-2021	21-Feb-2021	21-Feb-2021
Total Organic Carbon	26-Feb-2021	26-Feb-2021	26-Feb-2021
TPH CWG GC (S)	01-Mar-2021	01-Mar-2021	01-Mar-2021
VOC MS (S)	26-Feb-2021	26-Feb-2021	26-Feb-2021



CERTIFICATE OF ANALYSIS

Validated

SDG: 210220-28
Location: Cefn saesonClient Reference: B027006
Order Number: 7001060Report Number: 593427
Superseded Report: 588908

ASSOCIATED AQC DATA

Anions by Kone (soil)

Component	Method Code	QC 2361	QC 2370
Chloride (soluble)	TM243	146.11 86.68 : 115.67	131.61 86.68 : 115.67
Water Soluble Sulphate as SO ₄ 2:1 Extract	TM243	157.01 70.00 : 130.00	155.61 70.00 : 130.00

Boron Water Soluble

Component	Method Code	QC 2306
Water Soluble Boron	TM222	99.0 84.00 : 111.00

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2378
Free Cyanide	TM153	91.39 79.00 : 115.00
Thiocyanate	TM153	97.44 94.09 : 113.89
Total Cyanide	TM153	95.8 73.07 : 107.47

EPH CWG GC (S)

Component	Method Code	QC 2333
EPH >C8-C40 Raw	TM414	102.24 58.92 : 124.32
Total Aliphatics Raw	TM414	107.42 64.95 : 136.26
Total Aromatics Raw	TM414	122.97 58.15 : 147.12

GRO by GC-FID (S)

Component	Method Code	QC 2343	QC 2391
QC	TM089	82.38 70.34 : 111.95	85.45 70.75 : 114.19

Hexavalent Chromium (s)

Component	Method Code	QC 2322	QC 2314
Hexavalent Chromium	TM151	100.0 92.00 : 111.20	104.0 92.00 : 111.20



CERTIFICATE OF ANALYSIS

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SDG: 210220-28
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593427
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Metals in solid samples by OES

Component	Method Code	QC 2359	QC 2391
Aluminium	TM181	107.08 73.56 : 108.85	78.32 73.56 : 108.85
Antimony	TM181	96.34 76.89 : 111.24	82.93 76.89 : 111.24
Arsenic	TM181	99.13 88.53 : 111.01	91.86 88.53 : 111.01
Barium	TM181	96.33 77.67 : 105.35	82.39 77.67 : 105.35
Beryllium	TM181	102.99 85.44 : 109.61	94.4 85.44 : 109.61
Boron	TM181	97.13 73.51 : 104.66	80.52 73.51 : 104.66
Cadmium	TM181	92.18 77.67 : 104.12	84.36 77.67 : 104.12
Chromium	TM181	92.9 77.55 : 104.47	84.38 77.55 : 104.47
Cobalt	TM181	92.77 84.60 : 104.13	85.53 84.60 : 104.13
Copper	TM181	93.84 82.40 : 105.45	86.8 82.40 : 105.45
Iron	TM181	100.79 82.95 : 110.58	80.95 82.95 : 110.58
Lead	TM181	91.89 78.24 : 104.05	86.71 78.24 : 104.05
Manganese	TM181	113.61 94.29 : 119.51	102.5 94.29 : 119.51
Mercury	TM181	96.38 83.16 : 107.81	90.34 83.16 : 107.81
Molybdenum	TM181	100.82 87.11 : 106.87	94.24 87.11 : 106.87
Nickel	TM181	95.6 80.26 : 102.28	86.55 80.26 : 102.28
Phosphorus	TM181	112.32 94.56 : 124.28	106.46 94.56 : 124.28
Selenium	TM181	96.86 82.28 : 110.48	87.84 82.28 : 110.48
Strontium	TM181	97.1 79.13 : 102.79	82.85 79.13 : 102.79
Thallium	TM181	96.46 82.94 : 111.86	88.94 82.94 : 111.86
Tin	TM181	101.14 86.72 : 110.03	94.68 86.72 : 110.03
Titanium	TM181	91.6 66.23 : 102.06	78.63 66.23 : 102.06
Vanadium	TM181	103.3 75.51 : 108.87	89.74 75.51 : 108.87
Zinc	TM181	98.56 84.68 : 113.99	88.09 84.68 : 113.99

PAH by GCMS



CERTIFICATE OF ANALYSIS

Validated

SDG: 210220-28
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593427
Superseded Report: 588908

PAH by GCMS

Component	Method Code	QC 2370	QC 2362
Acenaphthene	TM218	95.5 73.47 : 109.80	99.5 78.59 : 112.16
Acenaphthylene	TM218	94.0 70.00 : 130.00	98.0 75.11 : 109.01
Anthracene	TM218	92.5 68.68 : 111.89	100.0 73.99 : 113.85
Benz(a)anthracene	TM218	91.5 68.12 : 118.39	97.5 69.31 : 119.18
Benzo(a)pyrene	TM218	94.0 71.72 : 115.31	91.0 66.97 : 114.92
Benzo(b)fluoranthene	TM218	96.5 66.89 : 120.40	91.5 67.41 : 114.46
Benzo(ghi)perylene	TM218	92.5 67.82 : 118.49	93.0 62.92 : 114.36
Benzo(k)fluoranthene	TM218	95.0 73.10 : 117.03	89.0 69.98 : 116.49
Chrysene	TM218	90.5 69.58 : 115.47	93.0 69.86 : 114.50
Dibenzo(ah)anthracene	TM218	89.5 67.32 : 121.35	95.5 64.54 : 115.22
Fluoranthene	TM218	97.0 75.16 : 117.28	99.5 72.56 : 111.70
Fluorene	TM218	94.5 73.81 : 108.66	99.0 79.13 : 111.49
Indeno(123cd)pyrene	TM218	99.5 68.91 : 117.62	88.5 61.22 : 113.25
Naphthalene	TM218	92.5 72.12 : 106.18	100.0 77.96 : 110.91
Phenanthrene	TM218	96.5 69.01 : 113.72	98.0 76.83 : 113.25
Pyrene	TM218	96.0 64.28 : 115.75	99.0 72.45 : 110.77

pH

Component	Method Code	QC 2311
pH	TM133	101.19 98.71 : 102.32

Phenols by HPLC (S)

Component	Method Code	QC 2311	QC 2319	QC 2344
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	53.9 70.71 : 116.42	54.55 70.71 : 116.42	53.25 68.54 : 123.77
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	49.12 64.54 : 117.79	48.54 64.54 : 117.79	46.78 68.54 : 123.77
Catechol by HPLC (S)	TM062 (S)	53.33 22.43 : 157.02	12.38 22.43 : 157.02	13.33 19.39 : 135.70
Cresols by HPLC (S)	TM062 (S)	51.36 74.40 : 108.98	50.94 74.40 : 108.98	47.18 77.98 : 111.41
Napthol by HPLC (S)	TM062 (S)	63.57 47.22 : 132.72	33.57 47.22 : 132.72	34.29 57.50 : 102.50



CERTIFICATE OF ANALYSIS

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SDG: 210220-28
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Client Reference: B027006
Order Number: 7001060

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Phenols by HPLC (S)

		QC 2311	QC 2319	QC 2344
Phenol by HPLC (S)	TM062 (S)	56.95 69.44 : 122.18	56.29 69.44 : 122.18	54.97 68.24 : 117.99
Resorcinol HPLC (S)	TM062 (S)	56.6 71.43 : 129.59	55.35 71.43 : 129.59	49.69 69.99 : 127.22
Xylenols by HPLC (S)	TM062 (S)	52.29 76.56 : 106.38	51.25 76.56 : 106.38	50.73 88.23 : 104.42

Total Organic Carbon

Component	Method Code	QC 2358
Total Organic Carbon	TM132	100.0 87.02 : 113.45

VOC MS (S)

Component	Method Code	QC 2376
1,1,1,2-tetrachloroethane	TM116	96.2 84.84 : 116.25
1,1,1-Trichloroethane	TM116	98.0 73.73 : 118.05
1,1,2-Trichloroethane	TM116	94.0 77.12 : 116.04
1,1-Dichloroethane	TM116	112.8 74.46 : 129.15
1,2-Dichloroethane	TM116	109.0 92.38 : 131.65
1,4-Dichlorobenzene	TM116	106.4 83.64 : 126.18
2-Chlorotoluene	TM116	92.8 76.03 : 113.25
4-Chlorotoluene	TM116	85.2 66.90 : 112.46
Benzene	TM116	103.8 88.60 : 113.80
Carbon Disulphide	TM116	94.4 74.91 : 122.14
Carbontetrachloride	TM116	98.6 80.31 : 124.50
Chlorobenzene	TM116	98.0 83.81 : 114.18
Chloroform	TM116	111.4 87.40 : 122.49
Chloromethane	TM116	111.8 65.89 : 136.93
Cis-1,2-Dichloroethene	TM116	106.4 80.67 : 126.72
Dibromomethane	TM116	95.6 73.23 : 118.35
Dichloromethane	TM116	118.6 81.11 : 133.25
Ethylbenzene	TM116	84.0 75.92 : 110.41



CERTIFICATE OF ANALYSIS

Validated

SDG: 210220-28
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593427
Superseded Report: 588908

VOC MS (S)

		QC 2376
Hexachlorobutadiene	TM116	50.8 12.82 : 152.73
Isopropylbenzene	TM116	66.8 55.79 : 97.59
Naphthalene	TM116	105.2 80.86 : 128.81
o-Xylene	TM116	78.8 69.99 : 108.74
p/m-Xylene	TM116	79.6 68.32 : 108.91
Sec-Butylbenzene	TM116	58.4 38.50 : 101.50
Tetrachloroethene	TM116	93.0 76.95 : 121.02
Toluene	TM116	89.6 74.24 : 107.42
Trichloroethene	TM116	93.4 85.28 : 109.36
Trichlorofluoromethane	TM116	108.2 84.55 : 133.27
Vinyl Chloride	TM116	108.4 68.02 : 143.37

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.

The figure detailed is the percentage recovery result for the AQC.

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

ALS Environmental, Land	QF.7.5.1 Data Amendments Form (Issue No. 4)
	Date: 03/03/2020
	Issued and Authorised by Quality Manager

SDG	Sample Event	Sample ID	Date Amended	Amendment Reason	Previous Reference	New Reference	Supersedes Report
210220-28	23765557	WS04	09/04/2021	Sample ID Change	WS04	WS104	588908
	23765561	WS04		Sample ID Change	WS04	WS104	
	23765565	WS01		Sample ID Change	WS01	WS101	
	23765570	WS01		Sample ID Change	WS01	WS101	



CERTIFICATE OF ANALYSIS

SDG:	210220-28	Client Reference:	8027006	Report Number:	593427
Location:	Cefn saeson	Order Number:	7001060	Superseded Report:	588908

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

General

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2017).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Tetra Tech Europe
5th Floor
Longcross Court
47 Newport Road
Cardiff
CF24 0AD

Attention: Geraint Thomas

CERTIFICATE OF ANALYSIS

Date of report Generation:	09 April 2021
Customer:	Tetra Tech Europe
Sample Delivery Group (SDG):	210225-41
Your Reference:	B027006
Location:	Cefn saeson
Report No:	593428

This report has been revised and directly supersedes 589496 in its entirety.

We received 7 samples on Thursday February 25, 2021 and 7 of these samples were scheduled for analysis which was completed on Saturday March 06, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 210225-41
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593428
Superseded Report: 589496

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
23791083	WS103	ESES1	0.35 - 0.45	23/02/2021
23791090	WS103	ESES2	0.50 - 0.70	23/02/2021
23791104	WS104	ESES3	1.40 - 1.60	23/02/2021
23791075	WS105	ESES1	0.10 - 0.25	23/02/2021
23791079	WS105	ESES2	0.35 - 0.60	23/02/2021
23791098	WS105	ESES3	1.00 - 1.20	23/02/2021
23791108	WS105	ESES4	1.80 - 2.00	23/02/2021

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 210225-41
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593428
Superseded Report: 589496

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water
Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	23791108	WS105	ESSES4	1.80 - 2.00	1kg TUB with Handle (ALE260)	S						
	23791098	WS105	ESSES3	1.00 - 1.20	60g VOC (ALE215)	S						
	23791079	WS105	ESSES2	0.35 - 0.60	1kg TUB with Handle (ALE260)	S						
	23791075	WS105	ESSES1	0.10 - 0.25	250g Amber jar (ALE210)	S						
	23791104	WS104	ESSES3	1.40 - 1.60	1kg TUB with Handle (ALE260)	S						
	23791090	WS103	ESSES2	0.50 - 0.70	250g Amber jar (ALE210)	S						
	23791083	WS103	ESSES1	0.35 - 0.45	1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
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					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
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					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
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					250g Amber jar (ALE210)	S						
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					250g Amber jar (ALE210)	S						
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					1kg TUB with Handle (ALE260)	S						
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					250g Amber jar (ALE210)	S						
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					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						
					60g VOC (ALE215)	S						
					250g Amber jar (ALE210)	S						
					1kg TUB with Handle (ALE260)	S						



CERTIFICATE OF ANALYSIS

Validated

SDG: 210225-41
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593428
Superseded Report: 589496

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
 UNS - Unspecified Solid
 GW - Ground Water
 SW - Surface Water
 LE - Land Leachate
 PL - Prepared Leachate
 PR - Process Water
 SA - Saline Water
 TE - Trade Effluent
 TS - Treated Sewage
 US - Untreated Sewage
 RE - Recreational Water
 DW - Drinking Water
 Non-regulatory
 UNL - Unspecified Liquid
 SL - Sludge
 G - Gas
 OTH - Other

VOC MS (S)

Lab Sample No(s)

Customer Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

All

NDPs: 0
Tests: 7

X

X

X

X

X

X

23791108	WS105	ESES4	1.80 - 2.00	60g VOC (ALE215)	S		
				250g Amber Jar (ALE210)	S		X



CERTIFICATE OF ANALYSIS

Validated

SDG: 210225-41
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593428
Superseded Report: 589496

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
23791083	WS103	0.35 - 0.45	Dark Brown	Loamy Sand	Stones	None
23791090	WS103	0.50 - 0.70	Dark Brown	Loamy Sand	Stones	Vegetation
23791104	WS104	1.40 - 1.60	Dark Brown	Silty Sand	Stones	None
23791075	WS105	0.10 - 0.25	Cream	Clay Loam	Stones	Brick
23791079	WS105	0.35 - 0.60	Dark Brown	Loamy Sand	Stones	Vegetation
23791098	WS105	1.00 - 1.20	Grey	Sand	Stones	None
23791108	WS105	1.80 - 2.00	Dark Brown	Silty Sand	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

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



Report Number: 593428
Superseded Report: 589496

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SDG:	210225-41
Location:	Cefn saeson

Client Reference:B027006
Order Number: 7001060

Report Number: 593428
Superseded Report: 589496

Location: Cefn saeson

Order Number: 7001060

Superseded Report: 589496

TPH CWG (S)

[illegible]



Report Number:	593428
Superseded Report:	589496

VOC MS (S)

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Report Number: 593428
Superseded Report: 589496

VOC MS (S)

08:48:50 09/04/2021



CERTIFICATE OF ANALYSIS

Validated

SDG: 210225-41 Client Reference: B027006 Report Number: 593428
Location: Cefn saeson Order Number: 7001060 Superseded Report: 589496

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5$ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS103ESES1 0.35 - 0.45 SOLID 23/02/2021 00:00:00 25/02/2021 05:00:00 210225-41 23791083 TM048	03/03/2021	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS103ESES2 0.50 - 0.70 SOLID 23/02/2021 00:00:00 25/02/2021 05:00:00 210225-41 23791090 TM048	03/03/2021	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS104ESES3 1.40 - 1.60 SOLID 23/02/2021 00:00:00 25/02/2021 05:00:00 210225-41 23791104 TM048	03/03/2021	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS105ESES1 0.10 - 0.25 SOLID 23/02/2021 00:00:00 25/02/2021 05:00:00 210225-41 23791075 TM048	02/03/2021	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS105ESES2 0.35 - 0.60 SOLID 23/02/2021 00:00:00 25/02/2021 05:00:00 210225-41 23791079 TM048	03/03/2021	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS105ESES3 1.00 - 1.20 SOLID 23/02/2021 00:00:00 25/02/2021 05:00:00 210225-41 23791098 TM048	03/03/2021	Paul Poynton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS105ESES4 1.80 - 2.00 SOLID 23/02/2021 00:00:00 25/02/2021 05:00:00 210225-41 23791108 TM048	03/03/2021	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 210225-41
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593428
Superseded Report: 589496

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM243		Mixed Anions In Soils By Kone
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 210225-41
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593428
Superseded Report: 589496

Test Completion Dates

Lab Sample No(s)
Customer Sample Ref.

AGS Ref.
Depth
Type

	23791083	23791090	23791104	23791075	23791079	23791098	23791108
	WS103	WS103	WS104	WS105	WS105	WS105	WS105
	ESES1	ESES2	ESES3	ESES1	ESES2	ESES3	ESES4
	0.35 - 0.45	0.50 - 0.70	1.40 - 1.60	0.10 - 0.25	0.35 - 0.60	1.00 - 1.20	1.80 - 2.00
	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Anions by Kone (soil)	03-Mar-2021	02-Mar-2021	02-Mar-2021	02-Mar-2021	03-Mar-2021	02-Mar-2021	03-Mar-2021
Asbestos ID in Solid Samples	03-Mar-2021	03-Mar-2021	03-Mar-2021	02-Mar-2021	03-Mar-2021	03-Mar-2021	03-Mar-2021
Boron Water Soluble	03-Mar-2021	03-Mar-2021	04-Mar-2021	03-Mar-2021	03-Mar-2021	04-Mar-2021	03-Mar-2021
Chromium III	02-Mar-2021	03-Mar-2021	03-Mar-2021	03-Mar-2021	03-Mar-2021	03-Mar-2021	03-Mar-2021
Cyanide Comp/Free/Total/Thiocyanate	01-Mar-2021	02-Mar-2021	02-Mar-2021	02-Mar-2021	02-Mar-2021	01-Mar-2021	02-Mar-2021
EPH CWG GC (S)	01-Mar-2021	01-Mar-2021	01-Mar-2021	01-Mar-2021	01-Mar-2021	01-Mar-2021	01-Mar-2021
GRO by GC-FID (S)	03-Mar-2021	03-Mar-2021	02-Mar-2021	03-Mar-2021	02-Mar-2021	03-Mar-2021	03-Mar-2021
Hexavalent Chromium (s)	01-Mar-2021	01-Mar-2021	01-Mar-2021	01-Mar-2021	03-Mar-2021	01-Mar-2021	01-Mar-2021
Metals in solid samples by OES	02-Mar-2021	03-Mar-2021	03-Mar-2021	03-Mar-2021	06-Mar-2021	03-Mar-2021	03-Mar-2021
PAH by GCMS	03-Mar-2021	03-Mar-2021	03-Mar-2021	04-Mar-2021	02-Mar-2021	02-Mar-2021	03-Mar-2021
pH	26-Feb-2021	26-Feb-2021	26-Feb-2021	26-Feb-2021	26-Feb-2021	26-Feb-2021	02-Mar-2021
Phenols by HPLC (S)	01-Mar-2021	01-Mar-2021	26-Feb-2021	26-Feb-2021	01-Mar-2021	26-Feb-2021	01-Mar-2021
Sample description	25-Feb-2021	25-Feb-2021	25-Feb-2021	25-Feb-2021	25-Feb-2021	25-Feb-2021	25-Feb-2021
Total Organic Carbon	03-Mar-2021	03-Mar-2021	03-Mar-2021	02-Mar-2021	03-Mar-2021	03-Mar-2021	02-Mar-2021
TPH CWG GC (S)	03-Mar-2021	03-Mar-2021	02-Mar-2021	03-Mar-2021	02-Mar-2021	03-Mar-2021	03-Mar-2021
VOC MS (S)	03-Mar-2021	03-Mar-2021	02-Mar-2021	03-Mar-2021	02-Mar-2021	03-Mar-2021	03-Mar-2021



CERTIFICATE OF ANALYSIS

Validated

SDG: 210225-41
Location: Cefn saesonClient Reference: B027006
Order Number: 7001060Report Number: 593428
Superseded Report: 589496

ASSOCIATED AQC DATA

Anions by Kone (soil)

Component	Method Code	QC 2372	QC 2390
Chloride (soluble)	TM243	140.93 83.05 : 116.28	141.45 83.05 : 116.28
Water Soluble Sulphate as SO ₄ 2:1 Extract	TM243	168.22 70.00 : 130.00	157.48 70.00 : 130.00

Boron Water Soluble

Component	Method Code	QC 2312	QC 2321	QC 2388
Water Soluble Boron	TM222	98.0 84.00 : 111.00	101.5 84.00 : 111.00	97.0 84.00 : 111.00

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2302	QC 2377	QC 2305
Free Cyanide	TM153	90.3 79.00 : 115.00	97.92 79.00 : 115.00	96.73 79.00 : 115.00
Thiocyanate	TM153	94.87 94.09 : 113.89	3032.05 94.09 : 113.89	-511.54 94.09 : 113.89
Total Cyanide	TM153	91.61 73.07 : 107.47	98.6 73.07 : 107.47	98.6 73.07 : 107.47

GRO by GC-FID (S)

Component	Method Code	QC 2398	QC 2357	QC 2319
QC	TM089	81.21 70.75 : 114.19	82.72 70.34 : 111.95	80.81 70.75 : 114.19

Hexavalent Chromium (s)

Component	Method Code	QC 2314	QC 2390	QC 2337
Hexavalent Chromium	TM151	102.0 92.00 : 111.20	104.0 92.00 : 111.20	102.0 92.00 : 111.20

Metals in solid samples by OES

Component	Method Code	QC 2346	QC 2383
Aluminium	TM181	95.58 73.56 : 108.85	97.35 73.56 : 108.85
Antimony	TM181	91.06 76.89 : 111.24	82.11 76.89 : 111.24
Arsenic	TM181	101.74 88.53 : 111.01	93.9 88.53 : 111.01



CERTIFICATE OF ANALYSIS

Validated

SDG: 210225-41
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593428
Superseded Report: 589496

Metals in solid samples by OES

		QC 2346	QC 2383
Barium	TM181	94.5 77.67 : 105.35	88.17 77.67 : 105.35
Beryllium	TM181	102.24 85.44 : 109.61	96.64 85.44 : 109.61
Boron	TM181	89.4 73.51 : 104.66	95.7 73.51 : 104.66
Cadmium	TM181	90.12 77.67 : 104.12	87.65 77.67 : 104.12
Chromium	TM181	87.42 77.55 : 104.47	90.06 77.55 : 104.47
Cobalt	TM181	94.65 84.60 : 104.13	92.45 84.60 : 104.13
Copper	TM181	92.61 82.40 : 105.45	89.08 82.40 : 105.45
Iron	TM181	97.62 82.95 : 110.58	91.27 82.95 : 110.58
Lead	TM181	93.02 78.24 : 104.05	91.22 78.24 : 104.05
Manganese	TM181	108.06 94.29 : 119.51	108.33 94.29 : 119.51
Mercury	TM181	101.21 83.16 : 107.81	96.62 83.16 : 107.81
Molybdenum	TM181	100.0 87.11 : 106.87	99.18 87.11 : 106.87
Nickel	TM181	94.62 80.26 : 102.28	93.64 80.26 : 102.28
Phosphorus	TM181	106.06 94.56 : 124.28	113.13 94.56 : 124.28
Selenium	TM181	101.96 82.28 : 110.48	94.9 82.28 : 110.48
Strontium	TM181	91.54 79.13 : 102.79	94.21 79.13 : 102.79
Thallium	TM181	97.79 82.94 : 111.86	42.96 82.94 : 111.86
Tin	TM181	101.9 86.72 : 110.03	97.72 86.72 : 110.03
Titanium	TM181	83.21 66.23 : 102.06	83.97 66.23 : 102.06
Vanadium	TM181	98.9 75.51 : 108.87	98.17 75.51 : 108.87
Zinc	TM181	98.15 84.68 : 113.99	100.82 84.68 : 113.99

PAH by GCMS

Component	Method Code	QC 2387	QC 2309	QC 2360
Acenaphthene	TM218	99.0 80.97 : 105.99	89.5 73.47 : 109.80	92.0 76.79 : 103.90
Acenaphthylene	TM218	98.0 74.76 : 107.36	92.5 70.00 : 130.00	89.5 78.40 : 108.66
Anthracene	TM218	97.0 73.04 : 106.97	91.5 68.68 : 111.89	90.5 70.90 : 109.22
Benz(a)anthracene	TM218	87.5 68.79 : 119.64	91.5 68.12 : 118.39	86.5 73.77 : 119.26



CERTIFICATE OF ANALYSIS

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SDG: 210225-41
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593428
Superseded Report: 589496

PAH by GCMS

		QC 2387	QC 2309	QC 2360
Benzo(a)pyrene	TM218	83.5 66.17 : 117.52	87.0 71.72 : 115.31	81.0 73.20 : 114.18
Benzo(b)fluoranthene	TM218	86.0 66.40 : 118.34	89.5 66.89 : 120.40	89.0 75.36 : 117.58
Benzo(ghi)perylene	TM218	79.0 67.68 : 112.07	85.5 67.82 : 118.49	81.0 70.73 : 116.12
Benzo(k)fluoranthene	TM218	83.5 72.84 : 114.66	89.5 73.10 : 117.03	88.0 75.98 : 116.59
Chrysene	TM218	84.5 68.39 : 115.56	93.5 69.58 : 115.47	84.0 74.82 : 114.18
Dibenzo(ah)anthracene	TM218	78.0 69.03 : 110.45	85.5 67.32 : 121.35	80.5 69.17 : 115.30
Fluoranthene	TM218	103.0 69.37 : 117.19	92.5 75.16 : 117.28	85.0 75.88 : 112.84
Fluorene	TM218	99.0 75.38 : 105.98	90.0 73.81 : 108.66	90.0 76.66 : 107.56
Indeno(123cd)pyrene	TM218	79.0 65.91 : 113.61	80.0 68.91 : 117.62	79.5 70.26 : 117.95
Naphthalene	TM218	94.0 71.40 : 105.87	90.5 72.12 : 106.18	92.0 74.70 : 101.83
Phenanthrene	TM218	106.0 74.04 : 109.30	91.5 69.01 : 113.72	90.5 73.62 : 109.34
Pyrene	TM218	101.0 69.68 : 115.27	94.0 64.28 : 115.75	85.0 71.46 : 117.00

pH

Component	Method Code	QC 2344	QC 2378	QC 2324
pH	TM133	100.53 98.71 : 102.32	99.87 97.97 : 101.10	99.74 98.71 : 102.32

Phenols by HPLC (S)

Component	Method Code	QC 2347	QC 2397	QC 2314
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	52.6 70.71 : 116.42	49.35 70.71 : 116.42	51.3 68.54 : 123.77
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	47.95 64.54 : 117.79	43.86 64.54 : 117.79	45.03 68.54 : 123.77
Catechol by HPLC (S)	TM062 (S)	13.33 22.43 : 157.02	16.19 22.43 : 157.02	14.29 19.39 : 135.70
Cresols by HPLC (S)	TM062 (S)	49.06 74.40 : 108.98	46.35 74.40 : 108.98	44.05 77.98 : 111.41
Napthol by HPLC (S)	TM062 (S)	30.71 47.22 : 132.72	32.86 47.22 : 132.72	34.29 57.50 : 102.50
Phenol by HPLC (S)	TM062 (S)	54.3 69.44 : 122.18	50.99 69.44 : 122.18	49.67 68.24 : 117.99
Resorcinol HPLC (S)	TM062 (S)	60.38 71.43 : 129.59	55.35 71.43 : 129.59	45.28 69.99 : 127.22
Xylenols by HPLC (S)	TM062 (S)	48.85 76.56 : 106.38	46.15 76.56 : 106.38	47.29 88.23 : 104.42



CERTIFICATE OF ANALYSIS

Validated

SDG: 210225-41
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593428
Superseded Report: 589496

Total Organic Carbon

Component	Method Code	QC 2300	QC 2398	QC 2328
Total Organic Carbon	TM132	92.58 87.02 : 113.45	104.3 87.02 : 113.45	98.05 87.02 : 113.45

VOC MS (S)

Component	Method Code	QC 2312	QC 2364	QC 2362
1,1,1,2-tetrachloroethane	TM116	97.0 84.84 : 116.25	110.0 79.10 : 119.66	111.0 79.10 : 119.66
1,1,1-Trichloroethane	TM116	96.6 73.73 : 118.05	99.6 84.25 : 112.57	101.4 84.25 : 112.57
1,1,2-Trichloroethane	TM116	96.0 77.12 : 116.04	93.2 81.29 : 113.79	90.2 81.29 : 113.79
1,1-Dichloroethane	TM116	106.6 74.46 : 129.15	101.0 86.77 : 122.11	105.8 86.77 : 122.11
1,2-Dichloroethane	TM116	108.0 92.38 : 131.65	113.0 90.04 : 132.28	108.4 90.04 : 132.28
1,4-Dichlorobenzene	TM116	104.2 83.64 : 126.18	107.2 80.81 : 125.07	115.4 80.81 : 125.07
2-Chlorotoluene	TM116	91.4 76.03 : 113.25	93.8 73.13 : 114.13	99.0 73.13 : 114.13
4-Chlorotoluene	TM116	94.4 66.90 : 112.46	91.6 68.66 : 109.13	99.6 68.66 : 109.13
Benzene	TM116	101.8 88.60 : 113.80	96.6 84.29 : 112.22	97.2 84.29 : 112.22
Carbon Disulphide	TM116	95.6 74.91 : 122.14	95.6 75.11 : 124.81	99.2 75.11 : 124.81
Carbontetrachloride	TM116	99.8 80.31 : 124.50	114.8 82.35 : 126.46	114.0 82.35 : 126.46
Chlorobenzene	TM116	99.6 83.81 : 114.18	104.6 82.88 : 122.42	107.4 82.88 : 122.42
Chloroform	TM116	105.8 87.40 : 122.49	103.0 90.35 : 120.38	106.4 90.35 : 120.38
Chloromethane	TM116	108.8 65.89 : 136.93	99.6 65.80 : 138.88	101.6 65.80 : 138.88
Cis-1,2-Dichloroethene	TM116	103.0 80.67 : 126.72	97.2 78.27 : 128.90	100.4 78.27 : 128.90
Dibromomethane	TM116	97.2 73.23 : 118.35	107.8 76.00 : 120.73	102.2 76.00 : 120.73
Dichloromethane	TM116	114.2 81.11 : 133.25	106.0 92.27 : 134.36	109.0 92.27 : 134.36
Ethylbenzene	TM116	86.4 75.92 : 110.41	90.2 70.95 : 113.07	93.2 70.95 : 113.07
Hexachlorobutadiene	TM116	44.0 12.82 : 152.73	59.4 14.55 : 147.92	74.4 14.55 : 147.92
Isopropylbenzene	TM116	70.4 55.79 : 97.59	68.8 52.00 : 108.19	76.8 52.00 : 108.19
Naphthalene	TM116	110.6 80.86 : 128.81	105.6 80.29 : 135.77	119.2 80.29 : 135.77
o-Xylene	TM116	80.6 69.99 : 108.74	85.2 64.92 : 98.85	87.6 64.92 : 98.85



CERTIFICATE OF ANALYSIS

Validated

SDG: 210225-41
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593428
Superseded Report: 589496

VOC MS (S)

		QC 2312	QC 2364	QC 2362
p/m-Xylene	TM116	81.7 68.32 : 108.91	85.6 72.04 : 104.04	89.7 72.04 : 104.04
Sec-Butylbenzene	TM116	60.0 38.50 : 101.50	66.4 27.03 : 135.73	80.4 27.03 : 135.73
Tetrachloroethene	TM116	96.0 76.95 : 121.02	108.2 81.43 : 126.65	113.4 81.43 : 126.65
Toluene	TM116	90.4 74.24 : 107.42	88.8 82.44 : 103.50	88.2 82.44 : 103.50
Trichloroethene	TM116	93.6 85.28 : 109.36	97.6 79.80 : 112.33	97.8 79.80 : 112.33
Trichlorofluoromethane	TM116	105.0 84.55 : 133.27	111.2 89.67 : 132.09	110.8 89.67 : 132.09
Vinyl Chloride	TM116	104.6 68.02 : 143.37	99.8 69.66 : 136.55	102.8 69.66 : 136.55

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.

The figure detailed is the percentage recovery result for the AQC.

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

ALS Environmental, Land	QF.7.5.1 Data Amendments Form (Issue No. 4)
	Date: 03/03/2020
	Issued and Authorised by Quality Manager

SDG	Sample Event	Sample ID	Date Amended	Amendment Reason	Previous Reference	New Reference	Supersedes Report
210225-41	23791075	WS05	09/04/2021	Sample ID Change	WS05	WS105	589496
	23791079	WS05		Sample ID Change	WS05	WS105	
	23791083	WS03		Sample ID Change	WS03	WS103	
	23791090	WS03		Sample ID Change	WS03	WS103	
	23791098	WS05		Sample ID Change	WS05	WS105	
	23791104	WS04		Sample ID Change	WS04	WS104	
	23791108	WS05		Sample ID Change	WS05	WS105	



CERTIFICATE OF ANALYSIS

SDG:	210225-41	Client Reference:	8027006	Report Number:	593428
Location:	Cefn saeson	Order Number:	7001060	Superseded Report:	589496

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2017).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Tetra Tech Europe
5th Floor
Longcross Court
47 Newport Road
Cardiff
CF24 0AD

Attention: Geraint Thomas

CERTIFICATE OF ANALYSIS

Date of report Generation:	09 April 2021
Customer:	Tetra Tech Europe
Sample Delivery Group (SDG):	210304-61
Your Reference:	B027006
Location:	Cefn saeson
Report No:	593426

This report has been revised and directly supersedes 590239 in its entirety.

We received 3 samples on Thursday March 04, 2021 and 3 of these samples were scheduled for analysis which was completed on Thursday March 11, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 210304-61
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593426
Superseded Report: 590239

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
23834673	WS101	EW1	1.00 - 1.00	03/02/2021
23834718	WS103	EW1	1.50 - 1.50	03/02/2021
23834757	WS104	EW1	1.50 - 1.50	03/02/2021

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 210304-61
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593426
Superseded Report: 590239

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water
Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	23834673	23834718	23834757
						WS101	WS103	WS104
Depth (m)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	EW1	EW1	EW1
						1.00 - 1.00	1.50 - 1.50	1.50 - 1.50
Container	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	Vial (ALE297)	Vial (ALE297)	Vial (ALE297)
						NaOH (ALE245)	NaOH (ALE245)	NaOH (ALE245)
Sample Type	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	HN03 Filtered (ALE204)	HN03 Filtered (ALE204)	HN03 Filtered (ALE204)
						H2SO4 (ALE244)	H2SO4 (ALE244)	H2SO4 (ALE244)
Sample Type	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	330ml plastic bottle (ALE503)	330ml plastic bottle (ALE503)	330ml plastic bottle (ALE503)
						250ml Amber GL. PTFE/PE (ALE219)	250ml Amber GL. PTFE/PE (ALE219)	250ml Amber GL. PTFE/PE (ALE219)
Sample Type	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	GW	GW	GW
						GW	GW	GW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 3						
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 3						
Anions by Kone (w)	All	NDPs: 0 Tests: 3						
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 3						
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 3						
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 3						
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 3						
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 3						
GRO by GC-FID (W)	All	NDPs: 0 Tests: 3						
Mercury Dissolved	All	NDPs: 0 Tests: 3						
Nitrite by Kone (w)	All	NDPs: 0 Tests: 3						
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 3						
pH Value	All	NDPs: 0 Tests: 3						
Phenols by HPLC (W)	All	NDPs: 0 Tests: 3						
TPH CWG (W)	All	NDPs: 0 Tests: 3						

SDG:	210304-61
Location:	Cefn saeson

[illegible]



CERTIFICATE OF ANALYSIS

Validated

SDG: 210304-61
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593426
Superseded Report: 590239

TPH CWG (W)

Results Legend			Customer Sample Ref.					
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	WS101 1.00 - 1.00 Ground Water (GW) 03/02/2021	WS103 1.50 - 1.50 Ground Water (GW) 03/02/2021	WS104 1.50 - 1.50 Ground Water (GW) 03/02/2021		
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted - refer to subcontractor report for accreditation status.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-4*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM245	111	109	107			
			@	@	@			
GRO >C5-C12	<50 µg/l	TM245	<50	<50	<50			
			@ #	@ #	@ #			
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245	<3	<3	<3			
			@ #	@ #	@ #			
Benzene	<7 µg/l	TM245	<7	<7	<7			
			@ #	@ #	@ #			
Toluene	<4 µg/l	TM245	<4	<4	<4			
			@ #	@ #	@ #			
Ethylbenzene	<5 µg/l	TM245	<5	<5	<5			
			@ #	@ #	@ #			
m,p-Xylene	<8 µg/l	TM245	<8	<8	<8			
			@ #	@ #	@ #			
o-Xylene	<3 µg/l	TM245	<3	<3	<3			
			@ #	@ #	@ #			
Sum of detected Xylenes	<11 µg/l	TM245	<11	<11	<11			
			@	@	@			
Sum of detected BTEX	<28 µg/l	TM245	<28	<28	<28			
			@	@	@			
Aliphatics >C5-C6	<10 µg/l	TM245	<10	<10	<10			
			@	@	@			
Aliphatics >C6-C8	<10 µg/l	TM245	<10	<10	<10			
			@	@	@			
Aliphatics >C8-C10	<10 µg/l	TM245	<10	<10	<10			
			@	@	@			
Aliphatics >C10-C12	<10 µg/l	TM245	<10	<10	<10			
			@	@	@			
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	<10	<10	<10			
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	<10	<10	<10			
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	<10	<10	<10			
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	<10	<10	<10			
Aromatics >EC5-EC7	<10 µg/l	TM245	<10	<10	<10			
			@	@	@			
Aromatics >EC7-EC8	<10 µg/l	TM245	<10	<10	<10			
			@	@	@			
Aromatics >EC8-EC10	<10 µg/l	TM245	<10	<10	<10			
			@	@	@			
Aromatics >EC10-EC12	<10 µg/l	TM245	<10	<10	<10			
			@	@	@			
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	<10	<10	<10			
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	<10	<10	<10			
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	<10	<10	<10			
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	<10	<10	<10			
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	<10	<10	<10			
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174	<10	<10	<10			



CERTIFICATE OF ANALYSIS

Validated

SDG: 210304-61
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593426
Superseded Report: 590239

Table of Results - Appendix

Method No	Reference	Description
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 210304-61
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593426
Superseded Report: 590239

Test Completion Dates

Lab Sample No(s)	23834673	23834718	23834757
Customer Sample Ref.	WS101	WS103	WS104
AGS Ref.	EW1	EW1	EW1
Depth	1.00 - 1.00	1.50 - 1.50	1.50 - 1.50
Type	Ground Water	Ground Water	Ground Water

Alkalinity as CaCO ₃	06-Mar-2021	06-Mar-2021	06-Mar-2021
Ammoniacal Nitrogen	09-Mar-2021	09-Mar-2021	09-Mar-2021
Anions by Kone (w)	09-Mar-2021	09-Mar-2021	09-Mar-2021
Cyanide Comp/Free/Total/Thiocyanate	08-Mar-2021	08-Mar-2021	08-Mar-2021
Dissolved Metals by ICP-MS	10-Mar-2021	10-Mar-2021	10-Mar-2021
Dissolved Organic/Inorganic Carbon	10-Mar-2021	11-Mar-2021	11-Mar-2021
EPH CWG (Aliphatic) Aqueous GC (W)	09-Mar-2021	09-Mar-2021	09-Mar-2021
EPH CWG (Aromatic) Aqueous GC (W)	09-Mar-2021	09-Mar-2021	09-Mar-2021
GRO by GC-FID (W)	09-Mar-2021	09-Mar-2021	09-Mar-2021
Mercury Dissolved	10-Mar-2021	09-Mar-2021	10-Mar-2021
Nitrite by Kone (w)	05-Mar-2021	05-Mar-2021	05-Mar-2021
PAH Spec MS - Aqueous (W)	10-Mar-2021	10-Mar-2021	10-Mar-2021
pH Value	09-Mar-2021	09-Mar-2021	09-Mar-2021
Phenols by HPLC (W)	08-Mar-2021	08-Mar-2021	08-Mar-2021
TPH CWG (W)	09-Mar-2021	09-Mar-2021	09-Mar-2021



CERTIFICATE OF ANALYSIS

Validated

SDG: 210304-61
Location: Cefn saesonClient Reference: B027006
Order Number: 7001060Report Number: 593426
Superseded Report: 590239

ASSOCIATED AQC DATA

Alkalinity as CaCO₃

Component	Method Code	QC 2375
Total Alkalinity as CaCO ₃	TM043	100.0 94.47 : 104.41

Ammoniacal Nitrogen

Component	Method Code	QC 2384
Ammoniacal Nitrogen as N	TM099	99.2 93.14 : 108.60

Anions by Kone (w)

Component	Method Code	QC 2339	QC 2347
Chloride	TM184	106.0 92.93 : 115.43	109.0 92.93 : 115.43
Sulphate (soluble)	TM184	106.8 90.53 : 113.03	109.6 90.53 : 113.03
TON as NO ₃	TM184	108.0 99.60 : 111.90	110.0 99.60 : 111.90

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2330
Free Cyanide (W)	TM227	79.0 91.52 : 123.82
Thiocyanate (W)	TM227	100.25 90.50 : 113.00
Total Cyanide (W)	TM227	101.0 91.75 : 112.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 2374	QC 2370
Aluminium	TM152	102.0 90.98 : 111.82	101.0 90.98 : 111.82
Antimony	TM152	96.0 90.44 : 113.04	101.0 90.44 : 113.04
Arsenic	TM152	99.0 88.00 : 112.00	99.33 88.00 : 112.00
Barium	TM152	99.5 90.20 : 111.19	97.17 90.20 : 111.19
Beryllium	TM152	104.0 87.77 : 113.97	102.17 87.77 : 113.97
Bismuth	TM152	101.17 91.90 : 112.20	100.83 91.90 : 112.20
Borate	TM152	103.09 88.00 : 112.00	102.47 88.00 : 112.00



CERTIFICATE OF ANALYSIS

Validated

SDG: 210304-61
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593426
Superseded Report: 590239

Dissolved Metals by ICP-MS

		QC 2374	QC 2370
Boron	TM152	103.0 96.48 : 114.93	102.33 96.48 : 114.93
Cadmium	TM152	101.17 96.43 : 110.53	100.83 96.43 : 110.53
Calcium	TM152	100.67 81.38 : 119.09	98.67 81.38 : 119.09
Chromium	TM152	95.83 91.84 : 108.67	97.0 91.84 : 108.67
Cobalt	TM152	93.83 88.00 : 112.00	97.0 88.00 : 112.00
Copper	TM152	95.33 92.47 : 118.11	98.67 92.47 : 118.11
Iron	TM152	96.67 92.00 : 113.00	98.67 92.00 : 113.00
Lead	TM152	100.67 88.00 : 112.00	99.83 88.00 : 112.00
Lithium	TM152	105.33 91.62 : 113.12	101.0 91.62 : 113.12
Magnesium	TM152	96.67 93.14 : 107.91	96.0 93.14 : 107.91
Manganese	TM152	98.33 95.03 : 110.58	99.0 95.03 : 110.58
Molybdenum	TM152	98.5 88.00 : 112.00	96.33 88.00 : 112.00
Nickel	TM152	95.67 88.00 : 112.00	98.17 88.00 : 112.00
Phosphorus	TM152	100.5 88.00 : 112.00	98.0 88.00 : 112.00
Potassium	TM152	101.33 93.90 : 112.36	98.0 93.90 : 112.36
Selenium	TM152	101.17 91.58 : 115.98	102.67 91.58 : 115.98
Silver	TM152	101.33 88.80 : 122.30	101.0 88.80 : 122.30
Sodium	TM152	96.67 94.28 : 110.71	96.67 94.28 : 110.71
Strontium	TM152	104.33 88.00 : 112.00	100.67 88.00 : 112.00
Tellurium	TM152	100.83 93.32 : 114.66	100.0 93.32 : 114.66
Thallium	TM152	98.67 88.00 : 112.00	96.33 88.00 : 112.00
Tin	TM152	102.17 92.63 : 109.70	100.67 92.63 : 109.70
Titanium	TM152	101.5 95.58 : 111.68	103.33 95.58 : 111.68
Tungsten	TM152	99.33 81.32 : 124.72	100.0 81.32 : 124.72
Uranium	TM152	100.5 88.00 : 112.00	100.0 88.00 : 112.00
Vanadium	TM152	101.17 88.00 : 112.00	100.5 88.00 : 112.00
Zinc	TM152	97.33 92.98 : 118.95	100.0 92.98 : 118.95



CERTIFICATE OF ANALYSIS

Validated

SDG: 210304-61
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593426
Superseded Report: 590239

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 2372	QC 2354
Dissolved Inorganic Carbon	TM090	99.67 93.58 : 112.28	99.5 93.58 : 112.28
Dissolved Organic Carbon	TM090	100.33 96.13 : 109.53	100.67 96.13 : 109.53

EPH CWG (Aliphatic) Aqueous GC (W)

Component	Method Code	QC 2330
Total Aliphatics >C10-C40	TM174	96.53 68.59 : 134.82

EPH CWG (Aromatic) Aqueous GC (W)

Component	Method Code	QC 2349
Total Aromatics >EC10-EC40	TM174	99.02 60.75 : 129.09

GRO by GC-FID (W)

Component	Method Code	QC 2355
Benzene by GC	TM245	107.5 81.54 : 119.70
Ethylbenzene by GC	TM245	106.0 80.99 : 121.09
m & p Xylene by GC	TM245	106.0 82.77 : 123.19
MTBE GC-FID	TM245	103.0 80.06 : 123.27
o Xylene by GC	TM245	107.5 84.26 : 121.50
QC	TM245	99.61 67.65 : 138.14
Toluene by GC	TM245	106.0 82.78 : 121.99

Mercury Dissolved

Component	Method Code	QC 2326	QC 2375
Mercury Dissolved (CVAF)	TM183	83.1 74.00 : 116.00	91.5 74.00 : 116.00

PAH Spec MS - Aqueous (W)



CERTIFICATE OF ANALYSIS

Validated

SDG: 210304-61
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593426
Superseded Report: 590239

PAH Spec MS - Aqueous (W)

Component	Method Code	QC 2362
Acenaphthene by GCMS	TM178	104.4 90.45 : 118.63
Acenaphthylene by GCMS	TM178	104.4 90.13 : 116.27
Anthracene by GCMS	TM178	104.4 92.40 : 114.00
Benz(a)anthracene by GCMS	TM178	106.8 89.51 : 117.69
Benzo(a)pyrene by GCMS	TM178	104.8 89.43 : 118.57
Benzo(b)fluoranthene by GCMS	TM178	105.6 87.80 : 121.80
Benzo(ghi)perylene by GCMS	TM178	99.2 87.10 : 119.30
Benzo(k)fluoranthene by GCMS	TM178	104.4 93.23 : 123.57
Chrysene by GCMS	TM178	107.6 88.68 : 116.92
Dibenzo(ah)anthracene by GCMS	TM178	101.2 86.24 : 118.56
Fluoranthene by GCMS	TM178	94.0 86.04 : 121.96
Fluorene by GCMS	TM178	100.8 90.76 : 121.24
Indeno(123cd)pyrene by GCMS	TM178	103.2 88.39 : 119.61
Naphthalene by GCMS	TM178	103.6 89.40 : 121.80
Phenanthrene by GCMS	TM178	100.8 90.41 : 119.19
Pyrene by GCMS	TM178	91.6 91.00 : 120.20

pH Value

Component	Method Code	QC 2328
pH	TM256	100.67 99.33 : 102.54

Phenols by HPLC (W)

Component	Method Code	QC 2310
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	50.0 77.41 : 127.55
2-Isopropyl Phenol by HPLC (W)	TM259	50.0 82.77 : 126.51
Cresols by HPLC (W)	TM259	48.67 76.60 : 126.28
Naphthol by HPLC (W)	TM259	57.0 75.40 : 129.40
Phenol by HPLC (W)	TM259	50.0 85.77 : 125.91



CERTIFICATE OF ANALYSIS

Validated

SDG: 210304-61
Location: Cefn saeson

Client Reference: B027006
Order Number: 7001060

Report Number: 593426
Superseded Report: 590239

Phenols by HPLC (W)

		QC 2310
Xylenols by HPLC (W)	TM259	49.67 79.09 : 131.82

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.

The figure detailed is the percentage recovery result for the AQC.

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

ALS Environmental, Land	QF.7.5.1 Data Amendments Form (Issue No. 4)
	Date: 03/03/2020
	Issued and Authorised by Quality Manager

SDG	Sample Event	Sample ID	Date Amended	Amendment Reason	Previous Reference	New Reference	Supersedes Report
210304-61	23834673	WS01	09/04/2021	Sample ID Change	WS01	WS101	590239
	23834718	WS03		Sample ID Change	WS03	WS103	
	23834757	WS04		Sample ID Change	WS04	WS104	



CERTIFICATE OF ANALYSIS

SDG:	210304-61	Client Reference:	8027006	Report Number:	593426
Location:	Cefn saeson	Order Number:	7001060	Superseded Report:	590239

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

General

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2017).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Website: www.alsenvironmental.co.uk

Tetra Tech Europe
5th Floor
Longcross Court
47 Newport Road
Cardiff
CF24 0AD

Attention: Peter Murphy

PRELIMINARY/INTERIM REPORT

Date of report Generation:	18 May 2021
Customer:	Tetra Tech Europe
Sample Delivery Group (SDG):	210511-33
Your Reference:	B027006
Location:	Cefn saeson
Report No:	598435

We received 9 samples on Monday May 10, 2021 and 8 of these samples were scheduled for analysis which was completed on Tuesday May 18, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

This is a preliminary report which has not had final authorisation

Approved By:





PRELIMINARY/INTERIM REPORT

Preliminary

SDG:	210511-33	Client Reference:	B027006	Report Number:	598435
Location:	Cefn saeson	Order Number:		Superseded Report:	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
24242394	WS201		0.25 - 0.60	
24242395	WS202		0.20 - 0.60	
24242396	WS202		0.60 - 0.80	
24242397	WS203		1.30 - 1.80	
24242398	WS203		1.80 - 2.00	
24242399	WS204		0.10 - 0.30	
24242400	WS204		0.30 - 0.60	
24242401	WS204		0.70 - 1.00	
24242403	WS204		1.50 - 2.00	

Only received samples which have had analysis scheduled will be shown on the following pages.



PRELIMINARY/INTERIM REPORT

Preliminary

SDG: 210511-33
Location: Cefn saesonClient Reference: B027006
Order Number:Report Number: 598435
Superseded Report:

Results Legend			Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
X Test N No Determination Possible			24242394		WS201				0.25 - 0.60		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)		S	
			24242396		WS202				0.60 - 0.80		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)		S	
			24242397		WS203				1.30 - 1.80		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)		S	
			24242398		WS203				1.80 - 2.00		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)		S	
			24242399		WS204				0.10 - 0.30		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)		S	
			24242400		WS204				0.30 - 0.60		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)		S	
			24242401		WS204				0.70 - 1.00		1kg TUB with Handle (ALE260) 60g VOC (ALE215)		S	
Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other														
Alkalinity Filtered as CaCO ₃	All	NDPs: 0 Tests: 2												
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2												
Anions by Kone (soil)	All	NDPs: 0 Tests: 8												
Anions by Kone (w)	All	NDPs: 0 Tests: 2												
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 8												
Boron Water Soluble	All	NDPs: 0 Tests: 8												
CEN Readings	All	NDPs: 0 Tests: 2												
Chromium III	All	NDPs: 0 Tests: 8												
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 10												
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2												
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 2												
EPH CWG (Aliphatic) Filtered GC (W)	All	NDPs: 0 Tests: 2												
EPH CWG (Aromatic) Filtered GC (W)	All	NDPs: 0 Tests: 2												
EPH CWG GC (S)	All	NDPs: 0 Tests: 8												
GRO by GC-FID (S)	All	NDPs: 0 Tests: 8												



PRELIMINARY/INTERIM REPORT

Preliminary

SDG: 210511-33
Location: Cefn saesonClient Reference: B027006
Order Number:Report Number: 598435
Superseded Report:

Results Legend



Test

No Determination
Possible

Sample Types -

S - Soil/Solid
 UNS - Unspecified Solid
 GW - Ground Water
 SW - Surface Water
 LE - Land Leachate
 PL - Prepared Leachate
 PR - Process Water
 SA - Saline Water
 TE - Trade Effluent
 TS - Treated Sewage
 US - Untreated Sewage
 RE - Recreational Water
 DW - Drinking Water Non-regulatory
 UNL - Unspecified Liquid
 SL - Sludge
 G - Gas
 OTH - Other

Results Legend	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	24242394	WS201					0.25 - 0.60		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260)	S	S	S
	24242396	WS202					0.60 - 0.80		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S	S	S
	24242397	WS203					1.30 - 1.80		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S	S	S
	24242398	WS203					1.80 - 2.00		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S	S	S
	24242399	WS204					0.10 - 0.30		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S	S	S
	24242400	WS204					0.30 - 0.60		250g Amber Jar (ALE210) 1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S	S	S
	24242401	WS204					0.70 - 1.00		1kg TUB with Handle (ALE260) 60g VOC (ALE215)	S	S	S
GRO by GC-FID (W)	All	NDPs: 0 Tests: 2										
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 8										
Mercury Dissolved	All	NDPs: 0 Tests: 2										
Metals in solid samples by OES	All	NDPs: 0 Tests: 8										
Nitrite by Kone (w)	All	NDPs: 0 Tests: 2										
PAH by GCMS	All	NDPs: 0 Tests: 8										
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 2										
pH	All	NDPs: 0 Tests: 8										
pH Value of Filtered Water	All	NDPs: 0 Tests: 2										
Phenols by HPLC (S)	All	NDPs: 0 Tests: 8										
Phenols by HPLC (W)	All	NDPs: 0 Tests: 2										
Sample description	All	NDPs: 0 Tests: 8										
Total Organic Carbon	All	NDPs: 0 Tests: 8										
TPH CWG Filtered (W)	All	NDPs: 0 Tests: 2										
TPH CWG GC (S)	All	NDPs: 0 Tests: 8										



PRELIMINARY/INTERIM REPORT

Preliminary

SDG: 210511-33
Location: Cefn saesonClient Reference: B027006
Order Number:Report Number: 598435
Superseded Report:

Results Legend



Test

No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

VOC MS (S)

All

NDPs: 0
Tests: 8

24242394

WS201

0.25 - 0.60

250g Amber Jar
(ALE210)
1kg TUB with
Handle (ALE260)
60g VOC (ALE215)

S

X

24242396

WS202

0.60 - 0.80

250g Amber Jar
(ALE210)
1kg TUB with
Handle (ALE260)
60g VOC (ALE215)

S

X

24242397

WS203

1.30 - 1.80

250g Amber Jar
(ALE210)
1kg TUB with
Handle (ALE260)
60g VOC (ALE215)

S

X

24242398

WS203

1.80 - 2.00

250g Amber Jar
(ALE210)
1kg TUB with
Handle (ALE260)
60g VOC (ALE215)

S

X

24242399

WS204

0.10 - 0.30

250g Amber Jar
(ALE210)
1kg TUB with
Handle (ALE260)
60g VOC (ALE215)

S

X

24242400

WS204

0.30 - 0.60

250g Amber Jar
(ALE210)
1kg TUB with
Handle (ALE260)
60g VOC (ALE215)

S

X

24242401

WS204

0.70 - 1.00

1kg TUB with
Handle (ALE260)
60g VOC (ALE215)

S

X

24242403	WS204		1.50 - 2.00	60g VOC (ALE215)	S		X
				250g Amber Jar (ALE210)	S		
				1kg TUB with Handle (ALE260)	S		
24242401	WS204		0.70 - 1.00	60g VOC (ALE215)	S		X
				250g Amber Jar (ALE210)	S		



PRELIMINARY/INTERIM REPORT

Preliminary

SDG: 210511-33
Location: Cefn saeson

Client Reference: B027006
Order Number:

Report Number: 598435
Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
24242394	WS201	0.25 - 0.60	Dark Brown	Loamy Sand	Oil/Petroleum	Stones
24242396	WS202	0.60 - 0.80	Dark Brown	Loamy Sand	Oil/Petroleum	Stones
24242397	WS203	1.30 - 1.80	Dark Brown	Stone/Soil	Oil/Petroleum	Stones
24242398	WS203	1.80 - 2.00	Dark Brown	Sandy Clay	Stones	None
24242399	WS204	0.10 - 0.30	Dark Brown	Loamy Sand	Stones	Oil/Petroleum
24242400	WS204	0.30 - 0.60	Dark Brown	Loamy Sand	Stones	Oil/Petroleum
24242401	WS204	0.70 - 1.00	Dark Brown	Sandy Clay Loam	Stones	None
24242403	WS204	1.50 - 2.00	Dark Brown	Sandy Clay	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

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



PRELIMINARY/INTERIM REPORT

Preliminary

SDG: 210511-33
Location: Cefn saesonClient Reference: B027006
Order Number:Report Number: 598435
Superseded Report:

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited.
M mCERTS accredited.
* Subcontracted test.
(F) Trigger breach confirmed
1-5&*%\$@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS201 0.25 - 0.60 SOLID 10/05/2021 12:15:00 210511-33 24242394 TM048	13/05/2021	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS202 0.60 - 0.80 SOLID 10/05/2021 12:15:00 210511-33 24242396 TM048	12/05/2021	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS203 1.30 - 1.80 SOLID 10/05/2021 12:15:00 210511-33 24242397 TM048	13/05/2021	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS203 1.80 - 2.00 SOLID 10/05/2021 12:15:00 210511-33 24242398 TM048	14/05/2021	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS204 0.10 - 0.30 SOLID 10/05/2021 12:15:00 210511-33 24242399 TM048	14/05/2021	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS204 0.30 - 0.60 SOLID 10/05/2021 12:15:00 210511-33 24242400 TM048	12/05/2021	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS204 0.70 - 1.00 SOLID 10/05/2021 12:15:00 210511-33 24242401 TM048	13/05/2021	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS204 1.50 - 2.00 SOLID 10/05/2021 12:15:00 210511-33 24242403 TM048	12/05/2021	Agnieszka Chelmowska	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



PRELIMINARY/INTERIM REPORT

Preliminary

SDG: 210511-33
Location: Cefn saesonClient Reference: B027006
Order Number:Report Number: 598435
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM243		Mixed Anions In Soils By Kone
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



PRELIMINARY/INTERIM REPORT

Preliminary

SDG: 210511-33
Location: Cefn saesonClient Reference: B027006
Order Number:Report Number: 598435
Superseded Report:

Test Completion Dates

Lab Sample No(s)
Customer Sample Ref.AGS Ref.
Depth
Type

	24242394	24242396	24242397	24242398	24242399	24242400	24242401	24242403
	WS201	WS202	WS203	WS203	WS204	WS204	WS204	WS204
	0.25 - 0.60	0.60 - 0.80	1.30 - 1.80	1.80 - 2.00	0.10 - 0.30	0.30 - 0.60	0.70 - 1.00	1.50 - 2.00
	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkalinity Filtered as CaCO ₃			14-May-2021					14-May-2021
Ammoniacal Nitrogen			17-May-2021					17-May-2021
Anions by Kone (soil)	18-May-2021	18-May-2021	18-May-2021	18-May-2021	18-May-2021	18-May-2021	18-May-2021	18-May-2021
Anions by Kone (w)			18-May-2021					18-May-2021
Asbestos ID in Solid Samples	13-May-2021	12-May-2021	13-May-2021	14-May-2021	14-May-2021	12-May-2021	13-May-2021	12-May-2021
Boron Water Soluble	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021
CEN 10:1 Leachate (1 Stage)			12-May-2021					12-May-2021
CEN Readings			13-May-2021					13-May-2021
Chromium III	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021
Cyanide Comp/Free/Total/Thiocyanate	13-May-2021	13-May-2021	17-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	17-May-2021
Dissolved Metals by ICP-MS			17-May-2021					17-May-2021
EPH CWG (Aliphatic) Filtered GC (W)			18-May-2021					18-May-2021
EPH CWG (Aromatic) Filtered GC (W)			18-May-2021					18-May-2021
EPH CWG GC (S)	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021
GRO by GC-FID (S)	17-May-2021	14-May-2021	14-May-2021	17-May-2021	14-May-2021	17-May-2021	14-May-2021	17-May-2021
GRO by GC-FID (W)			17-May-2021					17-May-2021
Hexavalent Chromium (s)	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021
Mercury Dissolved			17-May-2021					17-May-2021
Metals in solid samples by OES	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021
Moisture at 105C			11-May-2021					11-May-2021
Nitrite by Kone (w)			14-May-2021					18-May-2021
PAH by GCMS	13-May-2021	13-May-2021	13-May-2021	13-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021
PAH in waters by GC-MS (diss.filt)			17-May-2021					17-May-2021
pH	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021
pH Value of Filtered Water			14-May-2021					14-May-2021
Phenols by HPLC (S)	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021	13-May-2021
Phenols by HPLC (W)			14-May-2021					14-May-2021
Sample description	11-May-2021	11-May-2021	11-May-2021	11-May-2021	11-May-2021	11-May-2021	11-May-2021	11-May-2021
Total Organic Carbon	14-May-2021	17-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021
TPH CWG Filtered (W)			18-May-2021					18-May-2021
TPH CWG GC (S)	17-May-2021	14-May-2021	14-May-2021	17-May-2021	14-May-2021	17-May-2021	14-May-2021	17-May-2021
VOC MS (S)	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021	14-May-2021



PRELIMINARY/INTERIM REPORT

Preliminary

SDG: 210511-33
Location: Cefn saesonClient Reference: B027006
Order Number:Report Number: 598435
Superseded Report:

ASSOCIATED AQC DATA

Alkalinity Filtered as CaCO₃

Component	Method Code	QC 2494
Total Alkalinity Filtered as CaCO ₃	TM043	107.5 100.35 : 114.15

Ammoniacal Nitrogen

Component	Method Code	QC 2444
Ammoniacal Nitrogen as N	TM099	98.0 91.28 : 106.64

Anions by Kone (soil)

Component	Method Code	QC 2405
Chloride (soluble)	TM243	147.15 80.93 : 111.66
Water Soluble Sulphate as SO ₄ 2:1 Extract	TM243	165.89 70.00 : 130.00

Anions by Kone (w)

Component	Method Code	QC 2431
Chloride	TM184	95.8 91.40 : 109.10
Sulphate (soluble)	TM184	98.0 91.99 : 109.30
TON as NO ₃	TM184	95.5 90.35 : 108.35

Boron Water Soluble

Component	Method Code	QC 2436
Water Soluble Boron	TM222	103.5 84.00 : 111.00

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2462	QC 2483
Free Cyanide	TM153	96.14 86.90 : 108.50	
Free Cyanide (W)	TM227		76.75 90.67 : 122.67
Thiocyanate	TM153	99.36 94.53 : 113.33	



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Cyanide Comp/Free/Total/Thiocyanate

		QC 2462	QC 2483
Thiocyanate (W)	TM227		104.0 92.25 : 117.75
Total Cyanide	TM153	94.41 86.13 : 102.13	
Total Cyanide (W)	TM227		95.5 88.75 : 111.25

Dissolved Metals by ICP-MS

Component	Method Code	QC 2413
Aluminium	TM152	102.33 94.21 : 111.52
Antimony	TM152	103.17 88.37 : 130.57
Arsenic	TM152	101.17 92.62 : 113.52
Barium	TM152	99.83 88.62 : 113.14
Beryllium	TM152	103.83 87.08 : 111.38
Bismuth	TM152	103.33 92.62 : 115.02
Boron	TM152	105.33 86.31 : 120.88
Cadmium	TM152	100.67 93.85 : 111.65
Calcium	TM152	101.33 89.20 : 126.91
Chromium	TM152	100.33 92.50 : 113.03
Cobalt	TM152	103.83 85.01 : 114.87
Copper	TM152	101.83 89.87 : 119.73
Iron	TM152	102.67 93.02 : 113.86
Lead	TM152	99.17 91.11 : 116.98
Lithium	TM152	99.33 87.70 : 115.90
Magnesium	TM152	100.0 89.60 : 116.61
Manganese	TM152	105.17 93.97 : 112.46
Molybdenum	TM152	98.0 89.07 : 110.96
Nickel	TM152	102.5 93.70 : 112.15
Phosphorus	TM152	99.0 89.24 : 114.18
Potassium	TM152	102.0 93.20 : 115.55
Selenium	TM152	104.0 91.69 : 117.12



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Preliminary

SDG: 210511-33
Location: Cefn saesonClient Reference: B027006
Order Number:Report Number: 598435
Superseded Report:

Dissolved Metals by ICP-MS

		QC 2413
Silver	TM152	103.17 90.93 : 121.73
Sodium	TM152	99.33 92.42 : 113.24
Strontium	TM152	104.33 92.14 : 116.24
Tellurium	TM152	99.0 89.88 : 111.78
Thallium	TM152	95.0 82.43 : 113.83
Tin	TM152	102.33 94.62 : 107.79
Titanium	TM152	105.33 90.29 : 115.23
Tungsten	TM152	100.0 77.61 : 132.31
Uranium	TM152	99.5 86.97 : 115.76
Vanadium	TM152	105.0 89.61 : 115.48
Zinc	TM152	101.67 87.51 : 116.26

EPH CWG (Aliphatic) Filtered GC (W)

Component	Method Code	QC 2404
Total Aliphatics >C10-C40	TM174	89.6 71.82 : 134.09

GRO by GC-FID (S)

Component	Method Code	QC 2479	QC 2452
QC	TM089	87.41 70.75 : 114.19	81.22 70.34 : 111.95

GRO by GC-FID (W)

Component	Method Code	QC 2450
Benzene by GC	TM245	104.5 79.13 : 118.84
Ethylbenzene by GC	TM245	102.0 79.54 : 115.99
m & p Xylene by GC	TM245	102.25 78.44 : 116.32
MTBE GC-FID	TM245	101.0 81.43 : 120.09
o Xylene by GC	TM245	103.0 76.85 : 120.29



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GRO by GC-FID (W)

		QC 2450
QC	TM245	93.39 71.58 : 131.01
Toluene by GC	TM245	104.5 79.00 : 121.96

Mercury Dissolved

Component	Method Code	QC 2424
Mercury Dissolved (CVAf)	TM183	104.0 69.30 : 128.70

Metals in solid samples by OES

Component	Method Code	QC 2416	QC 2428
Aluminium	TM181	92.92 73.56 : 108.85	101.77 73.56 : 108.85
Antimony	TM181	95.93 76.89 : 111.24	96.34 76.89 : 111.24
Arsenic	TM181	96.51 88.53 : 111.01	97.67 88.53 : 111.01
Barium	TM181	91.56 77.67 : 105.35	92.66 77.67 : 105.35
Beryllium	TM181	97.39 85.44 : 109.61	99.25 85.44 : 109.61
Boron	TM181	93.12 73.51 : 104.66	94.56 73.51 : 104.66
Cadmium	TM181	92.59 77.67 : 104.12	92.18 77.67 : 104.12
Chromium	TM181	83.98 79.64 : 105.83	86.0 79.64 : 105.83
Cobalt	TM181	87.11 84.60 : 104.13	88.68 84.60 : 104.13
Copper	TM181	91.2 82.40 : 105.45	94.19 82.40 : 105.45
Iron	TM181	85.71 82.95 : 110.58	96.83 82.95 : 110.58
Lead	TM181	92.34 78.24 : 104.05	91.89 78.24 : 104.05
Manganese	TM181	100.56 94.29 : 119.51	103.06 94.29 : 119.51
Mercury	TM181	90.58 83.16 : 107.81	93.48 83.16 : 107.81
Molybdenum	TM181	97.53 87.11 : 106.87	98.77 87.11 : 106.87
Nickel	TM181	85.82 80.26 : 102.28	87.29 80.26 : 102.28
Phosphorus	TM181	102.02 94.56 : 124.28	104.65 94.56 : 124.28
Selenium	TM181	96.08 82.28 : 110.48	99.61 82.28 : 110.48
Strontium	TM181	92.2 79.13 : 102.79	95.1 79.13 : 102.79



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Superseded Report:

Metals in solid samples by OES

		QC 2416	QC 2428
Thallium	TM181	98.23 82.94 : 111.86	100.88 82.94 : 111.86
Tin	TM181	98.1 86.72 : 110.03	101.14 86.72 : 110.03
Titanium	TM181	90.08 66.23 : 102.06	89.31 66.23 : 102.06
Vanadium	TM181	98.17 86.19 : 109.45	100.37 86.19 : 109.45
Zinc	TM181	94.87 84.68 : 113.99	97.13 84.68 : 113.99

PAH by GCMS

Component	Method Code	QC 2479	QC 2420
Acenaphthene	TM218	89.0 73.47 : 109.80	90.0 76.79 : 103.90
Acenaphthylene	TM218	89.0 70.00 : 130.00	89.5 74.19 : 106.17
Anthracene	TM218	84.5 68.68 : 111.89	90.5 70.90 : 109.22
Benz(a)anthracene	TM218	85.5 68.12 : 118.39	90.5 73.77 : 119.26
Benzo(a)pyrene	TM218	84.0 71.72 : 115.31	89.0 73.20 : 114.18
Benzo(b)fluoranthene	TM218	82.0 66.89 : 120.40	88.0 75.36 : 117.58
Benzo(ghi)perylene	TM218	87.0 67.82 : 118.49	85.5 70.73 : 116.12
Benzo(k)fluoranthene	TM218	85.5 73.10 : 117.03	91.5 75.98 : 116.59
Chrysene	TM218	84.0 69.58 : 115.47	91.5 74.82 : 114.18
Dibenzo(ah)anthracene	TM218	82.5 67.32 : 121.35	86.5 69.17 : 115.30
Fluoranthene	TM218	83.0 75.16 : 117.28	99.5 66.06 : 114.63
Fluorene	TM218	87.0 73.81 : 108.66	90.0 76.66 : 107.56
Indeno(123cd)pyrene	TM218	87.5 68.91 : 117.62	79.0 70.26 : 117.95
Naphthalene	TM218	86.5 72.12 : 106.18	90.5 74.70 : 101.83
Phenanthrene	TM218	85.5 69.01 : 113.72	94.5 73.62 : 109.34
Pyrene	TM218	85.0 64.28 : 115.75	97.0 71.46 : 117.00

PAH in waters by GC-MS (diss.filt)

Component	Method Code	QC 2401
Acenaphthene (diss.filt)	TM178	109.6 93.20 : 119.60
Acenaphthylene (diss.filt)	TM178	107.6 92.00 : 118.40



PRELIMINARY/INTERIM REPORT

Preliminary

SDG: 210511-33
Location: Cefn saesonClient Reference: B027006
Order Number:Report Number: 598435
Superseded Report:

PAH in waters by GC-MS (diss.filt)

		QC 2401
Anthracene (diss.filt)	TM178	104.8 90.80 : 114.80
Benzo(a)anthracene (diss.filt)	TM178	103.6 91.60 : 115.60
Benzo(a)pyrene (diss.filt)	TM178	106.4 91.20 : 120.00
Benzo(b)fluoranthene (diss.filt)	TM178	106.8 86.80 : 120.40
Benzo(g,h,i)perylene (diss.filt)	TM178	100.8 89.20 : 118.00
Benzo(k)fluoranthene (diss.filt)	TM178	109.2 94.40 : 125.60
Chrysene (diss.filt)	TM178	106.0 96.40 : 122.80
Dibenzo(a,h)anthracene (diss.filt)	TM178	101.2 93.60 : 132.00
Fluoranthene (diss.filt)	TM178	106.4 92.80 : 121.60
Fluorene (diss.filt)	TM178	110.4 93.60 : 120.00
Indeno(1,2,3-cd)pyrene (diss.filt)	TM178	98.4 82.40 : 120.80
Naphthalene (diss.filt)	TM178	109.6 88.40 : 126.80
Phenanthrene (diss.filt)	TM178	108.8 92.40 : 118.80
Pyrene (diss.filt)	TM178	107.6 90.40 : 124.00

pH

Component	Method Code	QC 2428	QC 2432
pH	TM133	99.85 98.41 : 102.48	100.29 98.41 : 102.48

pH Value of Filtered Water

Component	Method Code	QC 2452
pH	TM256	100.13 99.33 : 102.54

Phenols by HPLC (S)



PRELIMINARY/INTERIM REPORT

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Phenols by HPLC (S)

Component	Method Code	QC 2490
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	51.3 70.71 : 116.42
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	45.03 64.54 : 117.79
Cresols by HPLC (S)	TM062 (S)	48.85 74.40 : 108.98
Phenol by HPLC (S)	TM062 (S)	50.99 69.44 : 122.18
Xylenols by HPLC (S)	TM062 (S)	50.21 76.56 : 106.38

Phenols by HPLC (W)

Component	Method Code	QC 2459
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	103.52 77.41 : 127.55
2-Isopropyl Phenol by HPLC (W)	TM259	97.51 82.77 : 126.51
Cresols by HPLC (W)	TM259	104.61 76.60 : 126.28
Napthol by HPLC (W)	TM259	99.61 75.40 : 129.40
Phenol by HPLC (W)	TM259	102.08 85.77 : 125.91
Xylenols by HPLC (W)	TM259	101.9 79.09 : 131.82

Total Organic Carbon

Component	Method Code	QC 2435	QC 2441	QC 2454
Total Organic Carbon	TM132	110.16 87.02 : 113.45	102.34 87.02 : 113.45	101.56 87.02 : 113.45

VOC MS (S)

Component	Method Code	QC 2485
1,1,1,2-tetrachloroethane	TM116	102.8 79.10 : 119.66
1,1,1-Trichloroethane	TM116	104.2 88.34 : 114.50
1,1,2-Trichloroethane	TM116	98.0 81.29 : 113.79
1,1-Dichloroethane	TM116	106.4 86.77 : 122.11
1,2-Dichloroethane	TM116	116.6 90.04 : 132.28
1,4-Dichlorobenzene	TM116	110.2 80.81 : 125.07
2-Chlorotoluene	TM116	101.2 73.13 : 114.13
4-Chlorotoluene	TM116	95.0 68.66 : 109.13



PRELIMINARY/INTERIM REPORT

Preliminary

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Location: Cefn saesonClient Reference: B027006
Order Number:Report Number: 598435
Superseded Report:

VOC MS (S)

		QC 2485
Benzene	TM116	100.6 84.29 : 112.22
Carbon Disulphide	TM116	98.8 75.11 : 124.81
Carbontetrachloride	TM116	109.2 82.35 : 126.46
Chlorobenzene	TM116	103.8 82.88 : 122.42
Chloroform	TM116	107.6 90.35 : 120.38
Chloromethane	TM116	99.2 67.89 : 143.51
Cis-1,2-Dichloroethene	TM116	106.0 78.27 : 128.90
Dibromomethane	TM116	99.2 76.00 : 120.73
Dichloromethane	TM116	109.8 92.27 : 134.36
Ethylbenzene	TM116	95.0 70.95 : 113.07
Hexachlorobutadiene	TM116	75.6 14.55 : 147.92
Isopropylbenzene	TM116	91.2 52.00 : 108.19
Naphthalene	TM116	106.8 80.29 : 135.77
o-Xylene	TM116	88.8 68.34 : 101.99
p/m-Xylene	TM116	88.2 69.47 : 97.31
Sec-Butylbenzene	TM116	92.8 27.03 : 135.73
Tetrachloroethene	TM116	104.6 81.43 : 126.65
Toluene	TM116	92.6 82.44 : 103.50
Trichloroethene	TM116	99.8 79.80 : 112.33
Trichlorofluoromethane	TM116	99.4 83.13 : 123.97
Vinyl Chloride	TM116	103.2 69.66 : 136.55

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.

The figure detailed is the percentage recovery result for the AQC.

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.



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SDG:	210511-33	Client Reference:	B027006	Report Number:	598435
Location:	Cefn saeson	Order Number:		Superseded Report:	

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

General

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung. Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2017).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Tetra Tech
5th Floor, Longcross Court
42 Newport Rd
Cardiff
Cardiff
UK
CF24 0AD

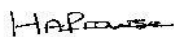


Attention : Peter Murphy
Date : 11th October, 2021
Your reference : B027006
Our reference : Test Report 21/15211 Batch 1
Location : Cefn Saeson CS
Date samples received : 29th September, 2021
Status : Final Report
Issue : 1

Ten samples were received for analysis on 29th September, 2021 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Hayley Prowse

Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Tetra Tech
Reference: B027006
Location: Cefn Saeson CS
Contact: Peter Murphy
EMT Job No: 21/15211

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	10-12	16-18	19-21	28-30						Please see attached notes for all abbreviations and acronyms		
Sample ID	TP01	TP02	TP03	TP04	TP06								
Depth	0.00-0.40	0.50-1.10	0.50-1.00	0.00-0.70	0.00-0.50								
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T								
Sample Date	27/09/2021	27/09/2021	27/09/2021	27/09/2021	27/09/2021								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1								
Date of Receipt	29/09/2021	29/09/2021	29/09/2021	29/09/2021	29/09/2021						LOD/LOR	Units	Method No.
Arsenic #	25.0	2.3	8.5	10.5	12.1						<0.5	mg/kg	TM30/PM15
Beryllium	4.5	0.9	1.4	1.4	1.2						<0.5	mg/kg	TM30/PM15
Cadmium #	0.3	<0.1	0.2	<0.1	<0.1						<0.1	mg/kg	TM30/PM15
Chromium #	18.4	47.0	37.6	33.6	35.0						<0.5	mg/kg	TM30/PM15
Copper #	28	13	24	21	24						<1	mg/kg	TM30/PM15
Lead #	176	9	15	15	145						<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	0.1						<0.1	mg/kg	TM30/PM15
Nickel #	7.8	32.9	37.8	27.1	26.0						<0.7	mg/kg	TM30/PM15
Selenium #	2	<1	1	<1	<1						<1	mg/kg	TM30/PM15
Vanadium	20	22	21	18	19						<1	mg/kg	TM30/PM15
Water Soluble Boron #	3.2	0.3	0.2	1.0	0.4						<0.1	mg/kg	TM74/PM32
Zinc #	669	67	101	83	198						<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	0.14	<0.03						<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05						<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	0.12	<0.04						<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.06	<0.03	0.12	1.74	<0.03						<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	0.53	<0.04						<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.05	<0.03	<0.03	2.28	<0.03						<0.03	mg/kg	TM4/PM8
Pyrene #	0.03	<0.03	<0.03	1.68	<0.03						<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	0.84	<0.06						<0.06	mg/kg	TM4/PM8
Chrysene #	0.03	<0.02	0.08	0.85	<0.02						<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	1.24	<0.07						<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	0.66	<0.04						<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	0.41	<0.04						<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	0.10	<0.04						<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	0.35	<0.04						<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	<0.6	<0.6	10.9	<0.6						<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	0.89	<0.05						<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	0.35	<0.02						<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	90	89	88	94	88						<0	%	TM4/PM8

Element Materials Technology

Client Name: Tetra Tech
Reference: B027006
Location: Cefn Saeson CS
Contact: Peter Murphy
EMT Job No: 21/15211

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	10-12	16-18	19-21	28-30						Please see attached notes for all abbreviations and acronyms		
Sample ID	TP01	TP02	TP03	TP04	TP06								
Depth	0.00-0.40	0.50-1.10	0.50-1.00	0.00-0.70	0.00-0.50								
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T								
Sample Date	27/09/2021	27/09/2021	27/09/2021	27/09/2021	27/09/2021								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1								
Date of Receipt	29/09/2021	29/09/2021	29/09/2021	29/09/2021	29/09/2021						LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}						<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}						<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}						<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	4.3	<0.2	<0.2	<0.2	<0.2						<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	41	<4	<4	<4	<4						<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	99	<7	<7	<7	<7						<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	39	<7	<7	<7	<7						<7	mg/kg	TM5/PM8/PM16
>C35-C44 (EH_1D_AL)	<7	<7	<7	<7	<7						<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-44 (EH+HS_1D_AL)	183	<26	<26	<26	<26						<26	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}						<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}						<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}						<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	<0.2	<0.2	<0.2	<0.2						<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	10	<4	<4	<4	<4						<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	35	<7	<7	<7	<7						<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	<7	<7	<7	<7	<7						<7	mg/kg	TM5/PM8/PM16
>EC35-EC44 (EH_1D_AR)	<7	<7	<7	<7	<7						<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-44 (EH+HS_1D_AR)	45	<26	<26	<26	<26						<26	mg/kg	TM5/PM8/PM16
Total aliphatics and aromatics (C5-44) (EH+HS_CU_1D_Total)	228	<52	<52	<52	<52						<52	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5 ^{SV}	<5 ^{SV}	<5 ^{SV}						<5	ug/kg	TM36/PM12
Benzene #	<5	<5	<5 ^{SV}	<5 ^{SV}	<5 ^{SV}						<5	ug/kg	TM36/PM12
Toluene #	<5	<5	<5 ^{SV}	<5 ^{SV}	<5 ^{SV}						<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5	<5 ^{SV}	<5 ^{SV}	<5 ^{SV}						<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5	<5 ^{SV}	<5 ^{SV}	<5 ^{SV}						<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5	<5 ^{SV}	<5 ^{SV}	<5 ^{SV}						<5	ug/kg	TM36/PM12
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15						<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	13.6	12.5	9.3	13.5	19.5						<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3						<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	1.7391	0.1068	0.0437	0.3493	0.1030						<0.0015	g/l	TM38/PM20
Chromium III	18.4	47.0	37.6	33.6	35.0						<0.5	mg/kg	NONE/NONE
Free Cyanide	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	mg/kg	TM89/PM45
Fraction Organic Carbon	0.004	0.005	0.023	0.015	0.022						<0.001	None	TM21/PM24
pH #	11.55	7.70	6.89	8.45	7.22						<0.01	pH units	TM73/PM11

Element Materials Technology

Client Name: Tetra Tech
Reference: B027006
Location: Cefn Saeson CS
Contact: Peter Murphy
EMT Job No: 21/15211

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Element Materials Technology

Client Name: Tetra Tech
Reference: B027006
Location: Cefn Saeson CS
Contact: Peter Murphy
EMT Job No: 21/15211

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	25-27										Please see attached notes for all abbreviations and acronyms	
Sample ID	TP05											
Depth	0.50-0.70											
COC No / misc												
Containers	V J T											
Sample Date	27/09/2021											
Sample Type	Soil											
Batch Number	1											
Date of Receipt	29/09/2021									LOD/LOR	Units	Method No.
TPH CWG												
Aliphatics												
>C5-C6	<10									<10	ug/l	TM36/PM6
>C6-C8	<10									<10	ug/l	TM36/PM6
>C8-C10	<10									<10	ug/l	TM36/PM6
>C10-C12	<5									<5	ug/l	TM5/PM16/PM3
>C12-C16	<10									<10	ug/l	TM5/PM16/PM3
>C16-C21	<10									<10	ug/l	TM5/PM16/PM3
>C21-C35	<10									<10	ug/l	TM5/PM16/PM3
Total aliphatics C5-35	<10									<10	ug/l	TM5/TM36/PM16/PM3
Aromatics												
>C5-EC7	<10									<10	ug/l	TM36/PM6
>EC7-EC8	<10									<10	ug/l	TM36/PM6
>EC8-EC10	<10									<10	ug/l	TM36/PM6
>EC10-EC12	<5									<5	ug/l	TM5/PM16/PM3
>EC12-EC16	<10									<10	ug/l	TM5/PM16/PM3
>EC16-EC21	<10									<10	ug/l	TM5/PM16/PM3
>EC21-EC35	<10									<10	ug/l	TM5/PM16/PM3
Total aromatics C5-35	<10									<10	ug/l	TM5/TM36/PM16/PM3
Total aliphatics and aromatics(C5-35)	<10									<10	ug/l	TM5/TM36/PM16/PM3
MTBE	<5									<5	ug/l	TM36/PM6
Benzene	<5									<5	ug/l	TM36/PM6
Toluene	<5									<5	ug/l	TM36/PM6
Ethylbenzene	<5									<5	ug/l	TM36/PM6
m/p-Xylene	<5									<5	ug/l	TM36/PM6
o-Xylene	<5									<5	ug/l	TM36/PM6
Total Phenols HPLC	<0.05									<0.05	mg/l	TM26/PM6
Sulphate as SO4 #	1.6									<0.5	mg/l	TM38/PM6
Chloride #	1.6									<0.3	mg/l	TM38/PM6
Nitrate as NO3 #	0.4									<0.2	mg/l	TM38/PM6
Nitrite as NO2 #	<0.02									<0.02	mg/l	TM38/PM6
Ammoniacal Nitrogen as NH3 #	0.05									<0.03	mg/l	TM38/PM6
Ammoniacal Nitrogen as NH4 #	0.05									<0.03	mg/l	TM38/PM6
Total Cyanide #	<0.01									<0.01	mg/l	TM89/PM6
Dissolved Organic Carbon	5									<2	mg/l	TM60/PM6
pH	8.05									<0.01	pH units	TM73/PM6
Total Alkalinity as CaCO3	22									<1	mg/l	TM75/PM6

Client Name: Tetra Tech
Reference: B027006
Location: Cefn Saeson CS
Contact: Peter Murphy

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/15211	1	TP01	0.00-0.40	3	30/09/2021	General Description (Bulk Analysis)	Soil
					30/09/2021	Asbestos Fibres	NAD
					30/09/2021	Asbestos ACM	NAD
					30/09/2021	Asbestos Type	NAD
					30/09/2021	Asbestos Level Screen	NAD
21/15211	1	TP02	0.50-1.10	12	30/09/2021	General Description (Bulk Analysis)	Soil
					30/09/2021	Asbestos Fibres	NAD
					30/09/2021	Asbestos ACM	NAD
					30/09/2021	Asbestos Type	NAD
					30/09/2021	Asbestos Level Screen	NAD
21/15211	1	TP03	0.50-1.00	18	30/09/2021	General Description (Bulk Analysis)	Soil
					30/09/2021	Asbestos Fibres	NAD
					30/09/2021	Asbestos ACM	NAD
					30/09/2021	Asbestos Type	NAD
					30/09/2021	Asbestos Level Screen	NAD
21/15211	1	TP04	0.00-0.70	21	30/09/2021	General Description (Bulk Analysis)	Soil
					30/09/2021	Asbestos Fibres	NAD
					30/09/2021	Asbestos ACM	NAD
					30/09/2021	Asbestos Type	NAD
					30/09/2021	Asbestos Level Screen	NAD
21/15211	1	TP06	0.00-0.50	30	30/09/2021	General Description (Bulk Analysis)	Soil
					30/09/2021	Asbestos Fibres	NAD
					30/09/2021	Asbestos ACM	NAD
					30/09/2021	Asbestos Type	NAD
					30/09/2021	Asbestos Level Screen	NAD

Client Name: Tetra Tech
Reference: B027006
Location: Cefn Saeson CS
Contact: Peter Murphy

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/15211

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/15211

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM16/PM30/PM69	please refer to PM16/PM30 and PM69 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes

EMT Job No: 21/15211

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes		AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM69	One part soil is mixed with 10 parts water in a vial leaving no headspace. The mixture is shaken and then left to leach for 24 hours before VOC analysis.			AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes

EMT Job No: 21/15211

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.			AR	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes		AR	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes

EMT Job No: 21/15211

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

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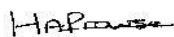


Attention : Peter Murphy
Date : 4th January, 2022
Your reference : B027006
Our reference : Test Report 21/19345 Batch 1
Location : Cefn Saeson
Date samples received : 4th December, 2021
Status : Final Report
Issue : 1

Eleven samples were received for analysis on 4th December, 2021 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Hayley Prowse

Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Tetra Tech
Reference: B027006
Location: Cefn Saeson
Contact: Peter Murphy
EMT Job No: 21/19345

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	4-6	7-9	13-15	22-24	25-27	28-30	31-33				Please see attached notes for all abbreviations and acronyms		
Sample ID	TP8	TP9	TP7	TP9	TP10	TP10	TP10						
Depth	0.00-0.20	0.20-0.60	0.40-0.60	0.90-1.10	0.60-0.65	0.80-1.00	1.20-1.40						
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	02/12/2021	02/12/2021	02/12/2021	02/12/2021	02/12/2021	02/12/2021	02/12/2021						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	04/12/2021	04/12/2021	04/12/2021	04/12/2021	04/12/2021	04/12/2021	04/12/2021				LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}				<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}				<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	0.6	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}				<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	9.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2				<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	67	<4	<4	<4	<4	<4	<4				<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	140	<7	<7	<7	<7	<7	<7				<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	<7	76	<7	<7	<7	<7	<7				<7	mg/kg	TM5/PM8/PM16
>C35-C44 (EH_1D_AL)	17	<7	<7	<7	<7	<7	<7				<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-44 (EH+HS_1D_AL)	234	76	<26	<26	<26	<26	<26				<26	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}				<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}				<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}				<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	4.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2				<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	31	<4	<4	<4	<4	<4	<4				<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	88	<7	<7	<7	<7	<7	<7				<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	144	60	<7	<7	27	23	<7				<7	mg/kg	TM5/PM8/PM16
>EC35-EC44 (EH_1D_AR)	28	<7	<7	<7	<7	<7	<7				<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-44 (EH+HS_1D_AR)	296	60	<26	<26	27	<26	<26				<26	mg/kg	TM5/PM8/PM16
Total aliphatics and aromatics (C5-44) (EH+HS_CU_1D_Total)	530	136	<52	<52	<52	<52	<52				<52	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5 ^{SV}	<5 ^{SV}	<5	<5	<5 ^{SV}	<5 ^{SV}				<5	ug/kg	TM36/PM12
Benzene #	<5	<5 ^{SV}	<5 ^{SV}	<5	<5	<5 ^{SV}	<5 ^{SV}				<5	ug/kg	TM36/PM12
Toluene #	25	30 ^{SV}	16 ^{SV}	9	15	14 ^{SV}	6 ^{SV}				<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5 ^{SV}	<5 ^{SV}	<5	<5	<5 ^{SV}	<5 ^{SV}				<5	ug/kg	TM36/PM12
m/p-Xylene #	13	7 ^{SV}	<5 ^{SV}	<5	<5	<5 ^{SV}	<5 ^{SV}				<5	ug/kg	TM36/PM12
o-Xylene #	8	<5 ^{SV}	<5 ^{SV}	<5	<5	<5 ^{SV}	<5 ^{SV}				<5	ug/kg	TM36/PM12
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15				<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	15.5	14.9	21.6	14.6	23.7	15.7	12.1				<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3				<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.3858	0.7223	0.2531	0.3623	0.2580	0.0514	0.0619				<0.0015	g/l	TM38/PM20
Chromium III	22.1	32.4	25.4	24.9	33.0	27.7	29.2				<0.5	mg/kg	NONE/NONE
Free Cyanide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	mg/kg	TM89/PM45
Fraction Organic Carbon	0.019	0.040	0.022	0.014	0.015	0.021	0.018				<0.001	None	TM21/PM24
pH #	10.52	11.24	5.63	11.55	10.49	6.92	5.08				<0.01	pH units	TM73/PM11

Element Materials Technology

Client Name: Tetra Tech
Reference: B027006
Location: Cefn Saeson
Contact: Peter Murphy
EMT Job No: 21/19345

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	13-15	19-21									Please see attached notes for all abbreviations and acronyms		
Sample ID	TP7	TP8											
Depth	0.40-0.60	0.80-1.00											
COC No / misc													
Containers	V J T	V J T											
Sample Date	02/12/2021	02/12/2021											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	04/12/2021	04/12/2021									LOD/LOR	Units	Method No.
Dissolved Antimony [#]	<2	<2									<2	ug/l	TM30/PM14
Dissolved Arsenic [#]	<2.5	<2.5									<2.5	ug/l	TM30/PM14
Dissolved Barium [#]	33	40									<3	ug/l	TM30/PM14
Dissolved Beryllium [#]	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Dissolved Boron [#]	<12	46									<12	ug/l	TM30/PM14
Dissolved Cadmium [#]	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Dissolved Chromium [#]	3.9	<1.5									<1.5	ug/l	TM30/PM14
Dissolved Copper [#]	<7	<7									<7	ug/l	TM30/PM14
Dissolved Lead [#]	<5	<5									<5	ug/l	TM30/PM14
Dissolved Mercury [#]	<1	<1									<1	ug/l	TM30/PM14
Dissolved Molybdenum [#]	<2	<2									<2	ug/l	TM30/PM14
Dissolved Nickel [#]	<2	<2									<2	ug/l	TM30/PM14
Dissolved Selenium [#]	<3	<3									<3	ug/l	TM30/PM14
Dissolved Zinc [#]	13	<3									<3	ug/l	TM30/PM14
PAH MS													
Naphthalene	<0.1	<0.1									<0.1	ug/l	TM4/PM30
Acenaphthylene	<0.013	<0.013									<0.013	ug/l	TM4/PM30
Acenaphthene	<0.013	<0.013									<0.013	ug/l	TM4/PM30
Fluorene	<0.014	<0.014									<0.014	ug/l	TM4/PM30
Phenanthrene	<0.011	<0.011									<0.011	ug/l	TM4/PM30
Anthracene	<0.013	<0.013									<0.013	ug/l	TM4/PM30
Fluoranthene	<0.012	<0.012									<0.012	ug/l	TM4/PM30
Pyrene	<0.013	<0.013									<0.013	ug/l	TM4/PM30
Benzo(a)anthracene	<0.015	<0.015									<0.015	ug/l	TM4/PM30
Chrysene	<0.011	<0.011									<0.011	ug/l	TM4/PM30
Benzo(bk)fluoranthene	<0.018	<0.018									<0.018	ug/l	TM4/PM30
Benzo(a)pyrene	<0.016	<0.016									<0.016	ug/l	TM4/PM30
Indeno(123cd)pyrene	<0.011	<0.011									<0.011	ug/l	TM4/PM30
Dibenzo(ah)anthracene	<0.01	<0.01									<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene	<0.011	<0.011									<0.011	ug/l	TM4/PM30
PAH 16 Total	<0.195	<0.195									<0.195	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	<0.01									<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	<0.01									<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	79	74									<0	%	TM4/PM30

Element Materials Technology

Client Name: Tetra Tech
Reference: B027006
Location: Cefn Saeson
Contact: Peter Murphy
EMT Job No: 21/19345

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	13-15	19-21									Please see attached notes for all abbreviations and acronyms		
Sample ID	TP7	TP8											
Depth	0.40-0.60	0.80-1.00											
COC No / misc													
Containers	V J T	V J T											
Sample Date	02/12/2021	02/12/2021											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	04/12/2021	04/12/2021									LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6	<10	<10									<10	ug/l	TM36/PM69
>C6-C8	<10	<10									<10	ug/l	TM36/PM69
>C8-C10	<10	<10									<10	ug/l	TM36/PM69
>C10-C12	<5	<5									<5	ug/l	TM5/PM16/PM30
>C12-C16	<10	<10									<10	ug/l	TM5/PM16/PM30
>C16-C21	<10	<10									<10	ug/l	TM5/PM16/PM30
>C21-C35	<10	<10									<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35	<10	<10									<10	ug/l	TM5/PM16/PM30/PM30
Aromatics													
>C5-EC7	<10	<10									<10	ug/l	TM36/PM69
>EC7-EC8	<10	<10									<10	ug/l	TM36/PM69
>EC8-EC10	<10	<10									<10	ug/l	TM36/PM69
>EC10-EC12	<5	<5									<5	ug/l	TM5/PM16/PM30
>EC12-EC16	<10	<10									<10	ug/l	TM5/PM16/PM30
>EC16-EC21	<10	<10									<10	ug/l	TM5/PM16/PM30
>EC21-EC35	<10	<10									<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35	<10	<10									<10	ug/l	TM5/PM16/PM30/PM30
Total aliphatics and aromatics(C5-35)	<10	<10									<10	ug/l	TM5/PM16/PM30/PM30/PM30
MTBE	<5	<5									<5	ug/l	TM36/PM69
Benzene	<5	<5									<5	ug/l	TM36/PM69
Toluene	<5	<5									<5	ug/l	TM36/PM69
Ethylbenzene	<5	<5									<5	ug/l	TM36/PM69
m/p-Xylene	<5	<5									<5	ug/l	TM36/PM69
o-Xylene	<5	<5									<5	ug/l	TM36/PM69
Total Phenols HPLC	<0.05	<0.05									<0.05	mg/l	TM26/PM0
Sulphate as SO4 #	80.0	41.4									<0.5	mg/l	TM38/PM0
Chloride #	2.7	4.7									<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	<0.2	<0.2									<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	<0.02	<0.02									<0.02	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	0.28	0.12									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4 #	0.30	0.13									<0.03	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01									<0.01	mg/l	TM89/PM0
Dissolved Organic Carbon	5	3									<2	mg/l	TM60/PM0
pH	6.58	7.19									<0.01	pH units	TM73/PM0
Total Alkalinity as CaCO3	14	46									<1	mg/l	TM75/PM0

Client Name: Tetra Tech
Reference: B027006
Location: Cefn Saeson
Contact: Peter Murphy

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/19345	1	TP8	0.00-0.20	6	07/12/2021	General Description (Bulk Analysis)	SOIL/STONE
					07/12/2021	Asbestos Fibres	NAD
					07/12/2021	Asbestos ACM	NAD
					07/12/2021	Asbestos Type	NAD
					07/12/2021	Asbestos Level Screen	NAD
21/19345	1	TP9	0.20-0.60	9	07/12/2021	General Description (Bulk Analysis)	SOIL/STONE
					07/12/2021	Asbestos Fibres	Fibre Bundles
					07/12/2021	Asbestos Fibres (2)	Free Fibres
					07/12/2021	Asbestos ACM	NAD
					07/12/2021	Asbestos ACM (2)	NAD
					07/12/2021	Asbestos Type	Chrysotile
					07/12/2021	Asbestos Type (2)	Amosite
					07/12/2021	Asbestos Level Screen	less than 0.1%
					13/12/2021	Total ACM Gravimetric Quantification (% Asb)	<0.001 (mass %)
					13/12/2021	Total Detailed Gravimetric Quantification (% Asb)	<0.001 (mass %)
					13/12/2021	Total Gravimetric Quantification (ACM + Detailed) (% Asb)	<0.001 (mass %)
21/19345	1	TP7	0.40-0.60	14	07/12/2021	General Description (Bulk Analysis)	Soil/Stones
					07/12/2021	Asbestos Fibres	NAD
					07/12/2021	Asbestos ACM	NAD
					07/12/2021	Asbestos Type	NAD
					07/12/2021	Asbestos Level Screen	NAD
21/19345	1	TP9	0.90-1.10	24	07/12/2021	General Description (Bulk Analysis)	soil/stones
					07/12/2021	Asbestos Fibres	NAD
					07/12/2021	Asbestos ACM	NAD
					07/12/2021	Asbestos Type	NAD
					07/12/2021	Asbestos Level Screen	NAD
21/19345	1	TP10	0.60-0.65	27	07/12/2021	General Description (Bulk Analysis)	Soil/Stones
					07/12/2021	Asbestos Fibres	NAD
					07/12/2021	Asbestos ACM	NAD
					07/12/2021	Asbestos Type	NAD
					07/12/2021	Asbestos Level Screen	NAD

Client Name:	Tetra Tech
Reference:	B027006
Location:	Cefn Saeson
Contact:	Peter Murphy

[illegible]

Client Name: Tetra Tech
Reference: B027006
Location: Cefn Saeson
Contact: Peter Murphy

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/19345

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

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REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/19345

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM16/PM30/PM69	please refer to PM16/PM30 and PM69 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes

EMT Job No: 21/19345

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes		AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM69	One part soil is mixed with 10 parts water in a vial leaving no headspace. The mixture is shaken and then left to leach for 24 hours before VOC analysis.			AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes

EMT Job No: 21/19345

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.			AR	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes		AR	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM131	Quantification of Asbestos Fibres and ACM based on HSG248 First edition:2006, HSG 264 Second edition:2012, HSE Contract Research Report No.83/1996, MDHS 87:1998, WM3 1st Edition v1.1:2018	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes

EMT Job No: 21/19345

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	



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CF24 0AD

Attention: Peter Murphy

CERTIFICATE OF ANALYSIS

Date of report Generation:	17 June 2021
Customer:	Tetra Tech Europe
Sample Delivery Group (SDG):	210614-39
Your Reference:	B027006
Location:	Cefn saeson
Report No:	602427

We received 3 samples on Tuesday June 01, 2021 and 3 of these samples were scheduled for analysis which was completed on Thursday June 17, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG:	210614-39	Client Reference:	B027006	Report Number:	602427
Location:	Cefn saeson	Order Number:	7002131	Superseded Report:	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
24442068	WS101			
24442069	WS203			
24442070	WS204			

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 210614-39 Client Reference: B027006 Report Number: 602427
 Location: Cefn saeson Order Number: 7002131 Superseded Report:

Results Legend	Lab Sample No(s)		24442068		24442069		24442070	
	Customer Sample Reference		WS101		WS203		WS204	
	AGS Reference							
	Depth (m)							
	Container		HNO3 Filtered (ALE204)		H2SO4 (ALE244)		500ml Plastic (ALE208)	
			250ml Amber Gl. PTFE/PE (ALE219)		0.5l glass bottle (ALE227)		ViaI (ALE297)	
	Sample Type		GW		GW		GW	
Alkalinity as CaCO3	All	NDPs: 0 Tests: 3		X		X		X
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 3		X		X		X
Anions by Kone (w)	All	NDPs: 0 Tests: 3		X		X		X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 3			X		X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 3		X		X		X
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 3	X		X		X	
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 3	X		X		X	
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 3	X		X		X	
GRO by GC-FID (W)	All	NDPs: 0 Tests: 3			X		X	
Mercury Dissolved	All	NDPs: 0 Tests: 3		X		X		X
Nitrite by Kone (w)	All	NDPs: 0 Tests: 3		X		X		
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 3	X		X		X	
pH Value	All	NDPs: 0 Tests: 3		X		X		X
Phenols by HPLC (W)	All	NDPs: 0 Tests: 3		X		X		X
TPH CWG (W)	All	NDPs: 0 Tests: 3	X		X		X	



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Validated

SDG: 210614-39
Location: Cefn saesonClient Reference: B027006
Order Number: 7002131Report Number: 602427
Superseded Report:

TPH CWG (W)

Results Legend			Customer Sample Ref.	WS101	WS203	WS204			
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.								
aq	Aqueous / settled sample.								
diss.filt	Dissolved / filtered sample.								
tot.unfilt	Total / unfiltered sample.								
*	Subcontracted - refer to subcontractor report for accreditation status.								
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery								
(F)	Trigger breach confirmed								
1-4*§@	Sample deviation (see appendix)								
Component	LOD/Units	Method		Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
GRO Surrogate % recovery**	%	TM245		103	106	108			
				§	§	§			
GRO >C5-C12	<50 µg/l	TM245		<50	1760	106			
				§ #	§ #	§ #			
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245		<3	<3	<3			
				§ #	§ #	§ #			
Benzene	<7 µg/l	TM245		<7	<7	<7			
				§ #	§ #	§ #			
Toluene	<4 µg/l	TM245		<4	<4	<4			
				§ #	§ #	§ #			
Ethylbenzene	<5 µg/l	TM245		<5	<5	<5			
				§ #	§ #	§ #			
m,p-Xylene	<8 µg/l	TM245		<8	<8	<8			
				§ #	§ #	§ #			
o-Xylene	<3 µg/l	TM245		<3	<3	<3			
				§ #	§ #	§ #			
Sum of detected Xylenes	<11 µg/l	TM245		<11	<11	<11			
				§	§	§			
Sum of detected BTEX	<28 µg/l	TM245		<28	<28	<28			
				§	§	§			
Aliphatics >C5-C6	<10 µg/l	TM245		<10	<10	<10			
				§	§	§			
Aliphatics >C6-C8	<10 µg/l	TM245		<10	10	<10			
				§	§	§			
Aliphatics >C8-C10	<10 µg/l	TM245		<10	178	12			
				§	§	§			
Aliphatics >C10-C12	<10 µg/l	TM245		<10	872	46			
				§	§	§			
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174		32	1770	959			
				§	§	§			
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174		62	2100	1710			
				§	§	§			
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174		62	1020	1640			
				§	§	§			
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174		156	4890	4310			
				§	§	§			
Aromatics >EC5-EC7	<10 µg/l	TM245		<10	<10	<10			
				§	§	§			
Aromatics >EC7-EC8	<10 µg/l	TM245		<10	<10	<10			
				§	§	§			
Aromatics >EC8-EC10	<10 µg/l	TM245		<10	119	<10			
				§	§	§			
Aromatics >EC10-EC12	<10 µg/l	TM245		<10	581	31			
				§	§	§			
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174		<10	183	157			
				§	§	§			
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174		<10	427	336			
				§	§	§			
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174		<10	267	425			
				§	§	§			
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174		<10	877	918			
				§	§	§			
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174		156	7530	5330			
				§	§	§			
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174		124	3120	3350			
				§	§	§			



CERTIFICATE OF ANALYSIS

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SDG:	210614-39	Client Reference:	B027006	Report Number:	602427
Location:	Cefn saeson	Order Number:	7002131	Superseded Report:	

Table of Results - Appendix

Method No	Reference	Description
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



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SDG: 210614-39
Location: Cefn saeson

Client Reference: B027006
Order Number: 7002131

Report Number: 602427
Superseded Report:

Test Completion Dates

Lab Sample No(s)	24442068	24442069	24442070
Customer Sample Ref.	WS101	WS203	WS204
AGS Ref.			
Depth			
Type	Ground Water	Ground Water	Ground Water

Alkalinity as CaCO ₃	16-Jun-2021	16-Jun-2021	16-Jun-2021
Ammoniacal Nitrogen	17-Jun-2021	17-Jun-2021	17-Jun-2021
Anions by Kone (w)	16-Jun-2021	16-Jun-2021	16-Jun-2021
Cyanide Comp/Free/Total/Thiocyanate	16-Jun-2021	16-Jun-2021	16-Jun-2021
Dissolved Metals by ICP-MS	15-Jun-2021	15-Jun-2021	15-Jun-2021
Dissolved Organic/Inorganic Carbon	17-Jun-2021	17-Jun-2021	17-Jun-2021
EPH CWG (Aliphatic) Aqueous GC (W)	17-Jun-2021	17-Jun-2021	17-Jun-2021
EPH CWG (Aromatic) Aqueous GC (W)	17-Jun-2021	17-Jun-2021	17-Jun-2021
GRO by GC-FID (W)	15-Jun-2021	15-Jun-2021	15-Jun-2021
Mercury Dissolved	15-Jun-2021	15-Jun-2021	15-Jun-2021
Nitrite by Kone (w)	16-Jun-2021	16-Jun-2021	16-Jun-2021
PAH Spec MS - Aqueous (W)	17-Jun-2021	17-Jun-2021	17-Jun-2021
pH Value	14-Jun-2021	14-Jun-2021	14-Jun-2021
Phenols by HPLC (W)	16-Jun-2021	16-Jun-2021	16-Jun-2021
TPH CWG (W)	17-Jun-2021	17-Jun-2021	17-Jun-2021



CERTIFICATE OF ANALYSIS

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SDG: 210614-39
Location: Cefn saesonClient Reference: B027006
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Superseded Report:

ASSOCIATED AQC DATA

Alkalinity as CaCO₃

Component	Method Code	QC 2478
Total Alkalinity as CaCO ₃	TM043	100.51 94.47 : 104.41

Ammoniacal Nitrogen

Component	Method Code	QC 2477
Ammoniacal Nitrogen as N	TM099	96.8 88.02 : 104.70

Anions by Kone (w)

Component	Method Code	QC 2450
Chloride	TM184	103.0 92.93 : 115.43
Sulphate (soluble)	TM184	101.2 90.53 : 113.03
TON as NO ₃	TM184	103.5 99.60 : 111.90

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2481
Free Cyanide (W)	TM227	81.25 90.67 : 122.67
Thiocyanate (W)	TM227	106.25 92.25 : 117.75
Total Cyanide (W)	TM227	100.75 88.75 : 111.25

Dissolved Metals by ICP-MS

Component	Method Code	QC 2452	QC 2455
Aluminium	TM152	99.67 94.21 : 111.52	96.0 94.21 : 111.52
Antimony	TM152	114.5 88.37 : 130.57	109.5 88.37 : 130.57
Arsenic	TM152	106.83 92.62 : 113.52	103.5 92.62 : 113.52
Barium	TM152	103.0 88.62 : 113.14	100.17 88.62 : 113.14
Beryllium	TM152	100.67 87.08 : 111.38	96.33 87.08 : 111.38
Bismuth	TM152	103.5 92.62 : 115.02	98.83 92.62 : 115.02
Boron	TM152	104.33 86.31 : 120.88	98.33 86.31 : 120.88



CERTIFICATE OF ANALYSIS

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SDG: 210614-39 **Client Reference:** B027006 **Report Number:** 602427
Location: Cefn saeson **Order Number:** 7002131 **Superseded Report:**

Dissolved Metals by ICP-MS

		QC 2452	QC 2455
Cadmium	TM152	103.83 93.85 : 111.65	101.33 93.85 : 111.65
Calcium	TM152	104.0 89.20 : 126.91	101.33 89.20 : 126.91
Chromium	TM152	102.5 92.50 : 113.03	100.0 92.50 : 113.03
Cobalt	TM152	104.67 85.01 : 114.87	101.17 85.01 : 114.87
Copper	TM152	106.17 89.87 : 119.73	102.33 89.87 : 119.73
Iron	TM152	105.33 93.02 : 113.86	102.0 93.02 : 113.86
Lead	TM152	101.33 91.11 : 116.98	97.5 91.11 : 116.98
Lithium	TM152	100.5 87.70 : 115.90	96.83 87.70 : 115.90
Magnesium	TM152	107.33 89.60 : 116.61	103.33 89.60 : 116.61
Manganese	TM152	106.33 93.97 : 112.46	102.17 93.97 : 112.46
Molybdenum	TM152	108.17 89.07 : 110.96	104.83 89.07 : 110.96
Nickel	TM152	105.17 93.70 : 112.15	101.33 93.70 : 112.15
Phosphorus	TM152	103.0 89.24 : 114.18	99.17 89.24 : 114.18
Potassium	TM152	105.33 93.20 : 115.55	101.33 93.20 : 115.55
Selenium	TM152	107.33 91.69 : 117.12	103.67 91.69 : 117.12
Silver	TM152	110.33 90.93 : 121.73	105.33 90.93 : 121.73
Sodium	TM152	106.0 92.42 : 113.24	102.0 92.42 : 113.24
Strontium	TM152	108.33 92.14 : 116.24	104.0 92.14 : 116.24
Tellurium	TM152	110.0 89.88 : 111.78	106.33 89.88 : 111.78
Thallium	TM152	98.33 82.43 : 113.83	95.0 82.43 : 113.83
Tin	TM152	105.5 94.62 : 107.79	101.0 94.62 : 107.79
Titanium	TM152	100.5 90.29 : 115.23	95.83 90.29 : 115.23
Tungsten	TM152	106.5 77.61 : 132.31	102.67 77.61 : 132.31
Uranium	TM152	104.0 86.97 : 115.76	99.5 86.97 : 115.76
Vanadium	TM152	104.0 89.61 : 115.48	100.83 89.61 : 115.48
Zinc	TM152	105.0 87.51 : 116.26	101.0 87.51 : 116.26

Dissolved Organic/Inorganic Carbon



CERTIFICATE OF ANALYSIS

Validated

SDG: 210614-39
Location: Cefn saesonClient Reference: B027006
Order Number: 7002131Report Number: 602427
Superseded Report:

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 2454
Dissolved Inorganic Carbon	TM090	99.17 93.58 : 112.28
Dissolved Organic Carbon	TM090	101.33 96.13 : 109.53

EPH CWG (Aliphatic) Aqueous GC (W)

Component	Method Code	QC 2488
Total Aliphatics >C10-C40	TM174	104.29 65.58 : 141.57

EPH CWG (Aromatic) Aqueous GC (W)

Component	Method Code	QC 2429
Total Aromatics >EC10-EC40	TM174	90.0 60.75 : 129.09

GRO by GC-FID (W)

Component	Method Code	QC 2425
Benzene by GC	TM245	104.5 79.13 : 118.84
Ethylbenzene by GC	TM245	104.0 79.54 : 115.99
m & p Xylene by GC	TM245	105.25 78.44 : 116.32
MTBE GC-FID	TM245	100.5 81.43 : 120.09
o Xylene by GC	TM245	106.0 76.85 : 120.29
QC	TM245	92.18 71.58 : 131.01
Toluene by GC	TM245	104.5 79.00 : 121.96

Mercury Dissolved

Component	Method Code	QC 2415
Mercury Dissolved (CVAf)	TM183	111.0 69.30 : 128.70

PAH Spec MS - Aqueous (W)



CERTIFICATE OF ANALYSIS

Validated

SDG: 210614-39
Location: Cefn saeson

Client Reference: B027006
Order Number: 7002131

Report Number: 602427
Superseded Report:

PAH Spec MS - Aqueous (W)

Component	Method Code	QC 2445
Acenaphthene by GCMS	TM178	106.4 90.45 : 118.63
Acenaphthylene by GCMS	TM178	112.4 90.13 : 116.27
Anthracene by GCMS	TM178	107.2 92.40 : 114.00
Benz(a)anthracene by GCMS	TM178	107.6 89.51 : 117.69
Benzo(a)pyrene by GCMS	TM178	108.0 89.43 : 118.57
Benzo(b)fluoranthene by GCMS	TM178	106.0 87.80 : 121.80
Benzo(ghi)perylene by GCMS	TM178	103.2 87.10 : 119.30
Benzo(k)fluoranthene by GCMS	TM178	109.2 93.23 : 123.57
Chrysene by GCMS	TM178	108.4 88.68 : 116.92
Dibenzo(ah)anthracene by GCMS	TM178	105.2 86.24 : 118.56
Fluoranthene by GCMS	TM178	106.0 86.04 : 121.96
Fluorene by GCMS	TM178	107.2 90.76 : 121.24
Indeno(123cd)pyrene by GCMS	TM178	105.2 88.39 : 119.61
Naphthalene by GCMS	TM178	111.6 89.40 : 121.80
Phenanthrene by GCMS	TM178	108.8 90.41 : 119.19
Pyrene by GCMS	TM178	106.4 91.00 : 120.20

pH Value

Component	Method Code	QC 2450
pH	TM256	101.07 99.33 : 102.54

Phenols by HPLC (W)

Component	Method Code	QC 2493	QC 2494
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	99.61 77.41 : 127.55	97.66 77.41 : 127.55
2-Isopropyl Phenol by HPLC (W)	TM259	93.69 82.77 : 126.51	91.78 82.77 : 126.51
Cresols by HPLC (W)	TM259	100.66 76.60 : 126.28	99.34 76.60 : 126.28
Napthol by HPLC (W)	TM259	97.66 75.40 : 129.40	95.7 75.40 : 129.40
Phenol by HPLC (W)	TM259	96.41 85.77 : 125.91	94.52 85.77 : 125.91



CERTIFICATE OF ANALYSIS

Validated

SDG: 210614-39 **Client Reference:** B027006 **Report Number:** 602427
Location: Cefn saeson **Order Number:** 7002131 **Superseded Report:**

Phenols by HPLC (W)

		QC 2493	QC 2494
Xylenols by HPLC (W)	TM259	97.47	96.2
		79.09 : 131.82	79.09 : 131.82

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .



CERTIFICATE OF ANALYSIS

SDG:	210614-39	Client Reference:	B027006	Report Number:	602427
Location:	Cefn saeson	Order Number:	7002131	Superseded Report:	

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

General

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung. Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2017).

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

APPENDIX D – GROUNDWATER MONITORING DATA

Tetra Tech

LANDGAS AND GROUNDWATER MONITORING RESULTS

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD



Site Name: Cefn Saeson
Job No.: B027006
Client: Morgan Sindall

Date Monitored:
Monitoring Engineer:
Weather:

02/03/21
GL
Overcast

EQUIPMENT USED

Type	Make	Last Calibrated	
Interface Meter	Solinst	na	
Peristaltic Pump	Geo-Tech	na	
Water Quality Meter	In-situ	Nov-20	

GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS

Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators								Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Dissolved Solids (ppt)	Resistivity (Ω·cm)	Temp (°C)	
WS101	0.65	1.28	nd	nd	nt	nt	nt	nt	nt	nt	nt	nt	
WS103	1.20	1.70	nd	nd	nt	nt	nt	nt	nt	nt	nt	nt	
WS104	0.82	2.60	nd	nd	nt	nt	nt	nt	nt	nt	nt	nt	
			nd	nd	nt	nt	nt	nt	nt	nt	nt	nt	

Notes

nt = not tested
nd = not detected

Data Compiled by: GL
Data Checked by: KW

Tetra Tech

LANDGAS AND GROUNDWATER MONITORING RESULTS

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD



Site Name: Cefn Saeson
Job No.: B027006
Client: Morgan Sindall

Date Monitored:
Monitoring Engineer:
Weather:

28/05/21
PM
Rain

EQUIPMENT USED

Type	Make	Last Calibrated	
Interface Meter	Solinst	na	
Peristaltic Pump	Geo-Tech	na	
Water Quality Meter	In-situ	Nov-20	

GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS

Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators								Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Dissolved Solids (ppt)	Resistivity (Ω·cm)	Temp (°C)	
WS101	0.59	1.28	nd	nd	nt	nt	nt	nt	nt	nt	nt	nt	
WS103	1.14	1.70	nd	nd	nt	nt	nt	nt	nt	nt	nt	nt	
WS104	0.78	2.60	nd	nd	nt	nt	nt	nt	nt	nt	nt	nt	
WS203	0.81	1.92	nd	nd	nt	nt	nt	nt	nt	nt	nt	nt	
WS204	1.6	2.2	nd	nd	nt	nt	nt	nt	nt	nt	nt	nt	

Notes

nt = not tested
nd = not detected

Data Compiled by: PM
Data Checked by: AJ

APPENDIX E – CIRIA C552 RISK METHODOLOGY

The following tables are derived from CIRIA C552 and have been used to define the risk rating presented in the Qualitative Risk Assessment matrix.

Classification of consequence

Classification	Definition
Severe	Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short term risk of pollution (note; Water Resources Act contains no scope for considering significant pollution) of sensitive water resource. Catastrophic damage to building/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem. (Note the definitions of ecological systems within the Draft Circular on Contaminated Land DETR, 2000).
Medium	Chronic damage to human health ('significant harm', as defined In DETR, 2000). Pollution of sensitive water resources (note; Water Resources Act contains no scope for considering significant pollution). A significant change in a particular ecosystem, or an organism forming part of such an ecosystem. (Note the definitions of ecological systems within the Draft Circular on Contaminated Land DETR, 2000).
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm', as defined In DETR, 2000). Damage to sensitive buildings/structures/services or the environment.
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.

Classification of probability

Classification	Definition
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollutant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period that such an event would take place, and is even less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Matrix of consequence against probability to gain a risk classification

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

APPENDIX F – COAL TAR TESTING RESULTS



CEFN SAESON

Reclaimed Asphalt Report

Carried out for:

TETRA TECH 51061274

June 2021

Report No. RS210437

SOCOTEC UK Limited
Unit 16 & 17
Oxford Court,
Cambridge Road,
Granby Industrial Estate,
Weymouth, Dorset, DT4 9GH
Tel: +44 (0) 1929 463091
email: tom.green@socotec.com

CEFN SAESON**June 2021**

Three bulk samples were taken by the client from a various locations at the above site. The samples were homogenised and tested as described in the ADEPT guidance (see references).

The test report referred to is SOCOTEC Environmental Chemistry report number 21060445
The following table summarises the results of test.

SUMMARY OF ENVIRONMENTAL LABORATORY TESTS

Location	Depth of material (mm)	Concentration (mg/kg)			Remarks
		Phenols	Total 16 PAH	Benzo[a]pyrene	
1 ZG Pitch	0.00	<0.5	<128	<8.00	No Significant tar products detected
2 Big Play Area	0.00	<0.5	<128	<8.00	No Significant tar products detected
3 Small Play Area	0.00	<0.5	<128	<8.00	No Significant tar products detected

The hazardous threshold for tar is 0.1%, and as described in the ADEPT guidance note this equates to a threshold for benzo[a]pyrene of 50 mg/kg.

All of the samples are below the detection limit. This indicates that the combined material can be classed as EWC code 17 03 02.

This report should be retained to demonstrate that the material has been tested.

We trust our report meets with your approval but if you have any queries or require additional information, we would be happy to assist.

Yours faithfully
for SOCOTEC UK Limited



Rob Gould
Laboratory Supervisor - South
SOCOTEC UK Infrastructure and Energy

References

Managing Reclaimed Asphalt – Highways And Pavements. ADEPT (formerly County Surveyors Society) Guidance Note Version 2016.1 January 2016
The Quality Protocol For Aggregates From Inert Waste. Environment Agency 2013
Waste Classification – Guidance on the classification and assessment of waste (1st edition 2015). Environment Agency

Appended

SOCOTEC Report RS210437
SOCOTEC Environmental Chemistry Report 21060445

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Whilst every effort has been made to ensure the accuracy of the data supplied and any analysis interpretation derived from it, the possibility exists of variations in the ground and groundwater conditions around and between the exploratory positions. No liability can be accepted for any such variations in these conditions. Furthermore, any recommendations are specific to the development as detailed in this Report and no liability will be accepted should they be used for the design of alternative schemes without prior consultant with SOCOTEC UK Limited.



Environmental Chemistry
SOCOTEC UK
Ashby Rd, Bretby,
Burton-on-Trent, UK
DE15 0YZ

Certificate of Analysis

Project No: 21051330

Client: SOCOTEC Materials Testing

Quote Number: BEC210114632

Project Reference: B027006

Site Name: CEFN Season - Tera Tech

Contact: Tom Green

Address: Unit 16 & 17 Oxford Court
Cambridge Road, Granby Industrial Estate
Weymouth
Dorset

Post Code: DT4 9GH

E-Mail: Tom.Green@socotec.com

Phone No: 07850 601763

Number of Samples Received: 8

Date Received: 19/05/2021

Analysis Date: 28/05/2021

Date Issued: 28/05/2021

Job Status: Complete

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory

Account Manager
Jacqui Hannah

Authorised by the Operations Manager
Becky Batham



Client: SOCOTEC Materials Testing

Project Name: CEFN Season - Tera Tech

Project No: 21051330

Date Issued: 28/05/2021

Samples Analysed

<u>Sample Reference</u>	<u>Text ID</u>	<u>Sample Date</u>	<u>Sample Type</u>
C1 - Core 1	21051330-001	08/05/2021 00:00:00	SOLID
C2 Core 2 Layer 1	21051330-002	08/05/2021 00:00:00	SOLID
C2 Core 2 Layer 2	21051330-003	08/05/2021 00:00:00	SOLID
C2 Core 2 Layer 3	21051330-004	08/05/2021 00:00:00	SOLID
C3 Core 3 Layer 1	21051330-005	08/05/2021 00:00:00	SOLID
C3 Core 3 Layer 2	21051330-006	08/05/2021 00:00:00	SOLID
C4 Core 4 Layer 1	21051330-007	08/05/2021 00:00:00	SOLID
C4 Core 4 Layer 2	21051330-008	08/05/2021 00:00:00	SOLID



Client: SOCOTEC Materials Testing
 Project Name: CEFN Season - Tera Tech
 Project No: 21051330
 Date Issued: 28/05/2021

Analysis Results

					Project ID	21051330				
					Sample ID	001	002	003	004	005
					Customer ID	C1 - Core 1	C2 Core 2 Layer 1	C2 Core 2 Layer 2	C2 Core 2 Layer 3	C3 Core 3 Layer 1
					Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
					Sampling Date	08/05/2021	08/05/2021	08/05/2021	08/05/2021	08/05/2021
Analysis	Method Code	MDL	Units	Accred						
Phenol Index	SFAPI	0.5	mg/kg	N		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Acenaphthylene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Anthracene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Chrysene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Coronene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Fluoranthene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Fluorene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Naphthalene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Phenanthrene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Pyrene	PAHMSUS	0.08	mg/kg	N		<8.00	<8.00	<8.00	<8.00	<8.00
Total PAH 16	PAHMSUS	1.28	mg/kg	N		<128	<128	<128	<128	<128
Total Moisture at 35°C	CLANDPREP	0.1	%	N		<0.1	<0.1	<0.1	<0.1	<0.1
Description of Solid Material	CLANDPREP		-	N		TARMAC	TARMAC	TARMAC	TARMAC	TARMAC



Client: SOCOTEC Materials Testing
 Project Name: CEFN Season - Tera Tech
 Project No: 21051330
 Date Issued: 28/05/2021

Analysis Results

					Project ID 21051330		
					006	007	008
					C3 Core 3 Layer 2	C4 Core 4 Layer 1	C4 Core 4 Layer 2
					SOLID	SOLID	SOLID
					08/05/2021	08/05/2021	08/05/2021
Analysis	Method Code	MDL	Units	Accred			
Phenol Index	SFAPI	0.5	mg/kg	N	<0.5	<0.5	<0.5
Acenaphthene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Acenaphthylene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Anthracene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Chrysene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Coronene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Fluoranthene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Fluorene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Naphthalene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Phenanthrene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Pyrene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Total PAH 16	PAHMSUS	1.28	mg/kg	N	<128	<128	<128
Total Moisture at 35°C	CLANDPREP	0.1	%	N	<0.1	<0.1	<0.1
Description of Solid Material	CLANDPREP		-	N	TARMAC	TARMAC	TARMAC

Additional Report Notes

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
PAHMSUS	001-008	Analysis of samples performed with high level of dilution to prevent failure of associated QC samples. This resulted in raised detection limit for these samples.

LIMS-F002 - Report Notes



Client: SOCOTEC Materials Testing

Project Name: CEFN Season - Tera Tech

Project No: 21051330

Date Issued: 28/05/2021

Deviating Sample Report

			Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
Sample Reference	Text ID	Reported Name						

Analysis Method

Analysis

CLANDPREP
PAHMSUS
SFAPI

Analysis Type

PHYS
ORGANIC
INORGANIC

Analysis Method

As Received
As Received
As Received



Client: SOCOTEC Materials Testing

Project Name: CEFN Season - Tera Tech

Project No: 21051330

Date Issued: 28/05/2021

Additional Information

This report refers to samples as received, and SOCOTEC Uk Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

- U = UKAS accredited analysis
- M = MCERT accredited analysis
- N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 105° c

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° c.

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Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

- IS = Insufficient Sample to complete analysis
- NA = Sample is not amenable for the required analysis
- ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis



Environmental Chemistry
SOCOTEC UK
Ashby Rd, Bretby,
Burton-on-Trent, UK
DE15 0YZ

Certificate of Analysis

Project No: 21060445

Client: SOCOTEC Materials Testing

Quote Number: BEC210114632

Project Reference: Waymouth

Site Name: CEFN Saeson

Contact: Tom Green

Address: Unit 16 & 17 Oxford Court
Cambridge Road, Granby Industrial Estate
Weymouth
Dorset

Post Code: DT4 9GH

E-Mail: Tom.Green@socotec.com

Phone No: 07850 601763

Number of Samples Received: 3

Date Received: 05/06/2021

Analysis Date: 14/06/2021

Date Issued: 14/06/2021

Job Status: Complete

Report Type: Final Version 01

This report supersedes any versions previously issued by the laboratory

Account Manager
Jacqui Hannah

Authorised by the Operations Manager
Becky Batham



Client: SOCOTEC Materials Testing

Project Name: CEFN Saeson

Project No: 21060445

Date Issued: 14/06/2021

Samples Analysed

<u>Sample Reference</u>	<u>Text ID</u>	<u>Sample Date</u>	<u>Sample Type</u>
1 ZG Pitch	21060445-001		SOLID
2 Big Play Area	21060445-002		SOLID
3 Small Play Area	21060445-003		SOLID



Client: SOCOTEC Materials Testing

Project Name: CEFN Saeson

Project No: 21060445

Date Issued: 14/06/2021

Analysis Results

					Project ID 21060445		
					001	002	003
					1 ZG Pitch	2 Big Play Area	3 Small Play Area
					SOLID	SOLID	SOLID
Analysis	Method Code	MDL	Units	Accred			
Phenol Index	SFAPI	0.5	mg/kg	N	<0.5	<0.5	<0.5
Acenaphthene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Acenaphthylene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Anthracene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Chrysene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Coronene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Fluoranthene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Fluorene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Naphthalene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Phenanthrene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Pyrene	PAHMSUS	0.08	mg/kg	N	<8.00	<8.00	<8.00
Total PAH 16	PAHMSUS	1.28	mg/kg	N	<128	<128	<128
Total Moisture at 35°C	CLANDPREP	0.1	%	N	<0.1	<0.1	2.8
Description of Solid Material	CLANDPREP		-	N	GRAVEL	GRAVEL	GRAVEL

Additional Report Notes

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
PAHMSUS	21060445-001 TO 21060445-003	Analysis of samples performed with high level of dilution to prevent failure of associated QC samples. This resulted in raised detection limit for these samples.

LIMS-F002 - Report Notes



Client: SOCOTEC Materials Testing

Project Name: CEFN Saeson

Project No: 21060445

Date Issued: 14/06/2021

Deviating Sample Report

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time
1 ZG Pitch	21060445-001	SFAPI Phenol Index					✓	✓
1 ZG Pitch	21060445-001	CLANDPREP					✓	✓
1 ZG Pitch	21060445-001	PAHMSUS					✓	✓
2 Big Play Area	21060445-002	SFAPI Phenol Index					✓	✓
2 Big Play Area	21060445-002	CLANDPREP					✓	✓
2 Big Play Area	21060445-002	PAHMSUS					✓	✓
3 Small Play Area	21060445-003	SFAPI Phenol Index					✓	✓
3 Small Play Area	21060445-003	CLANDPREP					✓	✓
3 Small Play Area	21060445-003	PAHMSUS					✓	✓

Analysis Method

Analysis

CLANDPREP
PAHMSUS
SFAPI

Analysis Type

PHYS
ORGANIC
INORGANIC

Analysis Method

As Received
As Received
As Received



Client: SOCOTEC Materials Testing

Project Name: CEFN Saeson

Project No: 21060445

Date Issued: 14/06/2021

Additional Information

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ND = Results cannot be determined

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HWOL Acronym Key

<u>Acronym</u>	<u>Description</u>
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e everything extracted by the solvent(s)
CU	Clean up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
+	Operator to indicate cumulative e.g. EH_CU+HS_1D_Total

End of Certificate of Analysis