6 Water

6.1 Introduction

This Chapter of the remedial Environmental Impact Assessment Report (rEIAR) considers and assesses any potential impacts resulting from quarrying related activities that have been carried out at the project site; a disused quarry located in the townland of Coolsickin or Quinsborough, Monasterevin, County (Co.) Kildare (the 'Site'), on the water environment.

It is noted that activity at the Site involved the extraction of sand, gravel and rock through blasting, mechanical excavation and rock breaking along with aggregate processing and stockpiling (the 'Project').

The following assessment was prepared by Kit Pannell (BSc, MSc). Kit is a hydrogeologist with over 11 years' experience, with focus on regulatory reporting within the mining industry.

6.1.1 Technical Scope

The technical scope of this assessment is to consider the potential impacts and effects on the water environment that could have resulted because of the quarrying related activities carried out at the Site. This assessment considers the potential sources of change resulting from Project activities detailed in the project description (Chapter 2 of this rEIAR) on hydrological and hydrogeological receptors. This assessment considers water levels, flow regimes, water resources and uses, water quality, flood risk and water management.

The associated secondary potential impacts from changes in the water environment on human health are also considered in this chapter and in Chapter 3 (Population & Human Health). Potential secondary effects of changes in land quality on water quality is addressed in this chapter and in Chapter 5 (Land, Soils and Geology). Any secondary (i.e. indirect) effects on ecology or biodiversity due to changes in the water environment are considered in Chapter 4 (Ecology and Biodiversity).

6.1.2 Geographical and Temporal Scope

The geographical study area for the assessment covers the EIA boundary (identified on Figure 6-1) and with a study area extending 1 km around the EIA Site boundary. The buffer allows for identification of downstream or downgradient hydraulic connectivity with off-Site water features or users that may have been affected by Site related activities. In the context of this rEIAR, the Substitute Consent Application Boundary is located entirely within the EIA Boundary and contains lands which form the historical extraction area and quarry working areas (i.e. the historical stockpile areas).

Historical aerial mapping and documentation held by Kildare Country Council indicates extraction of aggregates within the Application Site is estimated to have commenced within the year 2000 and the operation had ceased during the year 2006. Accordingly, the baseline for this rEIAR has been set to 01 January 2000, and the rEIAR process has

assessed environmental impacts from that date to 31 December 2006 (see Chapter 2 Project Description for detail).

This assessment establishes what the baseline water environment conditions were for the Site and then assesses what impacts may have occurred due to subsequent activities at the Site during the review period.



Figure 6-1 - Location of the Site (EIA Boundary) and the 1 km Study Area

6.1.3 Project Description Summary

The Project seeking substitute consent consists of extraction of sand, gravel and rock over an area of 7.87 ha through blasting, mechanical excavation and rock breaking along with aggregate processing and stockpiling. The Project was operational between the years 2000-2006.

A full project description is presented in Chapter 2 (Project Description).

6.2 Legislative and Policy Context

This section addresses the legislation and guidance that has been considered when preparing this chapter, and key policy context relevant to the water environment that has guided the focus of the assessment. The overarching EIA legislation under which this

assessment is required is addressed separately in Chapter 1 (Introduction, Scope and Methodology).

6.2.1 Legislation

This assessment has been made with cognisance to relevant legislation, including but not limited to:

- The Local Government (Water Pollution) Act 1977 (as amended) and associated Statutory Instrument Regulations made under that Act outline the general prohibition of entry of polluting matter to water, the requirement to licence both trade and sewage effluent discharges, licencing of water abstractions, controlling discharges to aquifers, and notification of accidental damages.
- The European Union (EU) Water Framework Directive (WFD) (2000/60/EC) is the European legislation that establishes a framework for the protection of groundwater and surface water, including the establishment of river basin districts, the requirement to prevent further deterioration by preventing or limiting inputs of pollutants into groundwater, reducing pollution, and promoting sustainable water use. The Groundwater Daughter Directive (GWDD) (2006/118/EC) sits beneath the WFD and relates to water protection and management. It establishes measures to prevent and control groundwater pollution, including criteria for assessing good chemical status and identifying trends.
- The WFD and GWDD have been transposed into Irish law by means of many Regulations. These Regulations cover governance, the shape of the WFD characterisation, monitoring, and status assessment programmes in terms of assigning responsibilities for the monitoring of different water categories, determining the quality elements and undertaking the characterisation and classification assessments. They include, but are not limited to, the following:
 - o European Communities (Water Policy) Regulations 2003 and its subsequent amendments,
 - European Communities Environmental Objectives (Surface Waters) Regulations, 2009 and its subsequent amendments,
 - European Communities Environmental Objectives (Groundwater) Regulations, 2010 and its subsequent amendments,
 - European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations 2011.

Many of these regulations contain threshold values or environmental quality standards which, when exceeded, can reflect a degradation in water quality. A degradation in water quality can be reflective of negative effects caused by the Project, but it should be noted that a poor water quality can be naturally occurring due to the environmental setting.

The EU Directive on the Assessment and Management of Flood Risks (2007/60/EC) is transposed into Irish law by the European Communities (Assessment and Management of Flood Risks) Regulations 2010 and its subsequent amendment. The aim of the legislation is to reduce the adverse consequences of flooding on human health and the environment, and it outlines the requirements for flood risk assessments to be completed as part of the planning process.

6.2.2 Relevant Policies and Plans

The Kildare County Development Plan (CDP) 1999 is the strategy document for County Kildare which covers most of the temporal scope of this assessment period. The key policies and objectives of this plan are listed in Section 2.5.1 of the Project Description (Chapter 2).

The Kildare CDP 2005-2011 was adopted on 18 May 2005 and covers the temporal scope from this date to 31 December 2006. The key policies and objectives of this current plan are listed in Section 2.5.2 of the Project Description (Chapter 2).

6.2.3 Relevant Guidance

Guidance relating to the EIA process that has been used to guide the assessment of potential impacts to the water environment and the identification of relevant mitigation includes:

- AA-EQS European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019) - European Communities Environmental Objectives (Surface Waters) Regulations is the 2022 amendment (S.I. No. 288/2022).
- GTV Groundwater Regulations (SI No. 9 of 2010 as updated by SI No. 366 of 2016)
- Relevant European Commission guidance Guidance on the Preparation of the Environmental Impact Assessment Report (2017).
- EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Environmental Protection Agency (May 2022).
- Institute of Geologists of Ireland (IGI) Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (April 2013).
- CIRIA C532: Control of water pollution from construction sites. Guidance for consultants and contractors (2001).
- CIRIA Environmental good practice on site guide (First Edition 1999).
- The EPA guidelines on Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (2006), for a more environmentally sustainable quarry & pit industrial sector, greater protection for the environment and human health.
- The CIRIA guidance Publication C532 Control of water pollution from construction sites: guidance for consultants and contractors (2001), which provides advice on environmental good practice for the control of water pollution arising from construction activities.

6.3 Assessment Methodology and Significance Criteria

This section presents the method used to assess the impacts and effects of the Development on the water environment and to secondary associated soils, land and geology and human health receptors. It establishes the stages of the assessment, and the

qualitative criteria used to assess impact magnitude and determine the level of effect significance.

6.3.1 Qualitative Assessment Method

The assessment of potential effects has been undertaken using the qualitative assessment method outlined below. The assessment is supported by the available baseline condition information, historical records of Site activities, previous hydrological and hydrogeological studies, historical monitoring data and recent monitoring and survey data collected to supplement the historical dataset. The assessment follows a staged approach with a summary of the stages involved below:

- Confirm baseline conditions determine baseline and develop conceptual site model by consideration of available records and data sets, site reports and published information;
- 2) Confirm the key receptors and their value/importance;
- 3) Qualitatively characterise the magnitude of impacts on the receptors describe what potential changes could have occurred to each receptor due to Site activities, identify source-pathway receptor linkages, and assign the magnitudes of impact. This stage considers embedded design mitigation, historical and existing site practices including good practice in construction environment management and pollution prevention;
- 4) Determine the effect significance of each potential impact on each sensitive receptor;
- 5) Consider the need for remedial measures if it is considered necessary to reduce the magnitude of any impact and associated effect. If remedial measures are considered necessary, a timeline will be presented in which the measures would be implemented;
- 6) Assess the residual impact magnitude and residual effect significance after all mitigation is carried out; and
- 7) Identify any monitoring that may be required to measure the success of the remedial measures.

Stages 1 and 2 have been completed using published literature, guidance, and available information specific to the Development, which is presented in Chapter 2 of this rEIAR. For the identification of receptor value/importance that completes Stage 2, and for the description of impact magnitude (Stage 3), a common framework of assessment criteria and terminology has been used based on the EPA's draft Guidelines on the Information to be Contained in EIARs (EPA, 2022), with some modifications based on the additional guidance outlined in Section 6.2.3, such as those by the NRA and IGI. The descriptions for sensitivity of receptors are provided in Table 6-1 and the descriptions for magnitude of impact are provided in Table 6-2.

The potential for an impact to have occurred at a receptor has been determined using the understanding of the baseline environment and its properties and consideration of whether

there is a feasible linkage between a source of impact and each receptor (i.e. a conceptual site model).

Value (sensitivity) of Receptor / Resource	Typical Description		
High	High importance and rarity, national scale, and limited potential for substitution. For example: Global/European/National designation. Human health. WFD river designation of 'High' and in hydraulic connectivity with the Site. Regionally important aquifer with multiple wellfields. Inner source protection area for a regional resource. Regionally important potable water source supplying >2500 homes (surface water or aquifer). Floodplain protecting more than 50 residential or commercial properties or nationally important infrastructure (e.g. motorways/national roads) from flooding.		
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution. For example: Regionally important sites. Regionally important aquifer. WFD river designation of 'Good' or 'Moderate'" and in hydraulic connectivity with the Site. Outer source protection area for a regional resource. Locally important potable water source supplying >1000 homes (surface water or aquifer). Floodplain protecting between 6 and 50 residential or commercial properties or regionally important infrastructure (e.g. regional roads) from flooding.		
Low	Low or medium importance and rarity, local scale. For example: Locally important aquifer. WFD river designation of 'Poor' or 'Bad' and in hydraulic connectivity with the Site. Outer source protection area for a local resource. Local potable water source supplying >50 homes (surface water or aquifer). Floodplain protecting between 2 and 5 residential or commercial properties or locally important infrastructure (e.g. local roads) from flooding.		
Negligible	Very low importance and rarity, local scale. For example: Environmental equilibrium is stable and is resilient to impacts that are greater than natural fluctuations, without detriment to its present character. Poorly productive aquifer. Any WFD river quality designation not in hydraulic connectivity with the Site. Local potable water source supplying <50 homes (surface water or aquifer). Floodplain protecting up to 1 residential or commercial properties from flooding.		

Table 6-1 – Environmental value	(sensitivity)	and descriptions
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Table 6-2 – Magnitude of impact and descriptions

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Magnitude of impact (change)		Typical description		
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements. Significant harm to human health - death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Significant harm to buildings/infrastructure/plant - Structural failure, substantial damage or substantial interference with any right of occupation. Significant pollution of the water environment, as defined by:		
		A breach of, or failure to meet any statutory quality standard for the water environment at an appropriate pollution assessment point. A breach of, or a failure to meet, any operational standard adopted by EPA for the protection of the water environment. Pollution results in an increase in treatment required for an existing drinking		
		 Water supply. Pollution results in an increased level of treatment required of water abstracted for industrial purposes. Pollution results in deterioration in the status of a water body, failure to meet good status objectives defined by the Water Framework Directive, or failure of a protected drinking water area to meet its objectives as defined by the Water Framework Directive. There is a significant and sustained upwards trend in concentration of pollutants in groundwater being affected by the land in question. 		
		There is a material and adverse impact on the economic, social and/or amening use associated with a particular water environment.		
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.		
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.		
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.		
Low	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.		
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.		
Negligible	Adverse	Very minor loss or alteration to one or more characteristics, features or elements.		
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.		

The assessment of magnitude of impact considers whether the change that causes the impact is positive or negative, and whether the impact is direct or indirect, short, medium or long-term, temporary or permanent, and if it is reversible.

For the purposes of this assessment, a direct impact is one that occurred as a direct result of the activities on Site and was likely to have occurred at or near the Site itself. Indirect impacts (or secondary/tertiary impacts) are those where a direct impact on one receptor has another knock-on impact on one or more other related receptor(s) (e.g. the Site activities result in a change in groundwater quality, which then has an indirect impact on surface water quality and/or users of the water, such as human health or ecology). Indirect impacts can occur within the study area or away from the Site.

For the purposes of this assessment, the following definitions of duration have been used:

- Temporary effect likely to last less than 1 year without intervention (i.e. less than the construction phase);
- Short term effect likely to last 1 to 7 years without intervention;
- Medium term effect likely to last 7 to 15 years without intervention;
- Long term effect likely to last 15 to 60 years without intervention; and,
- Permanent effect likely to last over 60 years without intervention.

An irreversible impact is defined as a change to the baseline that would not reverse itself naturally. Such impacts will usually be long-term and irreversible, such as the removal of best and most versatile agricultural soils. A reversible impact is defined as a change to the baseline conditions that would reverse naturally once the source of the impact is exhausted or has stopped. For example, impacts to groundwater quality from contamination may only last as long as the source of the impacts is present. If it is removed, groundwater quality may naturally improve or could be remediated.

6.3.2 Significance Criteria

The approach followed to derive effects significance from receptor value and magnitude of impacts (Stage 4) is shown in

Table 6-3. Where it includes two significance categories, reasoning is provided in the topic chapter if a single significance category is reported. A description of the significance categories used is provided in Table 6-4.

	Magnitude of Impact (Degree of Change)					
Environmental		Negligible	Low	Medium	High	
Value (Sensitivity)	High	Slight	Slight or moderate	Moderate or large	Profound	

Table 6-3 – Significance Matrix

Medium	Imperceptible or slight	Slight or moderate	Moderate	Large or profound
Low	Imperceptible	Slight	Slight	Slight or moderate
Negligible	Imperceptible	Imperceptible or slight	Imperceptible or slight	Slight

Table	6-4 –	Significance	categories	and typica	descriptions
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Significance Category	Typical Description
Profound	An effect which obliterates sensitive characteristics.
Large	An effect which, by its character, magnitude, duration or intensity alters a significant proportion of a sensitive aspect of the environment.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Imperceptible	An effect capable of measurement but without significant consequences.

Residual adverse effects of 'large' or 'profound' significance are considered to be 'significant' for the purposes of this assessment.

If required following the assessment of the current level of effect significance, additional mitigation measures (remedial measures) may be presented that will be used to avoid, prevent, or reduce the magnitude of the impact (Stage 5). The significance of the effect considering the additional mitigation is then assessed (Stage 6) to give the residual effect significance. Any monitoring that will be required to measure the success of the mitigation is included (Stage 7) (see Section 6.9).

The effects of the activities at the Site are also considered cumulatively, with those that could foreseeably have resulted from other known developments that have occurred in the assessment study area (see Chapter 15 Interactions).

6.4 Baseline Conditions and Subsequent Conditions

This Section presents a summary of the baseline (01 January 2000) and subsequent conditions to 31 December 2006 for the water environment (hydrology, hydrogeology, and flooding).

6.4.1 Site Topography

The Site is located approximately 6.6 km west of Red Hill, which reaches 194 m elevation. The land therefore rises to the east and drops to the northwest, towards the Figile River and its tributary. The regional shaded topography is shown in Figure 6-2 with respect to the rivers.

The topography within the vicinity of the Site (excluding the quarried areas) drops from ca. 80 m AOD in the east (vicinity of the Site access) to ca. 69 m AOD in the west (vicinity of the Grand Canal – Barrow Line).

Prior to the review period, the elevation of the ground in the vicinity of the present-day quarry void (and lake) was between 70 and 79 mAOD, with a gentle slope to the northwest. The present-day topography includes the quarry void, which has been allowed to fill with water post-cessation of mining at the end of the review period. The quarry void is understood to be ca. 15 m deep (below natural ground surface). The conceptual cross-sections presented in Section 6.5 help to present the changes in topography with baseline and subsequent conditions. The base of the quarry void in Figure 6-21 is ca. 55 mAOD.



Figure 6-2 - Regional Topography and River Network

6.4.2 Land Use

A full description of land use change arising from the Project over the temporal assessment period, and to the present is provided in Chapter 2 (Project Description).

6.4.2.1 Baseline Conditions (1 January 2000) Land Use

Aerial imagery indicates that prior to the Project, the Application Site comprised agricultural lands consisting of fields bordered primarily by hedgerows. The private entrance located on

the local road (L7049) on the south of the EIA boundary is depicted as present (see Figure 6-3). The Grand Canal – Barrow Line, forms the northwestern boundary to the Site.



Figure 6-3 - Land use prior to the Project (Map Genie Imagery 1996-2000)

Historical mapping indicates that the Application Site was likely in agricultural use since at least 1834. Fields and field boundaries over the Application Site are shown in the 1829-1834 Cassini 6" mapping records and the 25" mapping series from 1897-1913 (Heritage Council Online heritage maps viewer, 2025). Historical mapping indicates changes to field boundary configurations have taken place on the Application Site since 1834.

6.4.2.2 Existing conditions (31 December 2006) Land Use

The earliest publicly available aerial imagery following the cessation of extraction activities on the application Site is from 2009 (Google Earth Satellite). The 2009 aerial imagery (see Figure 6-4), shows collected groundwater present in the quarry void. The image also shows the extent of the historic stockpiling areas on the Application Site. The Site continues to be bound by the Grand Canal to the northwest and agricultural fields to the south. There is an adjacent quarry along the eastern boundary, which has also been allowed to be filled with groundwater. It is understood, however, that works continued at this quarry beyond the end of the review period.



Figure 6-4 - EIA Boundary overlain on October 2009 (Google Earth)

6.4.3 Site Water Management

The earliest publicly available aerial imagery following the cessation of extraction activities (Figure 6-4), shows that the quarry void had filled with water. It is most likely that this is groundwater from the bedrock limestone aquifer beneath the Site (see Section 6.4.7).

This groundwater is likely to have been encountered over the review period during the extraction of limestone rock and would have required to be dewatered to some degree. However, there is no information on the rate of dewatering, the pump specification or the location of discharge at the Site. Making assumptions as to dewatering rates/volumes and potential locations of discharge have not been made in this report due to too many unknown variables.

However, information is available from the third-party quarry operation to the east of the Site. As part of their 2006 planning submission (planning ref 062729) report, they stated that surface water is pumped to onsite settlement lagoons (3 no. on site) and reused when required for dampening internal roads and stockpiles. Evidence of these lagoons can be seen in Figure 6-4. It is therefore likely that water pumped from the base of the quarry at the Site over the review period was discharged to a similar settlement/soakaway pond, although this cannot be confirmed.

6.4.4 Geology

The underlying geology of the Site is presented in Chapter 5 of this rEIAR. A brief summary of the geology is provided below.

6.4.4.1 Soils

Teagasc's Irish Soil Information System (SIS) shows alluvial lake soil cover over the entire Site area. This is representative of the baseline soils at the Site prior to activities within the extraction area.

6.4.4.2 Superficial Deposits

GSI (2025) data indicates that the subsoils underlying the Site are composed of gravels derived from Limestones and till derived from Limestones. In the northern section of the study area GSI mapping indicates there is cut over raised peat. To the west of the study area there are areas of alluvium and lacustrine sediments.

6.4.4.3 Bedrock

The GSI Bedrock Geology 1:100,000 map (Figure 6-5) indicates that the Site is underlain by the Carboniferous Allenwood Formation, which is described as consisting of pale-grey, generally massive shelf limestones and their dolomitised equivalents.

The area to the west of the study area is underlain by the Carboniferous Lucan Formation, which consists of dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey.



Figure 6-5 - Underlying Bedrock Geology (GSI, 2024) overlain on ESRI Satellite aerial.

6.4.5 Rainfall and Climate Data

Table 6-5 below presents rainfall data recorded at the NAAS (Osberstown) meteorological station (number 8423), which is located ca. 25 km east of the Site, for the period January 2000 to December 2006 (Met Eireann, 2025). The monthly rainfall totals over the review period are presented in Figure 6-6, alongside the long-term average from 1985 to 2006.

The yearly totals indicate that the 2000 rainfall total of 942 mm was significantly higher than totals over 2001 to 2006 and long-term historical average (1985 to 2006) of 824 mm per annum (mm/a). The monthly rainfall totals over the review period are reduced in comparison to the long-term average, apart from the average for May, July and October.

GSI mapping (2024) indicates an effective rainfall (rainfall minus actual evapotranspiration) value of 395 mm/a for the area of the Site, which is approximately half of the long-term average rainfall.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Totals
2000	54	75	26	65	94	50	58	89	72	119	130	112	942
2001	41	47	37	66	38	49	58	67	23	72	21	24	542
2002	-	-	-	-	-	-	61	56	15	164	154	84	534*
2003	54	39	45	38	107	85	118	9	44	119	53	77	788
2004	104	27	49	50	35	49	30	113	60	119	48	55	739
2005	82	47	42	65	112	21	64	46	68	135	62	54	797
2006	29	46	74	-	95	23	20	84	111	104	110	122	820*
Avg.	61	47	46	57	80	46	58	66	56	119	83	75	737
Long- Term Avg.	76	57	60	65	60	64	54	75	63	94	76	79	824

Table 6-5 - Monthly Rainfall Totals and Long-Term Averages

Long-term average is taken from 1985 to 2006

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Figure 6-6 - Monthly Rainfall Graph for Review Period

6.4.6 Surface Water – Hydrology

6.4.6.1 Baseline Conditions (1 January 2000) Surface Water Features and Quality

The Site is located in the WFD (Water Framework Directive) Bagenalstown Upper Groundwater body (which is generally described as regionally important). The WFD (Water Framework Directive) designations has the Site situated within the River Sub-Basin Figile_080. There is a catchment divide to the southeast of the Site as depicted in Figure 6-7, with the River Sub-Basin Barrow_090 to the southeast of this divide.

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The surface river network and Special Area of Conservation (SAC) in the area surrounding the Site is shown in Figure 6-8. There are no surface water bodies as designated by the EPA in the area shown. The closest surface water feature to the Site under baseline conditions was the Grand Canal, which runs adjacent to the northwest boundary and is designated as a pNHA (see Chapter 4 Ecology and Biodiversity). Any run-off event from the Site would likely be absorbed by a dense hedgerow / treeline and a strip of grassland which separates the Site from the Grand Canal, or infiltrate to ground through the superficial sands and gravels, prior to reaching the Canal in any significant quantity. The Grand Canal was constructed above ground level, with the top of the embankment at approximately 5 m above original ground level. In light of this, there is no means by which surface water run-off can enter the Grand Canal from the Site.

Further west of the Site (ca. 0.5 km) is the River Figile, which flows from north to south. Directly north of the Site (ca. 0.8 km) is a tributary (Ummeras Beg) of the River Figile. Although not displayed by the WFD, there is also a small stream (Old Grange) ca. 0.6 km to the south of the Site which is culverted beneath the Grand Canal, which is labelled in Figure 6-8.

Further southwest of the Site (ca. 1.6 km) is the River Barrow and River Nore SAC (site code: 2162), which starts at the confluence of the River Figile and River Barrow.

It is likely that any surface water flows within the vicinity of the Site will have flowed towards the northwest, towards the Grand Canal, under baseline conditions, based on the catchment divide in Figure 6-7 and the topography shown in Figure 6-2.





Local Surface Water Quality

The surface water quality at the start of the review period (in 2000) has been derived using publicly available data from the EPA Geo Portal website.

The WFD Status is unavailable for baseline conditions. The baseline (2000) River Quality (Q) Values of surface water features in the vicinity of the Site, as assigned by the EPA, are shown in Figure 6-9 and summarised in Table 6-6.



Figure 6-9 – Baseline EPA River Quality Values and EPA Monitoring Stations (EPA, 2000)

To the southwest of the Site, the River Quality (Q) status of the River Figile was Q4 'good' in 1993 and the downstream section of the River Barrow had a River Quality (Q) status of Q3-4 'moderate' in 2000.

Table 6-6 - Summary of WFD Status and Baseline River Q Value in Surface Water Features Close to Site (EPA, 2000)

River Name	WFD Status (N/A)	Station Name	River Q Value (2000)
Barrow	(N/A)	BARROW - Baylough Br	No Q-Value (N/A)
Barrow	(N/A)	Pass Br	3-4 - Moderate (2000)
Figile	(N/A)	FIGILE - 1 km u/s Barrow R confl	4 - Good (1993)

Grand Canal – Barrow Line	(N/A)	BL6-1km South of Umeras Br.	No Q-Value (N/A)
Darrow Line		DI.	

6.4.6.2 Existing conditions (31 December 2006) Surface Water Features and Quality

As discussed in Section 6.4.3, by the end of the review period the quarry void had reached its maximum extent, which subsequently infilled with groundwater following the cessation of dewatering. The quarry void lake is labelled in Figure 6-4 and was ca. 22,000 m² at the end of the review period. There is very little variation in the area of the lake following this (based on aerial imagery), which suggests that the lake level had already equilibrated with the groundwater table.

The lagoon in the neighbouring quarry will have also filled with groundwater over a similar period. Although these surface water features are not directly connected, it is likely both are connected through the permeable bedrock limestone separating the voids.

Local Surface Water Quality

The surface water quality at the end of the review period (in 2006) has been derived using publicly available data from the EPA Geo Portal website.

The WFD Status is available for the date range of 2007 to 2009. The 2006 River Quality (Q) Values of surface water features in the vicinity of the Site, as assigned by the EPA, are shown in Figure 6-10 and summarised in Table 6-7.



Figure 6-10 – Local River WFD Status (2007-2009), EPA River Quality Values and EPA Monitoring Stations (EPA, 2006)

To the southwest of the Site, the River Barrow is classified as 'good' under the WFD (2007-2009) Status. There is not, however, a WFD Status available for the River Figile.

To the southwest of the Site, the River Quality (Q) status of the River Figile was Q3-4 'moderate' in 2006 and the downstream section of the River Barrow also had a River Quality (Q) status of Q3-4 'moderate' in 2006.

Although these Q values indicate a slight drop in quality in the River Figile over the review period, it should be noted that there were similar variations in quality prior to the baseline result.

Table 6-7 - Summary of WFD Status (2007-2009) and River Q Value in Surface Water	
Features Close to Site (EPA, 2006)	

River Name	WFD Status (2007-2009)	Station Name	River Q Value (2006)	
Barrow	Good	BARROW - Baylough Br	No Q-Value (N/A)	

Barrow	Good	Pass Br	3-4 - Moderate (2006)
Figile	(N/A)	FIGILE - 1 km u/s Barrow R confl	3-4 - Moderate (2006)
Grand Canal – Barrow Line	(N/A)	BL6-1km South of Umeras Br.	No Q-Value (N/A)

Site Surface Water Quality

The water quality in the quarry void lake has not been monitored historically, over the review period. Samples were therefore collected and analysed from the monitoring point labelled SW01 in Figure 6-11, from March to August 2024 as an indication of water quality in 2006, at the end of the review period.



Figure 6-11 - Surface Water Quality Monitoring

Full laboratory results are presented in Appendix 6B (Table 6B-1 to Table 6B-6) and graphed for some key analytes in Appendix 6C. The laboratory certificates for the results are included in Appendix 6D.

The laboratory results for the lake (SW01) were screened against GTV (2016) and AA-EQS (2019) thresholds. There are no recent exceedances in the guideline thresholds for SW01, indicating that the surface water is of good quality and is not connected to any ongoing source of pollution. There are some fluctuations in Nitrate concentrations over 2024, rising to 22.8 mg/L in April 2024. These fluctuations are no larger than those seen in groundwater concentrations as presented in the tables in Appendix 6B and discussed in Section 6.4.7.5.

6.4.7 Groundwater – Hydrogeology

Based on a review of borehole logs (Appendix 6A) and published information, it is understood that one main hydrogeological unit underlies the Site; permeable limestone of the Allenwood Formation – Regionally important Aquifer – Karstified (diffuse) - RKd. The GSI aquifer designation (GSI, 2023) for bedrock aquifers underlying the Site and the sand and gravel to the southwest of the Site, is shown in Figure 6-12 below.



Figure 6-12 - Aquifer Designation Map (GSI, 2023)

6.4.7.1 Sand and Gravel Aquifer

Sand and gravel are reported in the borehole logs across the site. However, this is not mapped as part of the locally important gravel aquifer shown below. It is likely that a higher fines/clay content in the sand and gravel beneath the Site result in lower permeabilities of the unit.

6.4.7.2 Bedrock Aquifer

Bedrock underlying the Site (the Allenwood Formation) is classified as a 'Rkd' regionally important aquifer – karstified (diffuse), which is described as "significant source of groundwater" where flow is more diffuse, storage is higher and there are many high yielding wells.

6.4.7.3 Groundwater Vulnerability

Groundwater Vulnerability (DELG/EPA/GSI, 1999) defines how easily groundwater may be contaminated by human activities. According to the GSI online mapping tool (GSI, 2023) the footprint of the Site is classified as 'High' to 'Extreme' (Figure 6-13). This 'Extreme' classification is appropriate given the 'regionally important aquifer' classification and the elevated ground to the southeast of the Site, where bedrock is closer to the surface.

The lower topographies to the northwest of the Site are characterised as having 'Moderate' to 'High' vulnerability, associated with a thickening sequence of superficial deposits, which offer increased protection, towards the River Figile.

The groundwater vulnerability classification is based on baseline conditions and has not taken into account the current presence of bedrock at the surface within the quarry void, with extraction activities.



Figure 6-13 - Groundwater Vulnerability Map (GSI, 2023)

6.4.7.4 Groundwater Recharge

The groundwater recharge map for the Site is presented in Figure 6-14. The high GSI recharge range of 351-400 mm/a applies to the area of mapped gravels derived from limestones (see Chapter 5) beneath the Site. GSI mapping (2023) indicates an effective rainfall of approximately 395 mm/a across the Site. There is, therefore, the potential that the superficial deposits of sands and gravels can accept all the effective rainfall, with there being very little rainfall run-off. The ability for the bedrock limestone to accept the local rainfall may be lower due to it consisting of an interconnected network of fractures, which may not always persist to the top of the unit.

The groundwater recharge classification is based on baseline conditions and has not taken into account the presence of bedrock now at the surface within the quarry void, with extraction.



Figure 6-14 - Groundwater Recharge Map (GSI, 2023)

6.4.7.5 Groundwater Level and Quality Investigations

There is no groundwater level or quality data available from the Site over the review period. The following data presented is taken from 2023 and 2024, with the assumption that the present is reflective of the groundwater conditions at the end of the review period.

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There are four monitoring wells available for water level and quality measurements. These monitoring wells were installed between February and March 2023. The locations of the existing monitoring wells are presented in Figure 6-15, with details on construction and lithology are provided in Table 6-8, where available. The borehole logs are provided in Appendix 6A.

The depth of the water strikes for available monitoring wells (BH2 and BH4) show that the main aquifer beneath the Site is within the limestone bedrock, rather than the superficial sand and gravels. This supports the aquifer designation in Figure 6-12, where the main sand and gravels aquifer is absent beneath the Site footprint.



Figure 6-15 - Monitoring Well Locations (including Surface Water Monitoring)

Monitoring Well ID	Installed Depth (m)	Measured Well Depth Range (m)	Ground Level (mAOD)	First Water Strike Depth (m)	Screened Interval (m) and screened lithology
BH1	19.5	18.21 to 18.31	68.75	Not recorded	16.5 to 19.5 (Dark Grey Limestone)
BH2	15.4	15.47 to 15.49	68.68	13 (55.68 mAOD) (in Dark Grey Limestone)	12.4 to 15.4 (Dark Grey Limestone)

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BH3	12	11.62 to 11.96	72.08	Not recorded	11.5 to 12 (Light Grey Limestone)
BH4	17	16.8 to 17.05	70.24	11.4 (58.84 mAOD) (in Light Grey Limestone)	14 to 17 (Light Grey Limestone)

Current Groundwater Elevations (2023 to 2024)

Recent manual groundwater elevations in Metres Above Ordnance Datum (m AOD) following the review period are displayed in Figure 6-16 alongside monthly rainfall totals, for the monitoring wells shown in Figure 6-15.

The present-day water levels appear to be seasonal, with groundwater highs in March and April 2024 and a decline in water levels during drier months of May and June 2024. The greatest water level fluctuations (1.12 m) are seen in BH3 and BH4 and both show a similar trend. The smallest fluctuations are seen in BH2 of 0.57 m. Although the fluctuations differ, the monitoring wells all show a similar trend, indicating that they are installed into the same aquifer. The highest groundwater elevation of 64.35 mAOD (4.57 mbgl) was recorded in BH2 in March 2023, following install of the monitoring well. BH2 is 22 m south of the Grand Canal. The Grand Canal is at approximately 69 mAOD and likely to be ca. 1-2 m depth. The groundwater table is therefore ca. 3.65 m below the base of the Grand Canal, indicating that there is no hydraulic connectivity.

It is possible that abstractions in the region are currently influencing the water levels in the monitoring bores. BH4 is the closest monitoring well to an inner Source Protection Area (SPA), located ca. 890 m to the southeast. It is, therefore, possible that the larger fluctuations in BH3 and BH4 are due to them being closer to the abstractions. More on this is discussed in Section 6.4.8.

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Figure 6-16 - Recent Groundwater Level and Monthly Rainfall

Groundwater Contours (2023 to 2024)

The recent groundwater contours are presented in Figure 6-17. These are taken during the summer low in July 2024, which could be representative of a period of lower rainfall. The groundwater contours show that there is a flow to the southeast of the Site, which supports the impact of the abstractions on the groundwater levels beneath the Site. The groundwater elevation falls from 63.8 mAOD to the northwest, between BH2 and the Grand Canal, to 63 mAOD, to the southeast of the Site, just beyond BH3 and BH4. This change of 0.8 m, suggests a slight gradient across the Site.

The groundwater contours indicate a flow direction (to the southeast), that is at odds to the topography (to the northwest) and location of the River Figile (to the west). As discussed previously, it is likely that the water levels beneath the Site are responding to the SPA abstractions shown in Figure 6-18, which are ca. 890 m to the southeast.



Figure 6-17 - Groundwater Contours July 2024 (Low) with aerial

Groundwater Quality (2024)

The four groundwater monitoring wells (Figure 6-15) have been used to monitor groundwater quality across the Site over a period of six months, from March to August 2024. Note that there is no groundwater quality results available over the review period (2000 to 2006). The recent results are therefore used as a guide to what the baseline and subsequent groundwater quality conditions may have been.

A summary of laboratory results with reference to GTV and AA-EQS threshold values is presented in Table 6-9. Full laboratory results are presented in Appendix 6B from Table 6B-1 to Table 6B-6, with comparison to relevant threshold values. A number of key analytes are shown graphically in Appendix 6C to represent any trends over the six months of monitoring. The laboratory certificates for the results are included in Appendix 6D.

The AA-EQS threshold for Total Dissolved Chromium III (4.7 μ g/l) was exceeded on one occasion in BH1 and BH2 and on three occasions in BH3. Note that the limit of detection (LOD) for Total Dissolved Chromium III is 6 μ g/l, therefore, the values of 7 μ g/l are marginally above the LOD. The value of 7 μ g/l for BH1 in May 2024 is a duplicate an initial measurement of <6 μ g/l (Appendix 6B – Table 6B-3). Similarly, the value of 41 μ g/l for BH3 in July 2024 had a subsequent duplicate reading measurement of <6 μ g/l (Appendix 6B –

Table 6B-5). Total Dissolved Chromium III is a less toxic form of Chromium than Total Dissolved Chromium VI and naturally occurs in rocks and soil and can leach into groundwater.

Both the GTV and AA-EQS thresholds for Nitrate as NO₃ (37.5 mg/l and 50 mg/l, respectively) were exceeded in BH1 in May 2024 (79.6 mg/l) and June 2024 (58.2 mg/l). The GTV threshold was then also exceeded in BH1 in April 2024 (44.7 mg/l). BH1 is the only monitoring well to have Nitrate exceed the thresholds. BH1 is located close to the agricultural farmland to the south of the Site (see Section 6.4.2 and Figure 6-15). This indicates that the elevated nitrate in the groundwater may be caused by off-Site activities, such as effluent and fertiliser application to agricultural land.

Analyte	Units	GTV	AA- EQS	BH1		BH2	BH3		
Date				Apr-24	May-24	Jun-24	Aug-24	Jul-24	Aug-24
Total Dissolved Chromium III	µg/l		4.7		7*		7	41*	7
Nitrate as NO ₃	mg/l	37.5	50	44.7	79.6	58.2			

 Table 6-9 – Summary of Recent (2024) Groundwater Screening Exceedances

*Indicates that the value has been measured twice, and the corresponding duplicate is below the AA-EQS

6.4.8 Designated Sites

On a regional scale, GSI mapping (2023) indicates that there are no groundwater source protection areas (SPAs) within the Site boundary. There is, however, an outer (SO) and inner (SI) source protection area within the 1 km study area, as shown in Figure 6-18. This SPA relates to four abstraction points that are part of the Monasterevin public water supply (PWS).

There is information which indicates the Monasterevin PWS initially consisted of at least two abstraction points (Ballykelly Bore and Spring) targeting the Allenwood Formation aquifer, as referenced in a report from 2002 (Kildare County Council, 2002). However, the pumping information, abstraction volumes, groundwater flow direction, zone of influence and locations of the abstractions are unknown.

In 2001, there was a plan to upgrade the water supply with a combined output estimated at 4 MI/day (K. T. Cullen & Co, 2001) from 4 wells. A review of the EPA abstractions database (December 2024) indicate Monasterevin wellfield's abstractions were registered in 2020 and they targeted the Bagenalstown Upper aquifer, rather than the Allenwood Formation aquifer, and has a maximum daily abstraction licence of 3.3 MI/d from 10 wells. The location of these wells and whether they stopped abstracting from the older wells prior to 2020 is unknown. It is unknown which abstractions were active over the review period.

It is likely that groundwater will have initially flowed to the west, following the fall in topography towards the River Figile, then with the onset of significant abstraction(s), the hydraulic gradient has switched towards the PWS (see Figure 6-17). However, due to the lack of baseline water level monitoring, the timing of this switch or the abstraction wells information, this cannot be confirmed.

The River Barrow and River Nore SAC is also represented in Figure 6-18 and is approximately 1.6 km from the Site boundary. Under baseline conditions, it is possible that a hydraulic connection existed between the groundwater beneath the Site (within the bedrock aquifer) and the River Figile within the study area to the west of the Site. This section of the River Figile is, however, within the mapped sand and gravels aquifer (see Figure 6-12). It is therefore, likely that the River Figile receives more groundwater contribution from the sand and gravels aquifer than from the underlying, moderately productive (LI) bedrock aquifer mapped in Figure 6-12.

Any significant connection between the Site groundwater and the SAC downstream of River Figile is, therefore, unlikely under the baseline conditions. With the potential onset of abstraction(s) over the review period, it is further less likely that a significant hydraulic connection existed between the Site and the SAC, as there has been the inferred reversal of the groundwater flow.

The Old Grange is culverted beneath the Grand Canal at N 63088 12311 and therefore, is no potential hydrological connection between the Grand Canal and the River Barrow and River Nore SAC. A wider review of the area found the closest connection between the Grand Canal and this SAC 25 km downstream at SF 65573 55024 in Athy, Co. Kildare.



Figure 6-18 - Source Protection Areas (SPA) near Site and River Barrow and River Nore SAC (GSI, 2023)

6.4.9 Conceptual Cross-sections

Two conceptual cross-sections have been produced for the Site to assist in assessments of hydraulic connectivity and groundwater flow. With relation to local topography and geology. The locations of the two conceptual cross-sections are presented in Figure 6-19.



Figure 6-19 - Conceptual Cross-section Locations

The two cross-sections in Figure 6-20 and Figure 6-21 present the changes in the topography from baseline conditions (labelled original topography) to the present day (taken from topographic survey completed in April 2024), which is considered applicable to the end of the review period. In Figure 6-20, there are two areas where material was removed over the review period. The area around BH4 relates to the quarry void and the area west of BH3 could potentially relate to an area used as a soakaway. With no clear evidence of this and is purely theoretical, however.

Figure 6-20 presents the groundwater table during the summer low and conveys the slight gradient to the east, with the potential response to the PWS abstractions.

Figure 6-21 displays the water level within the quarry void lake taken in the April 2024 survey. The cross-section indicates that the lake surface is slightly depressed in comparison to the measured groundwater table (BH2 and BH4), which is possible given the potential for evaporation from the lake.

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Figure 6-20 – Section A-A' West to East Conceptual Cross-Section

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Figure 6-21 – Section B-B' Northwest to Southeast Conceptual Cross-Section

6.5 Selection of Sensitive Receptors

Taking account of the above and the receptor classification method described in Section 6.3.1, the receptors carried forward in this assessment and their assigned importance are presented in Table 6-10.

Receptor	Importance and Reasoning	Sensitivity
Surface Water – Quality and availability	The River Figile is ca. 0.5 km west of the Site, with tributaries located north and south (Old Grange) of the Site. Under baseline conditions the river and tributaries would have been hydraulicly down gradient and are potential sensitive receptors to impacts on the water environment at the Site. It is unlikely, however, that there is a connection between the Site rainfall run-off and there is also limited connectivity with the groundwater beneath the Site.	Low
Groundwater - Quality and availability	Bedrock under the Site is classified as a regionally important aquifer (Rkd) with karstification (diffuse), which is described as "significant source of groundwater" with high yielding wells. Recent water quality analysis does not indicate any residual groundwater pollution. The bedrock aquifer is highly productive, so any dewatering over the review period is unlikely to have negatively impacted the availability.	Low
Grand Canal - pNHA	Proposed National Heritage Area. Adjacent to the northwest Site boundary	Negligible
River Barrow and River Nore SAC	The River Barrow and River Nore SAC is classified as a European designated site. The SAC is ca. 2 km downstream of the Site within the River Figile. Any hydraulic connectivity between the Site and the SAC would be through groundwater. This is negligible over the review period given the change in groundwater flow direction in response to PWS abstractions. The contribution of groundwater to the River Figile is also likely to be minimal, with further dilution before the downstream SAC. It is unlikely that there is	Negligible

Table 6-10 – Water Sensitive Receptors
	groundwater connectivity beneath the Site and the Old Grange stream, considering the likely groundwater flow directions based on topography and catchment divides.	
Flooding – changes in presence and impacts of water flows on infrastructure immediately adjacent and downstream of the Site.	It is not known if there were discharges of water from the quarry to the surface over the review period. It is possible that all discharged water from the quarry void was captured in a soakaway, returning to the groundwater. Change in Site topography redirecting Site run-off or creating pooling of water is unknown.	Negligible – Not enough information to inform of impacts over the review period
Monasterevin PWS – water availability and quality	The Monasterevin PWS consist of four abstraction wells that target the same limestone bedrock aquifer that is beneath the Site. Recent water quality analysis does not indicate any residual groundwater pollution. The bedrock aquifer is highly productive, so any dewatering over the review period is unlikely to have negatively impacted availability at the PWS supplies.	Negligible
Human Health	Workers during operation or public coming into contact with contaminated water. Unlikely to be any highly toxic substances used in on-Site operations. No indication of lasting contamination associated with groundwater or surface water on-Site.	Low

6.6 Characteristics of the Project

The Project is described in Chapter 2 (Project Description).

6.7 Potential Effects

The main potential impacts and associated effects that are considered and assessed in the following sections relate to:

- 1) Activities or events that might have caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles;
- 2) Loss of superficial deposits and bedrock, resulting in changed Site topography; and
- 3) Dewatering of seepage water from the quarry void and any associated collection of discharge water.

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6.7.1 Evaluation of Potential Effects

Using the methodology set out in Section 6.3 and the potential effects detailed above, an evaluation and assessment of the potential effects on the identified sensitive receptors is presented in Table 6.15. Note that the potential impacts are referenced based on numbering in Section 6.7.

Combined with the sensitivities of the identified receptors, the potential adverse effects caused by the Site through the review period are mostly **Imperceptible** with only one level of effect identified as **Slight**. The Slight level of effect is understood to be temporary as groundwater availability within the sands and gravels will have returned to baseline conditions following cessation of dewatering.

Receptor	Sensitivity	Source of Impact/Assessment of Magnitude	Impact Magnitude	Level of Effect
Surface Water – Quality and availability	Low	Changes in quality caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). <i>No recorded</i> <i>spills over the review period. Any leaks likely</i> <i>to be minor. No indication of lasting</i> <i>contamination in Site surface water quality.</i>	Negligible	Imperceptible
Surface Water – Quality and availability	Low	Changes in availability due to changed Site topography (2). Sands and gravels still present across the Site and allow infiltration of majority of rainfall, as under baseline conditions. Surface run-off understood to have been minimal under baseline conditions.	Negligible	Imperceptible
Groundwater - Quality and availability	Low	Changes in quality caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). <i>No recorded</i> <i>spills over the review period. Any leaks likely</i> <i>to be minor. No indication of lasting</i> <i>contamination in Site groundwater quality</i>	Negligible	Imperceptible
Groundwater - Quality and availability	Low	Changes in quality due to changed Site topography (2). <i>Quarry void provides more</i> <i>direct connection between surface water and</i> <i>groundwater. No recorded spills over the</i> <i>review period. Any leaks likely to be minor.</i> <i>No indication of lasting contamination in Site</i> <i>groundwater quality.</i>	Negligible	Imperceptible
Groundwater - Quality and availability	Low	Changes in availability due to changed Site topography (2). Sands and gravels still present across the Site and allow infiltration of majority of rainfall, as under baseline	Negligible	Imperceptible

Table 6-11 - Evaluation of Initial Impacts and their Effect Significance

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Receptor	Sensitivity	Source of Impact/Assessment of Magnitude	Impact Magnitude	Level of Effect
		conditions. Quarry void provides more direct connection between rainfall and groundwater. Possibly improved recharge to bedrock aquifer.		
Groundwater - Quality and availability	Low	Changes in availability due to dewatering and potential discharge and collection (3). Most likely that discharge water collected on- Site and allowed to infiltrate back into groundwater, rather than being discharged off-Site over the review period. However, there is not enough information to confirm this. Neighbouring third-party quarry indicates some impact on users wells installed into sands and gravel, although cessation of pumping allowed levels to recover.	Low	Slight
Grand Canal - pNHA	Negligible	Changes in quality caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). <i>No indication</i> <i>of lasting contamination in Site surface water</i> <i>quality. Highly unlikely to be surface water</i> <i>connection between Site and Canal. No</i> <i>groundwater connectivity between Site and</i> <i>Canal.</i>	Negligible	Imperceptible
Grand Canal - pNHA	Negligible	Changes in availability due to changed Site topography (2). <i>Highly unlikely to be surface</i> <i>water connection between Site and Canal.</i> <i>Already limited surface run-off from Site</i> <i>under baseline conditions.</i>	Negligible	Imperceptible
Grand Canal - pNHA	Negligible	Changes in availability due to dewatering and potential discharge and collection (3). The Canal is not in hydraulic connection with groundwater and the canal is understood to be lined.	Negligible	Imperceptible
River Barrow and River Nore SAC	Negligible	Changes in quality caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). <i>No indication</i> of lasting contamination in Site surface water quality. Unlikely to be surface water connection between Site and Rivers. Limited groundwater connectivity between Site and Rivers upstream of SAC.	Negligible	Imperceptible
Flooding – impacts of water flows on infrastructure	Negligible	Changes in water flows due to changed Site topography (2). Already limited surface run- off from Site under baseline conditions. Large amount of sands and gravels remain	Negligible	Imperceptible

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Receptor	Sensitivity	Source of Impact/Assessment of Magnitude	Impact Magnitude	Level of Effect
immediately adjacent and downstream of the Site.		across Site, which assist in retention of rainfall.		
Monasterevin PWS –water availability and quality	Negligible	Changes in quality caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). No recorded spills over the review period. Any leaks likely to be minor. No indication of lasting contamination in Site groundwater quality. Site not within SPA of PWS. Minimal influence of PWS on groundwater beneath Site, therefore, minimal contribution.	Negligible	Imperceptible
Monasterevin PWS –water availability and quality	Negligible	Changes in availability due to dewatering and potential discharge and collection (3). Site not within SPA of PWS. Minimal influence of PWS on groundwater beneath Site, therefore, minimal contribution. Site dewatering would have been a fraction of that abstracted at PWS wells.	Negligible	Imperceptible
Human Health	Low	Contact with contaminated water caused by hydrocarbon leaks from fuel storage tanks or the unmanaged spillage of fuels or lubricants from Site plant or vehicles (1). No recorded spills over the review period. Any leaks likely to be minor. No indication of lasting contamination in Site groundwater or surface water quality.	Negligible	Imperceptible

6.8 Remedial Mitigation and Monitoring

There are no effects on the land, soils and geology from the activities on the Site that require remedial measures.

6.9 Residual Effects

The assessment concludes that the Project activities have not given rise to significant adverse effects on the water environment at or surrounding the Site during the assessment period. In all cases the residual adverse effect is **not significant** and not greater than Slight.

6.10 Cumulative Impacts

Assuming other developments in the area have incorporated widely adopted good design, practice and mitigation measures it is considered that there have been no significant

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cumulative effects of the Project with other similar developments in the locality during the assessment period.

It is understood that the neighbouring third-party quarry dewatered from the limestone bedrock in order to maintain dry workings. As detailed in Section 6.4.3, this potentially impacted nearby shallow wells, with reduced yields reported by owners. Over the review period it is feasible that there was a cumulative impact on water supply from the sands and gravels, with dewatering of both quarry voids. Cessation of abstraction of groundwater from both quarries between 2006 and 2007 is likely to have allowed recovery of groundwater within the sands and gravels.

6.11 Difficulties Encountered

There are no monitoring records for water quality or level at the Site over the review period. This assessment is therefore based on recently collected data and uses the present groundwater conditions on the Site as a key to those at the end of the review period.

There is very little known about the dewatering that is likely to have taken place to maintain dry workings in the quarry. There are, therefore, no estimates made on volumes of dewatering or seepage volumes, as they could be misleading and inaccurate. There is simply the acknowledgement that dewatering is likely to have taken place to some extent.

There is also no information on any potential hydrocarbon spills over the review period, so the assessment uses the good present day water quality and river quality as an indication of no major pollution events over the review period.

There was a large amount of sediment sat in the base of the monitoring wells prior to 2024 sampling round, following drilling and install in 2023. This resulted in initially high readings for non-dissolved analytes, when well purging techniques were used. Repeated purging helped clear the monitoring wells of sediment to some extent. In the August 2024 sampling round, passive sampling techniques were used, which significantly reduced the disturbance of the water column.

6.12 References

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Appendix 6A

Borelogs

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Appendix 6B

Laboratory Results

Public

Table 6B-1 - Laboratory Results – March 2024

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	<2.5	<2.5	<2.5	<2.5	<2.5
Dissolved Barium	ug/l		100	47	68	23	22	26
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	61	<12	27	28	22
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			145.7	108.9	76.2	96.5	48.7
Total Dissolved Chromium	ug/l	37.5	30	<1.5	<1.5	<1.5	2.3	<1.5
Dissolved Copper	ug/l		30	<7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000					
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			12	16.1	5.1	9.3	10.4
Dissolved Manganese	ug/l		300	<2	<2	<2	<2	<2

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	2	<2	<2	<2	<2
Dissolved Potassium	mg/l			15.4	2	1.7	0.8	2.2
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			8.6	8.4	5	7.9	9
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	4	<3	3	<3	<3
Total Chromium	ug/l			91.5	80	100.3	130.6	<1.5
Total Iron	ug/l			109247	95803	111426	130244	<20
МТВЕ	ug/l	10		<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5
Ethylbenzene	ug/l			<5	<5	<5	<5	<5

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5
Aliphatics								
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
Aromatics								

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	15.1	35.3	7.1	22.4	21.5
Chloride	mg/l	187.5	250	15.3	19.6	9.9	14.8	19.4
Nitrate as NO3	mg/l	37.5	50	16.2	2	19.5	28.9	2.1

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Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Nitrite as NO2	mg/l	0.375	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			<0.06	<0.06	<0.06	<0.06	<0.06
Ammoniacal Nitrogen as N	mg/l			0.03	0.1	0.36	0.04	<0.03
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	<6	<6	<6	<6
Total Alkalinity as CaCO3	mg/l			5062	966	340	1622	142
COD (Settled)	mg/l			13	21	20	11	<7
Total Suspended Solids	mg/l		50	12376	2748	2328	5486	<10

1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

Table 6B-2 - Laboratory Results – April 2024

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	<2.5	<2.5	<2.5	<2.5	<2.5
Dissolved Barium	ug/l		100	80	81	18	21	26
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	61	<12	24	27	15
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			140.7	122.8	59.8	96	48.4
Total Dissolved Chromium	ug/l	37.5	30	<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Copper	ug/l		30	<7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000	<20	<20	<20	<20	<20
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			12.3	17.2	4.1	9.3	10.1
Dissolved Manganese	ug/l			2	31	<2	<2	<2

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	4	<2	<2	<2	<2
Dissolved Potassium	mg/l			35.1	2	1.2	0.7	2.1
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			9.1	11.3	3.9	6.8	8.3
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	6	4	4	<3	3
Total Chromium	ug/l			6.9	<1.5	6.7	<1.5	<1.5
Total Iron	ug/l			3653	384	2691	95	<20
МТВЕ	ug/l	10		<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5
Ethylbenzene	ug/l			<5	<5	<5	<5	<5

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5
Aliphatics								
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
Aromatics								

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	23.1	58.3	4.9	22	21.7
Chloride	mg/l	187.5	250	16.4	21.2	6.7	10.7	19.8
Nitrate as NO3	mg/l	37.5	50	44.7	7	12.4	22.8	2

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Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Nitrite as NO2	mg/l	0.375	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			0.22	<0.06	<0.06	<0.06	<0.06
Ammoniacal Nitrogen as N	mg/l			0.04	0.18	0.03	<0.03	<0.03
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	<6	<6	<6	<6
Total Alkalinity as CaCO3	mg/l			868	544	206	950	148
COD (Settled)	mg/l			13	9	<7	10	10
Total Suspended Solids	mg/l		50	2562	842	830	2802	<10

1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

Table 6B-3 - Laboratory Results – May 2024

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH1 Dup	BH2	BH3	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Dissolved Barium	ug/l		100	108	94	83	13	14	19
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	84	85	18	22	21	20
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			132.8	134.9	107.4	55.2	84.9	43.8
Total Dissolved Chromium	ug/l	37.5	30	<1.5	6.8	<1.5	<1.5	<1.5	<1.5
Dissolved Copper	ug/l		30	<7	7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000	<20	<20	<20	<20	<20	<20
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			15.4	15.6	15.2	4	8.5	9.6
Dissolved Manganese	ug/l		300	31	<2	97	<2	<2	<2

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH1 Dup	BH2	BH3	BH4	SW01
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	11	6	<2	<2	<2	<2
Dissolved Potassium	mg/l			70.1	71.7	1.8	1	0.6	2
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			12.9	13.5	10	4	6.9	8.3
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	7	5	4	<3	<3	<3
Total Chromium	ug/l			12.8	13.1	6.3	30	204.6	<1.5
Total Iron	ug/l			7627	2985	3175	24461	204054	<20
МТВЕ	ug/l	10		<5	<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5	<5
Ethylbenzene	ug/l			<5	<5	<5	<5	<5	<5

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH1 Dup	BH2	BH3	BH4	SW01
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5	<5
Aliphatics									
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
Aromatics									

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH1 Dup	BH2	BH3	BH4	SW01
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	91.4	82	28.9	3.9	23.9	21
Chloride	mg/l	187.5	250	28.1	25.1	21.5	5.8	13.5	19.4
Nitrate as NO3	mg/l	37.5	50	79.6	79	2.3	8.2	29	1.6

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Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH1 Dup	BH2	BH3	BH4	SW01
Nitrite as NO2	mg/l	0.375	0.2	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			0.41	0.6	<0.06	<0.06	<0.06	<0.06
Ammoniacal Nitrogen as N	mg/l			0.16	0.17	<0.03	0.03	0.03	<0.03
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	<6	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	7	<6	<6	<6	<6
Total Alkalinity as CaCO3	mg/l			1464	1046	388	238	2390	148
COD (Settled)	mg/l			<7	9	<7	<7	<7	9
Total Suspended Solids	mg/l		50	3406	2884	348	1866	6800	<10

1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

Table 6B-4 - Laboratory Results – June 2024

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	3.6	4	<2.5	3.1	<2.5
Dissolved Barium	ug/l		100	97	79	10	22	22
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	75	<12	23	24	15
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			126.8	105.7	50.3	100.4	46.4
Total Dissolved Chromium	ug/l	37.5	30	<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Copper	ug/l		30	<7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000	<20	<20	<20	<20	<20
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			15	15.8	3.7	10.1	10.5
Dissolved Manganese	ug/l		300	<2	167	<2	<2	<2

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	6	3	<2	<2	<2
Dissolved Potassium	mg/l			61.3	1.8	0.8	0.7	2.1
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			12.1	9.5	3.5	7.3	8.2
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	5	<3	<3	<3	4
Total Chromium	ug/l			14.2	6.5	13.2	64.7	<1.5
Total Iron	ug/l			12057	3214	5516	49276	53
МТВЕ	ug/l	10		<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5
Ethylbenzene	ug/l			<5	<5	<5	<5	<5

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5
Aliphatics								
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
Aromatics								

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	72.5	22.3	3.2	27.9	21.7
Chloride	mg/l	187.5	250	24.9	21.6	4.6	16	19.6
Nitrate as NO3	mg/l	37.5	50	58.2	0.4	4.7	32.7	0.9

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Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Nitrite as NO2	mg/l	0.375	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			0.41	<0.06	<0.06	<0.06	<0.06
Ammoniacal Nitrogen as N	mg/l			0.06	0.09	<0.03	0.03	0.05
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	<6	<6	<6	<6
Total Alkalinity as CaCO3	mg/l			1446	482	214	1138	140
COD (Settled)	mg/l			12	<7	<7	<7	<7
Total Suspended Solids	mg/l		50	3351	820	1273	3145	15

1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

Table 6B-5 - Laboratory Results – July 2024

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH3 Dup	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Dissolved Barium	ug/l		100	70	70	14	16	27	27
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	51	<12	16	25	28	21
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			127.6	96.4	53	52.9	101.6	44.4
Total Dissolved Chromium	ug/l	37.5	30	<1.5	5	<1.5	<1.5	6	<1.5
Dissolved Copper	ug/l		30	<7	<7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000	<20	<20	<20	<20	<20	<20
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			10.9	12.7	3.7	3.8	9.7	9.9
Dissolved Manganese	ug/l		300	4	74	22	23	<2	4

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH3 Dup	BH4	SW01
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	2	<2	<2	<2	<2	<2
Dissolved Potassium	mg/l			35.8	1.8	0.8	0.8	0.8	2
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			8.7	9.2	4.2	4.2	7.7	8.2
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	5	5	3	5	8	<3
Total Chromium	ug/l			33	33.3	43.5	54.7	107.6	<1.5
Total Iron	ug/l			39152	28726	38875	52187	115584	25
МТВЕ	ug/l	10		<5	<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5	<5
Ethylbenzene	ug/l			<5	<5	<5	<5	<5	<5

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH3 Dup	BH4	SW01
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5	<5
Aliphatics									
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10	<10
Aromatics									

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH3 Dup	BH4	SW01
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	29.9	20	3.7	3.9	26.1	20.3
Chloride	mg/l	187.5	250	13.1	20.9	5.1	5.4	15.3	19.4
Nitrate as NO3	mg/l	37.5	50	32.5	0.3	5.8	6	33.4	0.7

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Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH3 Dup	BH4	SW01
Nitrite as NO2	mg/l	0.375	0.2	<0.02	0.03	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			0.2	<0.06	<0.06	<0.06	<0.06	<0.06
Ammoniacal Nitrogen as N	mg/l			0.34	0.05	<0.03	<0.03	0.03	<0.03
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	41	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	<6	<6	<6	6	<6
Total Alkalinity as CaCO3	mg/l			764	500	208	254	1200	136
COD (Settled)	mg/l			10	<7	<7	<7	<7	21
Total Suspended Solids	mg/l		50	1447	828	828	1027	3074	<10

1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

Table 6B-6 - Laboratory Results – August 2024

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Dissolved Arsenic	ug/l	7.5	50	5.4	<2.5	<2.5	<2.5	<2.5
Dissolved Barium	ug/l		100	85	63	8	18	23
Dissolved Beryllium	ug/l			<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Boron	ug/l		2000	55	17	17	19	13
Dissolved Cadmium	ug/l		3	<0.5	<0.5	<0.5	<0.5	<0.5
Dissolved Calcium	mg/l			121.3	96.1	42.5	89.1	42.6
Total Dissolved Chromium	ug/l	37.5	30	4.6	6.6	6.9	<1.5	<1.5
Dissolved Copper	ug/l		30	<7	<7	<7	<7	<7
Total Dissolved Iron	ug/l		1000	<20	<20	<20	<20	<20
Dissolved Lead	ug/l	7.5	10	<5	<5	<5	<5	<5
Dissolved Magnesium	mg/l			10.9	12.5	3.1	8.1	10.1
Dissolved Manganese	ug/l		300	40	<2	22	<2	27

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Dissolved Mercury	ug/l	0.75	1	<1	<1	<1	<1	<1
Dissolved Nickel	ug/l		50	4	<2	<2	<2	<2
Dissolved Potassium	mg/l			31.4	2	0.7	0.6	2.1
Dissolved Selenium	ug/l			<3	<3	<3	<3	<3
Dissolved Sodium	mg/l			8.9	9.3	4.5	7.1	8.4
Dissolved Vanadium	ug/l			<1.5	<1.5	<1.5	<1.5	<1.5
Dissolved Zinc	ug/l	75	100	26	9	11	13	<3
Total Chromium	ug/l			<1.5	<1.5	35.9	<1.5	<1.5
Total Iron	ug/l			1018	536	25033	198	26
МТВЕ	ug/l	10		<5	<5	<5	<5	<5
Benzene	ug/l		10	<5	<5	<5	<5	<5
Toluene	ug/l	525	74	<5	<5	<5	<5	<5
Ethylbenzene	ug/l			<5	<5	<5	<5	<5

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
m/p-Xylene	ug/l		30	<5	<5	<5	<5	<5
o-Xylene	ug/l		30	<5	<5	<5	<5	<5
Aliphatics								
>C5-C6 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C6-C8 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C8-C10 (HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C10-C12 (EH_CU_1D_AL)	ug/l			<5	<5	<5	<5	<5
>C12-C16 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C16-C21 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
>C21-C35 (EH_CU_1D_AL)	ug/l			<10	<10	<10	<10	<10
Total aliphatics C5-35 (EH_CU+HS_1D_AL)	ug/l			<10	<10	<10	<10	<10
Aromatics								
\\SD

Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
>C5-EC7 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC7-EC8 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC8-EC10 (HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC10-EC12 (EH_CU_1D_AR)	ug/l			<5	<5	<5	<5	<5
>EC12-EC16 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC16-EC21 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
>EC21-EC35 (EH_CU_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aromatics C5-35 (EH_CU+HS_1D_AR)	ug/l			<10	<10	<10	<10	<10
Total aliphatics and aromatics (C5-35) (EH_CU+HS_1D_Total)	ug/l			<10	<10	<10	<10	<10
Sulphate as SO4	mg/l	187.5	200	23.3	19.1	2.5	19.5	20.4
Chloride	mg/l	187.5	250	14.2	20.1	3.8	15	19.1
Nitrate as NO3	mg/l	37.5	50	27.2	0.9	3.8	21.5	0.5

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Parameter	Units	GTV ¹	EQS 2019 2	BH1	BH2	BH3	BH4	SW01
Nitrite as NO2	mg/l	0.375	0.2	0.16	<0.02	<0.02	<0.02	<0.02
Ortho Phosphate as PO4	mg/l			0.27	0.09	0.08	0.08	0.07
Ammoniacal Nitrogen as N	mg/l			0.16	<0.03	0.03	<0.03	<0.03
Hexavalent Chromium	ug/l	7.5	3.4	<6	<6	<6	<6	<6
Total Dissolved Chromium III	ug/l		4.7	<6	7	7	<6	<6
Total Alkalinity as CaCO3	mg/l			352	258	160	208	122
COD (Settled)	mg/l			14	18	<7	21	25
Total Suspended Solids	mg/l		50	55	24	548	15	<10

1 Groundwater Regulations 2010 (S.I. No. 9 of 2010) and amendment S.I. No. 366/2016.

2 AA-EQS - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272/2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019)

Appendix 6C

Water Quality Graphs

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Appendix 6D

Laboratory Water Quality Certificates

11.



Element Materials Technology Unit 3 Deeside Point Zone 3 **Deeside Industrial Park** Deeside CH5 2UA

P: +44 (0) 1244 833780 F: +44 (0) 1244 833781

W: www.element.com

WSP Environmental Town Centre House Dublin Road Naas Co Kildare Ireland		VICE MRA UKAS TESTING 4225
Attention :	John Moran	
Date :	26th March, 2024	
Your reference :	400000205	
Our reference :	Test Report 24/4542 Batch 1	
Location :	Ballykelly	
Date samples received :	14th March, 2024	
Status :	Final Report	
Issue :	202403260917	

Five samples were received for analysis on 14th March, 2024 of which five 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.

The greenhouse gas emissions generated (in Carbon - Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 9.846 kg of CO2

Scope 1&2&3 emissions - 23.27 kg of CO2

Authorised By:

Poder

Paul Boden BSc Senior Project Manager

Please include all sections of this report if it is reproduced

Client Name: Reference: Location: Contact: EMT Job No: WSP Environmental 400000205 Ballykelly John Moran 24/4542

Report : Liquid

 $\label{eq:liquids} \mbox{ Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H_2SO_4, Z=ZnAc, N=NaOH, HN=HN0_3$

EMT Sample No.	1-5	6-10	11-15	16-20	21-26					
Sample ID	BH01	BH02	BH03	BH04	SW01					
Depth								Disesses		
COC No / mino								 abbrevi	e attached n ations and a	cronyms
COC NO7 INISC										
Containers	VHPG	VHPG	VHPG	VHPG	V H HN P G					
Sample Date	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water					
Batch Number	1	1	1	1	1					Method
Date of Receipt	14/03/2024	14/03/2024	14/03/2024	14/03/2024	14/03/2024			LOD/LOR	Units	No.
Dissolved Arsenic [#]	<2.5	<2.5	<2.5	<2.5	<2.5			<2.5	ug/l	TM30/PM14
Dissolved Barium [#]	47	68	23	22	26			<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM30/PM14
Dissolved Boron	61	<12	27	28	22			<12	ug/l	TM30/PM14
Dissolved Cadmium [#]	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM30/PM14
Dissolved Calcium [#]	145.7	108.9	76.2	96.5	48.7			<0.2	mg/l	TM30/PM14
Total Dissolved Chromium [#]	<1.5	<1.5	<1.5	2.3	<1.5			<1.5	ug/l	TM30/PM14
Dissolved Copper [#]	<7	<7	<7	<7	<7			<7	ug/l	TM30/PM14
Dissolved Lead [#]	<5	<5	<5	<5	<5			<5	ug/l	TM30/PM14
Dissolved Magnesium [#]	12.0	16.1	5.1	9.3	10.4			<0.1	mg/l	TM30/PM14
Dissolved Manganese #	<2	<2	<2	<2	<2			<2	ug/l	TM30/PM14
Dissolved Mercury [#]	<1	<1	<1	<1	<1			<1	ug/l	TM30/PM14
Dissolved Nickel [#]	2	<2	<2	<2	<2			<2	ug/l	TM30/PM14
Dissolved Potassium [#]	15.4	2.0	1.7	0.8	2.2			<0.1	mg/l	TM30/PM14
Dissolved Selenium [#]	<3	<3	<3	<3	<3			<3	ug/l	TM30/PM14
Dissolved Sodium [#]	8.6	8.4	5.0	7.9	9.0			<0.1	mg/l	TM30/PM14
Dissolved Vanadium [#]	<1.5	<1.5	<1.5	<1.5	<1.5			<1.5	ug/l	TM30/PM14
Dissolved Zinc [#]	4	<3	3	<3	<3			<3	ug/l	TM30/PM14
Total Chromium	91.5	80.0	100.3	130.6	<1.5			<1.5	ug/l	TM30/PM14
Total Iron	109247 _{AA}	95803 _{AA}	111426 _{AA}	130244 _{AA}	<20			<20	ug/l	TM30/PM14
MTBE [#]	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
Benzene [#]	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
Toluene [#]	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
Ethylbenzene [#]	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
m/p-Xylene [#]	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
o-Xylene [#]	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
TPH CWG										
Aliphatics										
>C5-C6 (HS_1D_AL) [#]	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>C6-C8 (HS_1D_AL) [#]	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL) [#]	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL) [#]	<5	<5	<5	<5	<5			<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL)*	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL)*	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL) [#]	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL)#	<10	<10	<10	<10	<10			<10	ug/l	TM5/TM36/PM12/PM16/PM3

Client Name: Reference: Location: Contact: EMT Job No: WSP Environmental 400000205 Ballykelly John Moran 24/4542

Report : Liquid

 $\label{eq:liquids} \mbox{ Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H_2SO_4, Z=ZnAc, N=NaOH, HN=HN0_3$

								-		
EMT Sample No.	1-5	6-10	11-15	16-20	21-26					
Sample ID	BH01	BH02	BH03	BH04	SW01					
Depth								Please se	e attached n	otes for all
COC No / misc								abbrevi	ations and a	cronyms
Containers	VHPG	VHPG	VHPG	VHPG	V H HN P G					
Sample Date	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water					
Cample Type		Ciound Water	Ciouna Water	Ciouna Water	ounace water					
Batch Number	1	1	1	1	1			 LOD/LOR	Units	Method
Date of Receipt	14/03/2024	14/03/2024	14/03/2024	14/03/2024	14/03/2024					110.
TPH CWG										
Aromatics										
>C5-EC7 (HS_1D_AR)*	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC7-EC8 (HS_1D_AR)*	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC8-EC10 (HS_1D_AR)*	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)*	<5	<5	<5	<5	<5			<5	ug/l	TM5/PM16/PM30
>EC12-EC16 (EH_CU_1D_AR)"	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>EC16-EC21 (EH_CU_1D_AR)"	<10	<10	<10	<10	<10			<10	ug/i	TM5/PM16/PM30
>EC21-EC35 (EH_CU_ID_AR)	<10	<10	<10	<10	<10			<10	ug/i	
Total aromatics C5-35 (EH_CU+HS_1D_AR)*	<10	<10	<10	<10	<10			<10	ug/i	TM5/TM58/PM12/PM16/PM5
Total aliphatics and aromatics(C5-35) (EH_CU+HS_1D_Total)*	<10	<10	<10	<10	<10			<10	ug/i	
Sulphate as SO/ #	15.1	35.3	7 1	22.4	21.5			<0.5	ma/l	TM38/PM0
Chloride [#]	15.3	19.6	9.9	14.8	19.4			<0.3	mg/l	TM38/PM0
Nitrate as NO3 [#]	16.0	2.0	19.5	28.9	21			<0.0	mg/l	TM38/PM0
Nitrite as NO2 [#]	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	ma/l	TM38/PM0
Ortho Phosphate as $PO4^{\#}$	<0.06	<0.06	<0.06	<0.06	<0.06			<0.06	ma/l	TM38/PM0
									5	
Ammoniacal Nitrogen as N [#]	0.03	0.10	0.36	0.04	<0.03			<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6	<6	<6			<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	<6	<6	<6			<6	ug/l	TM0/PM0
Total Alkalinity as CaCO3 #	5062	966	340	1622	142			<1	mg/l	TM75/PM0
COD (Settled) [#]	13	21	20	11	<7			<7	mg/l	TM57/PM0
Total Suspended Solids #	12376	2748	2328	5486	<10			<10	mg/l	TM37/PM0
			•							

Client Name:	WSP Environmental
Reference:	40000205
Location:	Ballykelly
Contact:	John Moran

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason				
	No deviating sample report results for job 24/4542									

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.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/4542

SOILS and ASH

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. Asbestos samples are retained for 6 months.

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 $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$. Ash samples are dried at $37^{\circ}C \pm 5^{\circ}C$.

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 HCI (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 overesitimate 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.

STACK EMISSIONS

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 for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

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

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 requirement of our Accreditation Body 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. Laboratory records are kept for a period of no less than 6 years.

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.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).

Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	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 quantitative calibration range. The result should be considered the minimum value and is indicative only. 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
со	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
ТВ	Trip Blank Sample
ОС	Outside Calibration Range
AA	x10 Dilution

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: 24/4542

Test Method No.	Description	Prep Method No. (if appropriate)	Description (L		MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
тмо	Not available	PM0	No preparation is required.				
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.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	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				
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			
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 GCFID 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			
TM37	2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition; USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and E678°C for VSS.	PM0	No preparation is required.	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: 2013I	PM0	No preparation is required.				
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	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

EMT Job No: 24/4542

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
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			

Method Code Appendix



Element Materials Technology Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA P: +44 (0) 1244 833780 F: +44 (0) 1244 833781

W: www.element.com

WSP Environmental Town Centre House Dublin Road Naas Co Kildare Ireland		
Attention :	John Moran	
Date :	2nd May, 2024	
Your reference :	40000205	
Our reference :	Test Report 24/7056 Batch 1	
Location :	Ballykelly	
Date samples received :	25th April, 2024	
Status :	Final Report	
Issue :	202405021325	

Six samples were received for analysis on 25th April, 2024 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.

The greenhouse gas emissions generated (in Carbon - Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 11.584 kg of CO2

Scope 1&2&3 emissions - 27.376 kg of CO2

Authorised By:

Baler

Paul Boden BSc Senior Project Manager

Please include all sections of this report if it is reproduced

Client Name: Reference: Location: Contact: EMT Job No: WSP Environmental 40000205 Ballykelly John Moran 24/7056

Report : Liquid

 $\label{eq:liquids} \mbox{ Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H_2SO_4, Z=ZnAc, N=NaOH, HN=HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36					
Sample ID	SW01	BH01	BH02	BH03	BH04	SW01D					
Depth									Please se	e attached n	otes for all
COC No / misc									abbrevia	auons and a	cronyms
Containers	V H HN P G	V H HNUF P G	V H HNUF P G	V H HNUF P G	V H HNUF P G	V H HN P G					
Sample Date	17/04/2024	17/04/2024	17/04/2024	17/04/2024	17/04/2024	17/04/2024					
Sample Type	Surface Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water					
Batch Number	1	1	1	1	1	1					
Date of Receipt	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024		 	LOD/LOR	Units	Nethod No.
Dissolved Arsonic#	<25	<25	<25	<25	<25	<25			<25	ug/l	TM30/PM14
Dissolved Barium [#]	26	80	81	18	21	26			<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM30/PM14
Dissolved Boron	15	61	<12	24	27	22			<12	ug/l	TM30/PM14
Dissolved Cadmium [#]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM30/PM14
Dissolved Calcium [#]	48.4	140.7	122.8	59.8	96.0	48.6			<0.2	mg/l	TM30/PM14
Total Dissolved Chromium [#]	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5			<1.5	ug/l	TM30/PM14
Dissolved Copper [#]	<7	<7	<7	<7	<7	<7			<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	<20	<20	<20	<20			<20	ug/l	TM30/PM14
Dissolved Lead [#]	<5	<5	<5	<5	<5	<5			<5	ug/l	TM30/PM14
Dissolved Magnesium [#]	10.1	12.3	17.2	4.1	9.3	10.3			<0.1	mg/l	TM30/PM14
Dissolved Manganese [#]	<2	2	31	<2	<2	<2			<2	ug/l	TM30/PM14
Dissolved Mercury [#]	<1	<1	<1	<1	<1	<1	 		<1	ug/l	TM30/PM14
Dissolved Nickel [#]	<2	4	<2	<2	<2	<2			<2	ug/l	TM30/PM14
Dissolved Potassium [#]	2.1	35.1	2.0	1.2	0.7	2.0			<0.1	mg/l	TM30/PM14
Dissolved Selenium [#]	<3	<3	<3	<3	<3	<3	 		<3	ug/l	TM30/PM14
Dissolved Sodium [#]	8.3	9.1	11.3	3.9	6.8	8.3			<0.1	mg/l	TM30/PM14
Dissolved Vanadium [#]	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5			<1.5	ug/l	TM30/PM14
Dissolved Zinc [#]	3	6	4	4	<3	<3			<3	ug/l	TM30/PM14
Total Chromium	<1.5	6.9	<1.5	6.7	<1.5	<1.5			<1.5	ug/l	TM30/PM14
I otal Iron	<20	3653	384	2691	95	<20			<20	ug/i	TM30/PM14
MTDE #	~F	-5	-5	-5	~F	-5	 		-5		TM26/DM12
MIBE	<5 <5	<5	<5	<5 <5	<5 <5	<5 <5	 		<5 <5	ug/i	TM26/DM12
Teluene #	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
Ethylbenzene [#]	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
m/n=Xylene [#]	<5	<5	<5	<5	<5	<5	 		<5	ug/l	TM36/PM12
o-Xvlene [#]	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
o rigiono	-			_	-	-			-	-3,-	
TPH CWG											
Aliphatics											
>C5-C6 (HS 1D AL)#	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>C6-C8 (HS_1D_AL) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL)*	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL)*	<5	<5	<5	<5	<5	<5			<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL)#	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL)#	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/TM36/PM12/PM16/PM30

Client Name: Reference: Location: Contact: EMT Job No: WSP Environmental 40000205 Ballykelly John Moran 24/7056

Report : Liquid

 $\label{eq:liquids} \mbox{ Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H_2SO_4, Z=ZnAc, N=NaOH, HN=HN0_3$

	-	-	-								
EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36					
Sample ID	SW01	BH01	BH02	BH03	BH04	SW01D					
Depth									Please se	e attached n	otes for all
COC No / misc									abbrevi	ations and a	cronyms
Containers	V H HN P G	V H HNUF P G	V H HNUF P G	V H HNUF P G	V H HNUF P G	V H HN P G					
Samula Data	47/04/2024	47/04/2024	47/04/0004	17/04/2024	17/04/2024	17/04/2024					
Sample Date	17/04/2024	17/04/2024	17/04/2024	17/04/2024	17/04/2024	17/04/2024					
Sample Type	Surface Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water					
Batch Number	1	1	1	1	1	1				Units	Method
Date of Receipt	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024	25/04/2024					No.
TPH CWG											
Aromatics											
>C5-EC7 (HS_1D_AR) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)*	<5	<5	<5	<5	<5	<5			<5	ug/l	TM5/PM16/PM30
>EC12-EC16 (EH_CU_1D_AR)"	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>EC16-EC21 (EH_CU_1D_AR)*	<10	<10	<10	<10	<10	<10			<10	ug/i	TM5/PM16/PM30
	<10	<10	<10	<10	<10	<10			<10	ug/i	TM5/TM56PM12/PM16/PM30
Total alonatics CS-35 (EH_CU+HS_ID_AR)	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/TM56/PM12/PM16/PM30
Total alphanes and alomates(C5-55) (EP_C0+H5_10_10a)										ug,	-
Sulphate as SO4 #	21.7	23.1	58.3	4.9	22.0	22.6			<0.5	mg/l	TM38/PM0
Chloride [#]	19.8	16.4	21.2	6.7	10.7	19.0			<0.3	mg/l	TM38/PM0
Nitrate as NO3 [#]	2.0	44.7	7.0	12.4	22.8	1.9			<0.2	mg/l	TM38/PM0
Nitrite as NO2 [#]	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4 [#]	<0.06	0.22	<0.06	<0.06	<0.06	<0.06			<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N [#]	<0.03	0.04	0.18	0.03	<0.03	<0.03			<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6	<6	<6	<6			<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	<6	<6	<6	<6			<6	ug/l	TM0/PM0
Total Alkalinity as CaCO3"	148	868	544	206	950	150			<1	mg/l	TM75/PM0
000 (0, 44, 1)#	10	12	0	-7	10	10			-7	mall	
COD (Sellied)	<10	2562	842	830	2802	<10			<10	mg/l	TM37/PM0
	10	2002	042	000	2002	10			10	ing/i	

Client Name:WSP EnvironmentalReference:40000205Location:Ballykelly

Contact: John Moran

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
24/7056	1	BH01		7-12	Mercury, Metals	Sample holding time exceeded
24/7056	1	BH02		13-18	Mercury, Metals	Sample holding time exceeded
24/7056	1	BH03		19-24	Mercury, Metals	Sample holding time exceeded
24/7056	1	BH04		25-30	Mercury, Metals	Sample holding time exceeded

Matrix : Liquid

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.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/7056

SOILS and ASH

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. Asbestos samples are retained for 6 months.

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 $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$. Ash samples are dried at $35^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil 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 HCI (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 overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

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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.

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DEVIATING SAMPLES

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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 requirement of our Accreditation Body 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. Laboratory records are kept for a period of no less than 6 years.

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.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).

Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	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 quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
со	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
ТВ	Trip Blank Sample
ос	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: 24/7056

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
тмо	Not available	PM0	No preparation is required.				
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.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	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				
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			
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 GCFID 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			
TM37	2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition; USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and E678°C for VSS.	PM0	No preparation is required.	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: 2013I	PM0	No preparation is required.				
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	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

EMT Job No: 24/7056

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
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			

Method Code Appendix



Element Materials Technology Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA P: +44 (0) 1244 833780 F: +44 (0) 1244 833781

W: www.element.com



Seven samples were received for analysis on 29th May, 2024 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.

The greenhouse gas emissions generated (in Carbon - Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 11.729 kg of CO2

Scope 1&2&3 emissions - 27.718 kg of CO2

Authorised By:

5.600

Simon Gomery BSc Senior Project Manager

Please include all sections of this report if it is reproduced

Client Name: Reference: Location: Contact: EMT Job No: WSP Environmental 40000205 Ballykelly John Moran 24/9124

Report : Liquid

 $\label{eq:liquids} \mbox{ Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H_2SO_4, Z=ZnAc, N=NaOH, HN=HN0_3$

EMT Sample No.	1-6	7-12	13-17.30	18.31-35	19-24	25-29					
Sample ID	BH01	BH03	BH01D	SW01	BH02	BH04					
Depth									DI		
COC No / mino								 	abbrevi	ations and a	cronyms
COC NO / IIISC											
Containers	V H HNUF P G	V H HNUF P G	V H HNUF G P	P V H HN G	V H HN P G	V H HNUF P		 			
Sample Date	24/05/2024	24/05/2024	24/05/2024	24/05/2024	24/05/2024	24/05/2024					
Sample Type	Ground Water	Ground Water	Ground Water	Surface Water	Ground Water	Ground Water					
Batch Number	1	1	1	1	1	1					Method
Date of Receipt	29/05/2024	29/05/2024	29/05/2024	29/05/2024	29/05/2024	29/05/2024			LOD/LOR	Units	No.
Dissolved Arsenic [#]	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5			<2.5	ug/l	TM30/PM14
Dissolved Barium [#]	108	13	94	19	83	14			<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM30/PM14
Dissolved Boron	84	22	85	20	18	21			<12	ug/l	TM30/PM14
Dissolved Cadmium [#]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM30/PM14
Dissolved Calcium [#]	132.8	55.2	134.9	43.8	107.4	84.9			<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	6.8	<1.5	<1.5	<1.5			<1.5	ug/l	TM30/PM14
Dissolved Copper [#]	<7	<7	7	<7	<7	<7			<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	<20	<20	<20	<20			<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5	<5			<5	ug/l	TM30/PM14
Dissolved Magnesium [#]	15.4	4.0	15.6	9.6	15.2	8.5			<0.1	mg/l	TM30/PM14
Dissolved Manganese [#]	31	<2	<2	<2	97	<2			<2	ug/l	TM30/PM14
Dissolved Mercury#	<1	<1	<1	<1	<1	<1			<1	ug/l	TM30/PM14
Dissolved Nickel [#]	11	<2	6	<2	<2	<2			<2	ug/l	TM30/PM14
Dissolved Potassium [#]	70.1	1.0	71.7	2.0	1.8	0.6			<0.1	mg/l	TM30/PM14
Dissolved Selenium [#]	<3	<3	<3	<3	<3	<3			<3	ug/l	TM30/PM14
Dissolved Sodium [#]	12.9	4.0	13.5	8.3	10.0	6.9			<0.1	mg/l	TM30/PM14
Dissolved Vanadium [#]	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5			<1.5	ug/l	TM30/PM14
Dissolved Zinc [#]	7	<3	5	<3	4	<3			<3	ug/l	TM30/PM14
Total Chromium	12.8	30.0	13.1	<1.5	6.3	204.6			<1.5	ug/l	TM30/PM14
Total Iron	7627	24461 _{AA}	2985	<20	3175	204054 _{AB}			<20	ug/l	TM30/PM14
MTBE [#]	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
Benzene [#]	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
Toluene [#]	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
o-Xylene [#]	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
TPH CWG											
Aliphatics											
>C5-C6 (HS_1D_AL)*	<10	<10	<10	<10	<10	<10			<10	ug/l	1M36/PM12
>C6-C8 (HS_1D_AL)"	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL)"	<10	<10	<10	<10	<10	<10			<10	ug/i	1M36/PM12
>C10-C12 (EH_CU_1D_AL)*	<5	<5	<5	<5	<5	<5			<5	ug/i	TM5/PM16/PM30
>C12-C10 (EH_CU_1D_AL)*	<10	< IU <10	<10	<10	<10	<10			<10	ug/i	TM5/PM16/PM30
>C10-C21 (EH_CU_1D_AL)"	<10	<10	<10	<10	<10	<10			<10	ug/i	TM5/PM16/PM30
	<10	<10	<10	<10	<10	<10			<10	ug/i	тиб/тиберын земле выке
rotai aliphatics C5-35 (EH_CU+HS_1D_AL)"	-10	-10	-10	- 10	-10	-10			- 10	uyn	and a second sec

Client Name: Reference: Location: Contact: EMT Job No: WSP Environmental 40000205 Ballykelly John Moran 24/9124

Report : Liquid

 $\label{eq:liquids} \mbox{ Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H_2SO_4, Z=ZnAc, N=NaOH, HN=HN0_3$

EMT Sample No.	1-6	7-12	13-17,30	18,31-35	19-24	25-29					
Sample ID	BH01	BH03	BH01D	SW01	BH02	BH04					
Depth									Please se	e attached n	otes for all
COC No / misc									abbrevi	ations and a	cronyms
Containers	V H HNUF P G	V H HNUF P G	V H HNUF G P	P V H HN G	V H HN P G	V H HNUF P					
Sample Date	24/05/2024	24/05/2024	24/05/2024	24/05/2024	24/05/2024	24/05/2024					
Sample Type	Ground Water	Ground Water	Ground Water	Surface Water	Ground Water	Ground Water					
Batch Number	1	1	1	1	1	1					
Data of Respire	20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024	20/05/2024			LOD/LOR	Units	Method No.
	29/03/2024	29/03/2024	29/03/2024	29/03/2024	29/03/2024	29/03/2024					
Aromatics											
>C5-EC7 (HS_1D_AR) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC7-EC8 (HS_1D_AR) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)*	<5	<5	<5	<5	<5	<5			<5	ug/l	TM5/PM16/PM30
>EC12-EC16 (EH_CU_1D_AR) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>EC16-EC21 (EH_CU_1D_AR) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>EC21-EC35 (EH_CU_1D_AR)*	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 (EH_CU+HS_1D_AR)*	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(CS-35) (EH_CU+HS_1D_Total)*	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/TM36/PM12/PM16/PM30
Sulphoto os SO/ #	01.4	3.0	82.0	21.0	28.0	23.0			<0.5	ma/l	TM38/PM0
Chloride [#]	28.1	5.8	25.1	19.4	21.5	13.5			<0.3	ma/l	TM38/PM0
Nitrate as NO3 [#]	79.6	8.2	79.0	1.6	2.3	29.0			<0.2	ma/l	TM38/PM0
Nitrite as NO2 [#]	0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4 #	0.41	<0.06	0.60	<0.06	<0.06	<0.06			<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N [#]	0.16	0.03	0.17	<0.03	<0.03	0.03			<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6	<6	<6	<6			<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	7	<6	<6	<6			<6	ug/l	TM0/PM0
Total Alkalinity as CaCO3 [#]	1464	238	1046	148	388	2390			<1	mg/l	TM75/PM0
000 (0, ///, 1)#	-7	-7	0	0	-7	-7			-7	mall	
COD (Settled)	3406	1866	9 2884	9 <10	3/18	6800			<10	mg/l	TM37/PM0
Total Suspended Solids	3400	1800	2004	<10	340	0800				iiig/i	

Client Name:WSP EnvironmentalReference:40000205Location:Ballykelly

Contact: John Moran

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
24/9124	1	BH04		25-29	EPH	Sample received in inappropriate container
24/9124	1	BH04		25-29	Mercury, Metals	Sample holding time exceeded

Matrix : Liquid

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.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/9124

SOILS and ASH

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. Asbestos samples are retained for 6 months.

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 $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$. Ash samples are dried at $35^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil 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 HCI (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 overesitimate 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 is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

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 for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

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

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 requirement of our Accreditation Body 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. Laboratory records are kept for a period of no less than 6 years.

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.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).

Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	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 quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
со	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
ТВ	Trip Blank Sample
ос	Outside Calibration Range
AA	x5 Dilution
AB	x20 Dilution

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: 24/9124

Test Method No.	Description	Prep Method No. (if appropriate)	Description		MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
тмо	Not available	PM0	No preparation is required.				
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 SPEWater samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	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				
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			
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 GCFID 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			
TM37	2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and E65°C for VSS.	PM0	No preparation is required.	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: 2013I	PM0	No preparation is required.				
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	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

EMT Job No: 24/9124

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
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			

Method Code Appendix



Element Materials Technology Unit 3 Deeside Point Zone 3 **Deeside Industrial Park** Deeside CH5 2UA

P: +44 (0) 1244 833780 F: +44 (0) 1244 833781

W: www.element.com

WSP Environmental Town Centre House Dublin Road Naas Co Kildare Ireland		
Attention :	John Moran	
Date :	26th June, 2024	
Your reference :	40000205	
Our reference :	Test Report 24/10504 Batch 1	
Location :	Ballykelly	
Date samples received :	19th June, 2024	
Status :	Final Report	
Issue :	202406261504	

Six samples were received for analysis on 19th June, 2024 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.

The greenhouse gas emissions generated (in Carbon - Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 12.453 kg of CO2

Scope 1&2&3 emissions - 29.429 kg of CO2

Authorised By:

Poder

Paul Boden BSc Senior Project Manager

Please include all sections of this report if it is reproduced
Client Name: Reference: Location: Contact: EMT Job No: WSP Environmental 40000205 Ballykelly John Moran 24/10504

Report : Liquid

 $\label{eq:liquids} \mbox{ Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H_2SO_4, Z=ZnAc, N=NaOH, HN=HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36					
Sample ID	BH01	BH02	BH03	BH04	SW01_D	SW01					
Depth									Please se	e attached n	otes for all
COC No / misc									abbrevi	ations and a	cronyms
Containers	V H HN P G	VHHNPG	VHHNPG	VHHNPG	VHHNPG	VHHNPG					
O-mula D-ta								 			
Sample Date	13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water					,
Batch Number	1	1	1	1	1	1				Linite	Method
Date of Receipt	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024	19/06/2024			LOD/LOR	Units	No.
Dissolved Arsenic [#]	3.6	4.0	<2.5	3.1	<2.5	<2.5			<2.5	ug/l	TM30/PM14
Dissolved Barium [#]	97	79	10	22	22	22			<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM30/PM14
Dissolved Boron	75	<12	23	24	15	15			<12	ug/l	TM30/PM14
Dissolved Cadmium [#]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM30/PM14
Dissolved Calcium [#]	126.8	105.7	50.3	100.4	46.3	46.4			<0.2	mg/l	TM30/PM14
Total Dissolved Chromium [#]	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5			<1.5	ug/l	TM30/PM14
Dissolved Copper [#]	<7	<7	<7	<7	<7	<7			<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	<20	<20	<20	<20			<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5	<5			<5	ug/l	TM30/PM14
Dissolved Magnesium [#]	15.0	15.8	3.7	10.1	10.6	10.5			<0.1	mg/l	TM30/PM14
Dissolved Manganese [#]	<2	167	<2	<2	<2	<2			<2	ug/l	TM30/PM14
Dissolved Mercury#	<1	<1	<1	<1	<1	<1			<1	ug/l	TM30/PM14
Dissolved Nickel [#]	6	3	<2	<2	<2	<2			<2	ug/l	TM30/PM14
Dissolved Potassium [#]	61.3	1.8	0.8	0.7	2.1	2.1			<0.1	mg/l	TM30/PM14
Dissolved Selenium [#]	<3	<3	<3	<3	<3	<3			<3	ug/l	TM30/PM14
Dissolved Sodium [#]	12.1	9.5	3.5	7.3	8.2	8.2			<0.1	mg/l	TM30/PM14
Dissolved Vanadium [#]	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5			<1.5	ug/l	TM30/PM14
Dissolved Zinc [#]	5	<3	<3	<3	4	4			<3	ug/l	TM30/PM14
Total Chromium	14.2	6.5	13.2	64.7	<1.5	<1.5			<1.5	ug/l	TM30/PM14
Total Iron	12057	3214	5516	49276 _{AA}	48	53			<20	ug/l	TM30/PM14
MTBE [#]	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
Benzene#	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
Toluene*	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
Ethylbenzene *	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
m/p-Xylene*	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
o-Xylene"	<5	<5	<5	<5	<5	<5			<5	ug/l	TM36/PM12
TPH CWG											
Alinhation											
	~10	~10	~10	~10	~10	~10			~10	ua/	TM36/DM40
>C5-C0 (H5_1D_AL)#	<10	<10	<10	<10	<10	<10			<10	ug/i	TM36/PM12
>C8 C10 (HS_1D_AL)#	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL)#	<5	<5	<5	<5	<5	<5			<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL)#	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL)*	<10	<10	<10	<10	<10	<10			<10	ua/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL)*	<10	<10	<10	<10	<10	<10			<10	ua/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL)*	<10	<10	<10	<10	<10	<10			<10	ua/l	TM5/TM36/PM12/PM16/PM30
										-9-	

Client Name: Reference: Location: Contact: EMT Job No: WSP Environmental 40000205 Ballykelly John Moran 24/10504

Report : Liquid

 $\label{eq:liquids} \mbox{ Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H_2SO_4, Z=ZnAc, N=NaOH, HN=HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36					
Sample ID	BH01	BH02	BH03	BH04	SW01_D	SW01					
					-						
Depth									Please se	e attached r	otes for all
COC No / misc									abbrevi	ations and a	cronyms
Containers	V H HN P G	V H HN P G									
Sample Date	13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024	13/06/2024					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water					
Batch Number	1	1	1	1	1	1					
Date of Receipt	10/06/2024	10/06/2024	10/06/2024	10/06/2024	10/06/2024	10/06/2024			LOD/LOR	Units	Nethod No.
	19/00/2024	19/00/2024	19/06/2024	19/00/2024	19/00/2024	19/00/2024					
Aromatics											
>C5-EC7 (HS 1D AR) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC7-EC8 (HS_1D_AR) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC8-EC10 (HS_1D_AR)*	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<5	<5	<5	<5	<5	<5			<5	ug/l	TM5/PM16/PM30
>EC12-EC16 (EH_CU_1D_AR)*	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>EC16-EC21 (EH_CU_1D_AR)#	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
>EC21-EC35 (EH_CU_1D_AR)*	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 (EH_CU+HS_1D_AR)*	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) (EH_CU+HS_1D_Total)*	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/TM36/PM12/PM16/PM30
Sulphate as SO4 [#]	72.5	22.3	32	27.9	22.0	21.7			<0.5	ma/l	TM38/PM0
Chloride [#]	24.9	21.6	4.6	16.0	19.5	19.6			<0.3	mg/l	TM38/PM0
Nitrate as NO3 [#]	58.2	0.4	4.7	32.7	0.9	0.9			<0.2	mg/l	TM38/PM0
Nitrite as NO2 [#]	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4 #	0.41	<0.06	<0.06	<0.06	<0.06	<0.06			<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N [#]	0.06	0.09	<0.03	0.03	0.05	0.05			<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<6	<6	<6	<6	<6	<6			<6	ug/l	TM38/PM0
Total Dissolved Chromium III	<6	<6	<6	<6	<6	<6			<6	ug/l	TM0/PM0
	1446	492	214	1120	140	140			-1	mg/l	
Total Alkalinity as CaCO3	1440	402	214	1130	140	140				mg/i	11017 5/1-1010
COD (Settled) [#]	12	<7	<7	<7	<7	<7			<7	mg/l	TM57/PM0
Total Suspended Solids [#]	3351	820	1273	3145	12	15			<10	mg/l	TM37/PM0

Client Name:	WSP Environmental
Reference:	40000205
Location:	Ballykelly
Contact:	John Moran

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason					
	No deviating sample report results for job 24/10504										

Notification of Deviating Samples

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.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/10504

SOILS and ASH

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. Asbestos samples are retained for 6 months.

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 $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$. Ash samples are dried at $35^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil 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 HCI (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 overesitimate 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 is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

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 for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

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

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 requirement of our Accreditation Body 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. Laboratory records are kept for a period of no less than 6 years.

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.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).

Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	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 quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
со	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
ТВ	Trip Blank Sample
OC	Outside Calibration Range
AA	x10 Dilution

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.

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
тмо	Not available	PM0	No preparation is required.				
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.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
ТМ30	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				
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			
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 GCFID 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			
TM37	2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition; USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and VOL	PM0	No preparation is required.	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: 2013I	PM0	No preparation is required.				
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	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

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
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			



Element Materials Technology Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA P: +44 (0) 1244 833780 F: +44 (0) 1244 833781

W: www.element.com

WSP Environmental Town Centre House Dublin Road Naas Co Kildare Ireland	CONTRACTION OF THE SECOND STATESTING
Attention :	John Moran
Date :	24th July, 2024
Your reference :	40000205
Our reference :	Test Report 24/12294 Batch 1 Schedule A 24/12294 Batch 1 Schedule B
Location :	Ballykelly
Date samples received :	17th July, 2024
Status :	Final Report
Issue ·	202407241506

Six samples were received for analysis on 17th July, 2024 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.

The greenhouse gas emissions generated (in Carbon - Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 12.525 kg of CO2

Scope 1&2&3 emissions - 29.6 kg of CO2

Authorised By:

Baler

Paul Boden BSc Senior Project Manager

Please include all sections of this report if it is reproduced

Client Name: Reference: Location: Contact: EMT Job No: WSP Environmental 40000205 Ballykellly John Moran 24/12294

Report : Liquid

 $\label{eq:liquids} \mbox{ Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H_2SO_4, Z=ZnAc, N=NaOH, HN=HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36						
Sample ID	BH01	BH02	BH03	BH04	SW01	BH03_D						
Depth										D		
COC No / mino										Please se abbrevi	e attached n ations and a	otes for all cronyms
COC NO / MISC												
Containers	V H HN P G	V H HN P G	V H HN P G									
Sample Date	11/07/2024	15/07/2024	11/07/2024	15/07/2024	11/07/2024	11/07/2024						
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Ground Water						
Batch Number	1	1	1	1	1	1					Lipito	Method
Date of Receipt	17/07/2024	17/07/2024	17/07/2024	17/07/2024	17/07/2024	17/07/2024				LODILOI	Onita	No.
Dissolved Arsenic [#]	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5				<2.5	ug/l	TM30/PM14
Dissolved Barium [#]	70	70	14	27	27	16				<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	ug/l	TM30/PM14
Dissolved Boron	51	<12	16	28	21	25				<12	ug/l	TM30/PM14
Dissolved Cadmium [#]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	ug/l	TM30/PM14
Dissolved Calcium [#]	127.6	96.4	53.0	101.6	44.4	52.9				<0.2	mg/l	TM30/PM14
Total Dissolved Chromium [#]	<1.5	5.0	<1.5	6.0	<1.5	<1.5				<1.5	ug/l	TM30/PM14
Dissolved Copper [#]	<7	<7	<7	<7	<7	<7				<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	<20	<20	<20	<20				<20	ug/l	TM30/PM14
Dissolved Lead [#]	<5	<5	<5	<5	<5	<5				<5	ug/l	TM30/PM14
Dissolved Magnesium [#]	10.9	12.7	3.7	9.7	9.9	3.8				<0.1	mg/l	TM30/PM14
Dissolved Manganese [#]	4	74	22	<2	4	23				<2	ug/l	TM30/PM14
Dissolved Mercury#	<1	<1	<1	<1	<1	<1				<1	ug/l	TM30/PM14
Dissolved Nickel [#]	2	<2	<2	<2	<2	<2				<2	ug/l	TM30/PM14
Dissolved Potassium [#]	35.8	1.8	0.8	0.8	2.0	0.8				<0.1	mg/l	TM30/PM14
Dissolved Selenium [#]	<3	<3	<3	<3	<3	<3				<3	ug/l	TM30/PM14
Dissolved Sodium [#]	8.7	9.2	4.2	7.7	8.2	4.2				<0.1	mg/l	TM30/PM14
Dissolved Vanadium [#]	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5				<1.5	ug/l	TM30/PM14
Dissolved Zinc [#]	5	5	3	8	<3	5				<3	ug/l	TM30/PM14
Total Chromium	33.0	33.3	43.5	107.6	<1.5	54.7				<1.5	ug/l	TM30/PM14
Total Iron	39152 _{AA}	28726 _{AA}	38875 _{AA}	115584 _{AB}	25	52187 _{AB}				<20	ug/l	TM30/PM14
MTBE [#]	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
Benzene [#]	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
Toluene [#]	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
m/p-Xylene [#]	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
o-Xylene [#]	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
TPH CWG												
Aliphatics												
>C5-C6 (HS_1D_AL) [#]	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>C6-C8 (HS_1D_AL) [#]	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL) [#]	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL)*	<5	<5	<5	<5	<5	<5				<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL)*	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL) [#]	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL) [#]	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL)#	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/TM36/PM12/PM16/PM30
												1

Client Name: WSP Environmental Report : Liquid 40000205 Reference: Ballykellly Location: John Moran Contact: Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle 24/12294 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HN0₃ FMT Job No. EMT Sample No. 7-12 13-18 19-24 25-30 31-36 1-6 BH03_D Sample ID BH01 BH02 BH03 BH04 SW01 Depth COC No / misc Containers V H HN P G 11/07/2024 Sample Date 15/07/2024 11/07/2024 15/07/2024 11/07/2024 11/07/2024 Sample Type Ground Wate Ground Wate Ground Wate Ground Wate Surface Wat Ground Wate Batch Number 1 1 1 Date of Receipt 17/07/2024 17/07/2024 17/07/2024 17/07/2024 17/07/2024 17/07/2024 TPH CWG Aromatics >C5-EC7 (HS_1D_AR)# <10 <10 <10 <10 <10 <10 >EC7-EC8 (HS_1D_AR)# <10 <10 <10 <10 <10 <10 >EC8-EC10 (HS_1D_AR)# <10 <10 <10 <10 <10 <10 >EC10-EC12 (EH_CU_1D_AR)* <5 <5 <5 <5 <5 <5 >EC12-EC16 (EH_CU_1D_AR)* <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 >EC16-EC21 (EH_CU_1D_AR)* <10 <10 <10 >EC21-EC35 (EH_CU_1D_AR)* <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 Fotal aromatics C5-35 (EH_CU+HS_1D_AR)* <10 <10 <10 <10 <10 <10 ics and aro C5-35) (EH CU+HS 1D T Sulphate as SO4 # 29.9 20.0 3.7 26.1 20.3 3.9 Chloride # 13.1 20.9 5.1 15.3 19.4 5.4 Nitrate as NO3 # 32.5 0.3 5.8 33.4 0.7 6.0 <0.02 <0.02 <0.02 <0.02 Nitrite as NO2# <0.02 0.03 0.20 <0.06 <0.06 <0.06 <0.06 <0.06 Ortho Phosphate as PO4 # Ammoniacal Nitrogen as N[#] 0.34 0.05 <0.03 0.03 <0.03 <0.03 Hexavalent Chromium <6 41 <6 <6 <6 <6 Total Dissolved Chromium III <6 <6 <6 <6 6 <6 500 208 1200 136 254 Total Alkalinity as CaCO3 # 764 10 <7 21 <7 COD (Settled)# <7 <7 Total Suspended Solids # 1447 828 828 3074 <10 1027

QF-PM 3.1.2 v11

Please see attached notes for all abbreviations and acronyms

Units

ug/l

ug/l

ug/l

ug/l

ug/l

ug/l

ug/l

ug/l

ug/l

ma/l

ma/l

ma/l

mg/l

mg/l

mg/l

ug/l

ug/l

mg/l

mg/l

mg/l

LOD/LOR

<10

<10

<10

<5

<10

<10

<10

<10

<10

<0.5

<0.3

<0.2

<0.02

<0.06

<0.03

<6

<6

<1

<7

<10

Method

No.

TM36/PM12

TM36/PM12

TM36/PM12

TM5/PM16/PM3

TM5/PM16/PM3

TM5/PM16/PM3

TM5/PM16/PM3

TM38/PM0

TM38/PM0

TM38/PM0

TM38/PM0

TM38/PM0

TM38/PM0

TM38/PM0

TM0/PM0

TM75/PM0

TM57/PM0

TM37/PM0

Client Name:	WSP Environmental
Reference:	40000205
Location:	Ballykellly
Contact:	John Moran

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason					
	No deviating sample report results for job 24/12294										
1											

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.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/12294

SOILS and ASH

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. Asbestos samples are retained for 6 months.

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 $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$. Ash samples are dried at $35^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil 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 HCI (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 overesitimate 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 is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

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 for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

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

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 requirement of our Accreditation Body 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. Laboratory records are kept for a period of no less than 6 years.

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.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).

Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	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 quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
со	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
ТВ	Trip Blank Sample
ос	Outside Calibration Range
AA	x5 Dilution
AB	x10 Dilution

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.

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
тмо	Not available	PM0	No preparation is required.				
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.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	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				
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			
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 GCFID 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			
TM37	2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition; USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and VOL	PM0	No preparation is required.	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: 2013I	PM0	No preparation is required.				
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	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

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
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			



Element Materials Technology Unit 3 Deeside Point Zone 3 Deeside Industrial Park Deeside CH5 2UA P: +44 (0) 1244 833780 F: +44 (0) 1244 833781

W: www.element.com

WSP Environmental Town Centre House Dublin Road Naas Co Kildare Ireland		BC-MRA	
		(4225
Attention :	John Moran		
Date :	9th September, 2024		
Your reference :	40000205		
Our reference :	Test Report 24/14693 Batch 1		
Location :	Ballykelly		
Date samples received :	28th August, 2024		
Status :	Final Report		
Issue :	202409091506		

Six samples were received for analysis on 28th August, 2024 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.

The greenhouse gas emissions generated (in Carbon - Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 13.539 kg of CO2

Scope 1&2&3 emissions - 31.996 kg of CO2

Authorised By:

5.6000

Simon Gomery BSc Senior Project Manager

Please include all sections of this report if it is reproduced

Client Name: Reference: Location: Contact: EMT Job No: WSP Environmental 40000205 Ballykelly John Moran 24/14693

Report : Liquid

 $\label{eq:liquids} \mbox{ Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle H=H_2SO_4, Z=ZnAc, N=NaOH, HN=HN0_3$

EMT Sample No.	1-6	7-12	13-18	19-24	25-30	31-36						
Sample ID	BH01	BH02	BH03	BH04	SW01	SW01_DUP						
Donth												
Deptil										 Please se abbrevi	e attached n ations and a	otes for all cronyms
COC No / misc										 		,
Containers	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G	V H HN P G						
Sample Date	26/08/2024	26/08/2024	26/08/2024	26/08/2024	26/08/2024	26/08/2024						
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water						
Batch Number	1	1	1	1	1	1						Method
Date of Receipt	28/08/2024	28/08/2024	28/08/2024	28/08/2024	28/08/2024	28/08/2024				LOD/LOR	Units	No.
Dissolved Arsenic [#]	5.4	<2.5	<2.5	<2.5	<2.5	<2.5				<2.5	ua/l	TM30/PM14
Dissolved Barium [#]	85	63	8	18	23	23				<3	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	ug/l	TM30/PM14
Dissolved Boron	55	17	17	19	13	16				<12	ug/l	TM30/PM14
Dissolved Cadmium [#]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	ug/l	TM30/PM14
Dissolved Calcium [#]	121.3	96.1	42.5	89.1	42.6	42.8				<0.2	mg/l	TM30/PM14
Total Dissolved Chromium [#]	4.6	6.6	6.9	<1.5	<1.5	<1.5				<1.5	ug/l	TM30/PM14
Dissolved Copper [#]	<7	<7	<7	<7	<7	<7				<7	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5	<5				<5	ug/l	TM30/PM14
Dissolved Magnesium [#]	10.9	12.5	3.1	8.1	10.1	10.1				<0.1	mg/l	TM30/PM14
Dissolved Manganese #	40	<2	22	<2	27	27				<2	ug/l	TM30/PM14
Dissolved Mercury [#]	<1	<1	<1	<1	<1	<1				<1	ug/l	TM30/PM14
Dissolved Nickel [#]	4	<2	<2	<2	<2	<2				<2	ug/l	TM30/PM14
Dissolved Potassium [#]	31.4	2.0	0.7	0.6	2.1	2.1				<0.1	mg/l	TM30/PM14
Dissolved Selenium [#]	<3	<3	<3	<3	<3	<3				<3	ug/l	TM30/PM14
Dissolved Sodium [#]	8.9	9.3	4.5	7.1	8.4	8.3				<0.1	mg/l	TM30/PM14
Dissolved Vanadium [#]	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5				<1.5	ug/l	TM30/PM14
Dissolved Zinc [#]	26	9	11	13	<3	3				<3	ug/l	TM30/PM14
Total Chromium	<1.5	<1.5	35.9	<1.5	<1.5	<1.5				<1.5	ug/l	TM30/PM14
Total Iron	1018	536	25033 _{AA}	198	26	29				<20	ug/l	TM30/PM14
MTBE [#]	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
Benzene [#]	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
Toluene [#]	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
Ethylbenzene [#]	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
m/p-Xylene [#]	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
o-Xylene#	<5	<5	<5	<5	<5	<5				<5	ug/l	TM36/PM12
TPH CWG												
Aliphatics												
>C5-C6 (HS_1D_AL) [#]	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>C6-C8 (HS_1D_AL) [#]	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>C8-C10 (HS_1D_AL) [#]	<10	<10	<10	<10	<10	<10				<10	ug/l	TM36/PM12
>C10-C12 (EH_CU_1D_AL)*	<5	<5	<5	<5	<5	<5				<5	ug/l	TM5/PM16/PM30
>C12-C16 (EH_CU_1D_AL)*	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
>C16-C21 (EH_CU_1D_AL)*	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
>C21-C35 (EH_CU_1D_AL) [#]	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 (EH_CU+HS_1D_AL)#	<10	<10	<10	<10	<10	<10				<10	ug/l	TM5/TM36/PM12/PM16/PM30
		1	1	1								

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Containers	V H HN P G	V H HN P G		 								
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Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water						
Batch Number	1	1	1	1	1	1					Method	
Date of Receipt	28/08/2024	28/08/2024	28/08/2024	28/08/2024	28/08/2024	28/08/2024			LOD/LOR	Units	No.	
TPH CWG												
Aromatics												
>C5-EC7 (HS_1D_AR) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12	
>EC7-EC8 (HS_1D_AR) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12	
>EC8-EC10 (HS_1D_AR)#	<10	<10	<10	<10	<10	<10			<10	ug/l	TM36/PM12	
>EC10-EC12 (EH_CU_1D_AR)#	<5	<5	<5	<5	<5	<5	 		<5	ug/l	TM5/PM16/PM30	
>EC12-EC16 (EH_CU_1D_AR) [#]	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30	
>EC16-EC21 (EH_CU_1D_AR)*	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30	
>EC21-EC35 (EH_CU_1D_AR)"	<10	<10	<10	<10	<10	<10			<10	ug/l	TM5/PM16/PM30	
Total aromatics C5-35 (EH_CU+HS_1D_AR)*	<10	<10	<10	<10	<10	<10			<10	ug/i	TMS/TMS6PM12PM16/PM30	
Total aliphatics and aromatics(CS-35) (EH_CU+HS_1D_Total)*	<10	<10	<10	<10	<10	<10			<10	ug/i		
Sulphate as SO4 #	23.3	19.1	2.5	19.5	20.4	20.4			<0.5	ma/l	TM38/PM0	
Chloride [#]	14.2	20.1	3.8	15.0	19.1	19.1			<0.3	mg/l	TM38/PM0	
Nitrate as NO3 [#]	27.2	0.9	3.8	21.5	0.5	0.5			<0.2	mg/l	TM38/PM0	
Nitrite as NO2 [#]	0.16	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/l	TM38/PM0	
Ortho Phosphate as PO4 [#]	0.27	0.09	0.08	0.08	0.07	0.07			<0.06	mg/l	TM38/PM0	
Ammoniacal Nitrogen as N [#]	0.16	<0.03	0.03	<0.03	<0.03	0.03			<0.03	mg/l	TM38/PM0	
Hexavalent Chromium	<6	<6	<6	<6	<6	<6			<6	ug/l	TM38/PM0	
Total Dissolved Chromium III	<6	7	7	<6	<6	<6			<6	ug/l	TM0/PM0	
		050	(00		400	400						
Total Alkalinity as CaCO3"	352	258	160	208	122	122			<1	mg/l	TM75/PM0	
COD (Sottlad) [#]	14	18	<7	21	25	12			<7	ma/l	TM57/PM0	
Total Suspended Solids [#]	55	24	548	15	<10	<10			<10	ma/l	TM37/PM0	

Client Name:	WSP Environmental
Reference:	40000205
Location:	Ballykelly
Contact:	John Moran

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
					No deviating sample report results for job 24/14693	

Notification of Deviating Samples

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.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 24/14693

SOILS and ASH

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. Asbestos samples are retained for 6 months.

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 $35^{\circ}C \pm 5^{\circ}C$ unless otherwise stated. Moisture content for CEN Leachate tests are dried at $105^{\circ}C \pm 5^{\circ}C$. Ash samples are dried at $35^{\circ}C \pm 5^{\circ}C$.

Where Mineral Oil 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 HCI (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 overesitimate 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 is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

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 for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

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

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 requirement of our Accreditation Body 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. Laboratory records are kept for a period of no less than 6 years.

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.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).

Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
В	Indicates analyte found in associated method blank.
DR	Dilution required.
М	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 quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
со	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
ТВ	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution

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.

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
тмо	Not available	PM0	No preparation is required.				
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.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	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				
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			
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 GCFID 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			
TM37	2540D:1999 22nd Edition; VSS: USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition; USEPA 1684 (Jan 2001), USEPA 160.4 (1971) and SMEWW 2540E:1999 22nd Edition. Gravimetric determination of Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS). Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed at 105°C for TSS and VOL	PM0	No preparation is required.	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: 2013I	PM0	No preparation is required.				
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	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. (Rev. 2.0 1993) Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			

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
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			