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Introduction

Background

7.1 This chapter of the EIAR provides a description of the surface water (hydrology) and groundwater (hydrogeology) conditions in the application area within the context of the regional setting, and assesses the potential impacts the proposed development will have on surface water and groundwater. Mitigation measures, if required, are proposed.

7.2 Available information on the surface water and groundwater of the Mounthall area and its surrounds was collated and evaluated.

Proposed Development

7.3 The proposed development is described in detail in Chapter 2: Project Description of this EIAR and only those elements which relate to water and water management are presented here for the purpose of this chapter. The proposed site layout is shown on **Figure 2-3**.

7.4 Extraction within the existing pit was carried out as a dry extraction operation above the groundwater table. It is proposed that extraction within the extension area will also be carried out above the groundwater table, with the proposed pit floor sloping from northwest (c. 205m AOD) to southeast (c. 175m AOD). It is proposed to extract the sand and gravel in 3 phases as shown on **Figure 2-2** and outlined below with extraction progressing in an anti-clockwise direction from Phase 1 to Phase 3.

7.5 Sand and gravel extraction in the extension area will remain above the surficial groundwater level in the sand and gravel deposits (dry working). The sand and gravel deposits are not classified as an aquifer, and these deposits are underlain by low permeability silt and clay across the extension area, which provides protection to the underlying sandstone aquifer.

7.6 The proposed development consists of continued use and extraction of sand and gravel (dry working) over an area of c. 8 hectares with processing that includes crushing, washing (closed loop water recycling system with associated silt storage lagoons), screening and all ancillary works and structures.

7.7 The development includes site facilities consisting of mobile processing plant, portacabin site office, portacabin welfare facility, serviced portaloo toilet, bunded fuel storage and refuelling pad with hydrocarbon interceptor, weighbridge, wheelwash, water supply borehole, perimeter berms, vegetation planting and fencing.

7.8 Construction of silt storage lagoons (1,952.25m^2) associated with the washing plant closed loop water recycling system.

Water Management

7.9 The sand and gravel processing methods will consist primarily of washing and screening, using a mobile processing plant, to produce a range of aggregates for sale and distribution by the company. The mobile plant will operate within a closed loop water circuit with the silt storage lagoons to minimise the need for excessive take of groundwater and to eliminate the need to discharge process water from the site.

7.10 There is no surface water drainage infrastructure within the site. Rain falling across the existing site percolates down through the existing ground surface as recharge to shallow groundwater in superficial deposits.

7.11 The provision of a serviced portaloo on site will negate the requirement for installing a septic tank / propriety effluent treatment system.

7.12 Drinking water will be supplied by means of bottled water.

Water Supply Well

7.13 A water supply well will be required to provide water for the closed loop water recycling system for washing and dust suppression.

7.14 The water supply well will be located in the site facilities area and will extend into the underlying bedrock which is classified by the GSI as a locally important aquifer. Details on this aquifer are provided in Section 7.58.

7.15 Due to the closed loop water recycling system, the water requirement for top-up of the washing plant is considered to be minimal.

Scope of Work

7.16 The scope of this chapter includes:

- an assessment of the existing surface water and groundwater within approximately 2 km of the application area;
- an assessment of the potential impact of the proposed sand and gravel extraction on surface water and groundwater, and;
- where necessary, recommendation(s) for mitigation measures to reduce or eliminate any potential impacts.

Project Team

7.17 This chapter of the EIAR was prepared by SLR Consulting Ireland. The project team consists of:

- Technical Director (Hydrogeology) Dominica Baird BSc (Earth Science), MSc (Hydrogeology), CGeol, EurGeol, MIAH;
- Technical Director (Hydrology) Peter Glanville BA (Geography), PhD (Geomorphology), PGeo, EurGeol; and
- Project Hydrogeologist Mairéad Brown BSc (Earth Science).

Limitations / Difficulties Encountered

7.18 The evaluation of the hydrological and hydrogeological environment provided here relies on the detailed assessment, visual inspections conducted during site visits, a comprehensive dataset of monitoring records, publicly available information, and anecdotal evidence from local personnel.

7.19 No constraints or challenges were encountered during the compilation of this chapter in the Environmental Impact Assessment Report (EIAR).

Regulatory Background

Legislation

7.20 The key European Directives / European Union Legislation which apply to this Chapter of the EIAR and the hydrology and hydrogeology assessment presented herein are:

- Environmental Impact Assessment Directive (2011/92/EU); and
- Directive of the European Parliament and of the Council amending Directive 2011/92/EU on assessment of effects of certain public and private projects on the environment (2014/52/EU).

7.21 Other European Directives to which this EIAR makes reference, or has had regard, are listed in **Appendix 7-A**.

7.22 Irish Government Acts, National Legislation and Regulations which apply to this Chapter of the EIAR and the surface water and groundwater assessment presented herein are also listed in **Appendix 7-A.**

7.23 Most notably, under Regulation 4 of the Groundwater Regulations 2010, a duty is placed on public authorities to promote compliance with the requirements of the regulations and to take all reasonable steps including, where necessary, the implementation of programmes of measures, to:

7.24 *"(**a**) prevent or limit, as appropriate, the input of pollutants into groundwater and prevent the deterioration of the status of all bodies of groundwater;*

7.25 *`(**b**) protect, enhance and restore all bodies of groundwater and ensure a balance between abstraction and recharge of groundwater with the aim of achieving good groundwater quantitative status and good groundwater chemical status by 2015 or, at the latest, by 2027;*

7.26 *(**c**) reverse any significant and sustained upward trend in the concentration of any pollutant resulting from the impact of human activity in order to progressively reduce pollution of groundwater;*

7.27 *(**d**) achieve compliance with any standards and objectives established for a groundwater dependent protected area included in the register of protected areas established under Regulation 8 of the 2003 Regulations [S.I. No. 722 of 2003] by not later than 2015, unless otherwise specified in the Community legislation under which the individual protected areas have been established."*

Planning Policy and Development Control

7.28 The Planning Policy and Development Control relating to water at the site in this EIAR is set out in the Laois County Development Plan 2021-2027.

Guidelines and Technical Standards

7.29 The following key guidelines apply to this hydrology and hydrogeology assessment:

- Institute of Geologists of Ireland. Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements, April 2013;
- National Roads Authority, 2008. Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;

- Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports: Environmental Protection Agency;
- Environmental Protection Agency, 2006. Environmental Management in the Extractive Industry: Non-Scheduled Minerals; and
- Geological Survey of Ireland - Irish Concrete Federation, 2008. Geological Heritage Guidelines for the Extractive Industry.

7.30 Additional guidelines and technical standards which apply to this Chapter of the EIAR and the hydrology and hydrogeology assessment presented herein are listed in **Appendix 7-A**.

Receiving Environment

Study Area

7.31 For the purposes of this assessment, the study area comprises the application site and the surrounding area up to 2km reflect the sensitivity of the surface water and groundwater; this is in line with the Institute of Geologists of Ireland's (IGI) guidelines (2013).

7.32 The IGI guidelines state that the minimum distance of 2 km should be reviewed in the context of the geological environment as well as the scale of development and increased to reflect the sensitivity of the subsurface, and this has been carried out.

Baseline Study Methodology

7.33 A detailed geological, hydrological and hydrogeological dataset has been collected as part of this EIAR study.

7.34 The investigation methodology adheres to the Environmental Protection Agency's (EPA) guidelines on environmental impact assessments and the IGI's recommendations on Geology in Environmental Impact Statements.

Desk Study

7.35 Existing information on the geology, hydrogeology and hydrological features of the Mounthall area and its surrounds was collated and evaluated. The desk study involved the examination of several datasets to determine the geological and hydrogeological setting of the area, as detailed in **Table 7-1**.

Table 7-1: Regional Data Consultation

Data	Dataset Source
Soils	Irish Soils Information System – Teagasc
Subsoil Geology	Teagasc/GSI/EPA Subsoil Mapping
Bedrock Geology	GSI Groundwater Data Viewer - Bedrock Geology
Surface Water	OSi Discovery Series mapping; Environmental Protection Agency online mapping; Water Framework Directive; OPW CFRAM; and Current Laois County Council Development Plan.

Groundwater	GSI Groundwater Data Viewer - bedrock and gravel aquifers, vulnerability, water supplies, groundwater recharge; GSI Groundwater body description documents; Environmental Protection Agency water maps; and National Federation of Group Water Schemes (NFGWS) Data Viewer.
Climate	Met Eireann
Protected Areas, Environmental Pressures	Environmental Protection Agency; and National Parks and Wildlife Service

Detailed Site Investigations

7.36 In addition to the above desk study of publicly available data, extensive data gathering has been undertaken at the site. The works carried out for assessing hydrology and hydrogeology in the Mounthall area is outlined as follows:

- Installation of 9 no. groundwater monitoring boreholes across the proposed development area, to monitor both the sand and gravel superficial deposits and underlying sandstone aquifer;
- Installation of groundwater level data loggers at 5 no. on-site groundwater monitoring boreholes to facilitate continuous groundwater level monitoring;
- Manual dipping of groundwater wells from 9 no. on-site groundwater monitoring boreholes on 13 no. occasions;
- 5 no. rising head tests;
- Installation of rain gauge;
- Measurement of surface water flow values at 3 no. locations over 3 no. rounds of monitoring,
- 3 no. rounds of surface water quality monitoring at 3 no. monitoring points in the vicinity of the proposed development area.
- 3 no. rounds of groundwater quality from 9 no. on-site groundwater monitoring boreholes; and analysis of the information gathered.
- Well survey of private wells within 500m of the proposed development area.

Site Setting

7.37 The proposed application area (c. 12.2 hectares) lies in County Laois in the townlands of Mounthall and Cummer, Camross. Within the application area, the northern portion of the site (c. 1.2 hectares) contains the existing sand and gravel pit and entrance onto the L10317. The existing pit consists of a single face typically 8m in height. Ground levels rise from the entrance at c. 194m AOD westwards to the toe of the existing face along the western boundary where ground levels are c. 200-203m AOD.

7.38 To the south of the existing pit, existing agricultural grazing lands are situated, over which the proposed extension extraction operations (c. 8 hectares) are intended to gradually advance through. The extension lands are undulating, and ground levels are variable from c. 205m AOD adjacent to the existing pit to the north, falling south-eastwards to c. 195m

AOD, before rising to 205m AOD and again falling away to c. 180m AOD in the southeast corner of the site.

7.39 The rural lands surrounding the application site mainly consist of agricultural fields and private residential properties.

7.40 Surface water features at the proposed development area include a small pond (c. 20m in diameter) located along the eastern site boundary, outside of the proposed extraction area which will be retained.

7.41 There is a small stream located along the southern boundary, which flows into the Killeen River from the southern boundary approx. 150m from the site.

7.42 Located north to the existing pit are the Slieve Bloom Mountains. These are both an SPA and a SAC. The Slieve Bloom SPA borders the north of the existing pit while the Slieve Bloom SAC is located c. 1.5km north of the pit.

Rainfall and Climate

7.43 There is no Met Éireann rainfall gauging station near to the application site and therefore a rain gauge station was installed on the site. The rain gauge was installed on 24th April 2024 at the entrance to the existing sand and gravel pit, see **Plate 7-1** below. The average monthly rainfall for the on-site rain gauge is presented in **Table 7-2**. The daily rainfall measurements are shown in **Appendix 7-B**.

Plate 7-1: Site Rain Gauge

Table 7-2: Average Monthly Rainfall (mm) for On Site Rain Gauge

April (from 25th)	May	June	July	August
17.4	63.4	63.6	82.2	36.2

7.44 The nearest Met Éireann rain gauging station is Slieve Bloom (Nealstown), located c. 8km to the south-west of the proposed extraction facility.

7.45 The Long-Term Average (LTA) annual rainfall is not available for the Slieve Bloom weather station but is available for Gurteen College, located c. 30km west of the site. The most recent period published is 1981-2010. The LTA annual rainfall for Gurteen is 948.2mm/yr for the period 1981-2010 (Met Eireann, 2021). The LTA monthly rainfall for the period 1981-2010 are shown in **Table 7-3** below.

Table 7-3: Long Term Average Annual Rainfall (1981-2010), Gurteen College

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
96.4	66.2	74.5	59.8	68.0	71.8	66.7	84.9	74.8	103.8	89.8	91.5

7.46 According to Met Éireann's Past Weather Statement for Spring 2024 (March – May), spring 2024 was one of the warmest and wettest springs on record. The highest daily rainfall total was 45.3 mm at Dublin Airport, Co Dublin on Friday 1st March (highest daily fall for spring since 2002). For the Winter 2023 / 2024 season, nearly all rainfall totals were above their Long-Term Average 1981-2010 (LTA).

Soils and Geology

7.47 Soils and Geology are discussed in detail in Chapter 6 of this EIAR. A summary is provided below. The soils are shown in **Figure 6-2**, subsoils are presented in **Figure 6-3** and Bedrock Geology is presented in **Figure 6-4**.

Soils and Subsoils

7.48 The Irish Soil Information System project has developed a national association soil map for Ireland, the project is co-funded by Teagasc and the Environmental Protection Agency (EPA). The soils are discussed in detail in Chapter 6 of this EIAR.

7.49 The soils at the site are coarse loamy drift with siliceous stones known as the Clonegall (0920a) Soil Association, see **Figure 6-2**.

7.50 The EPA website publishes subsoil maps created by the Spatial Analysis Unit and Teagasc in collaboration with the Geological Survey Ireland (GSI). The subsoils are discussed in detail in Chapter 6 of this EIAR.

7.51 The subsoils at the site are glacial tills chiefly derived from Devonian sandstone and glaciofluvial sands and gravels chiefly derived from Devonian sandstone, see EIAR **Figure 6-3**. These subsoils are moderate (glacial tills) to highly (glaciofluvial sands and gravels) permeable and are overlain by well-drained soil (GSI online map viewer).

7.52 The soils and subsoils at the site will be removed to facilitate extraction.

7.53 Surrounding subsoils are bedrock at or close to the surface and alluvium undifferentiated along the Killeen River, see **Figure 6-2**. All of these subsoils are moderate to highly permeable, according to the GSI online map viewer.

Local Bedrock Geology

7.54 The GSI online map viewer (1:100,000 geology map) shows the site is underlain by pale and red sandstone, grit and claystone of the Cadamstown Formation. The local bedrock geology is shown in **Figure 6-4**.

7.55 The formation consists predominantly of medium to coarse yellow-white, purple, grey and brown sandstones, with occasional intraformational conglomerates and quartz pebble conglomerates.

7.56 There is an unconformity present northwest of the site c. 2km between the Cadamstown Formation and the Capard Formation.

Karst

7.57 There is no carbonate geology within the vicinity of the proposed development and hence there is no record of any karst features within 5km of the site.

Groundwater – Hydrogeology

Aquifer Characteristics

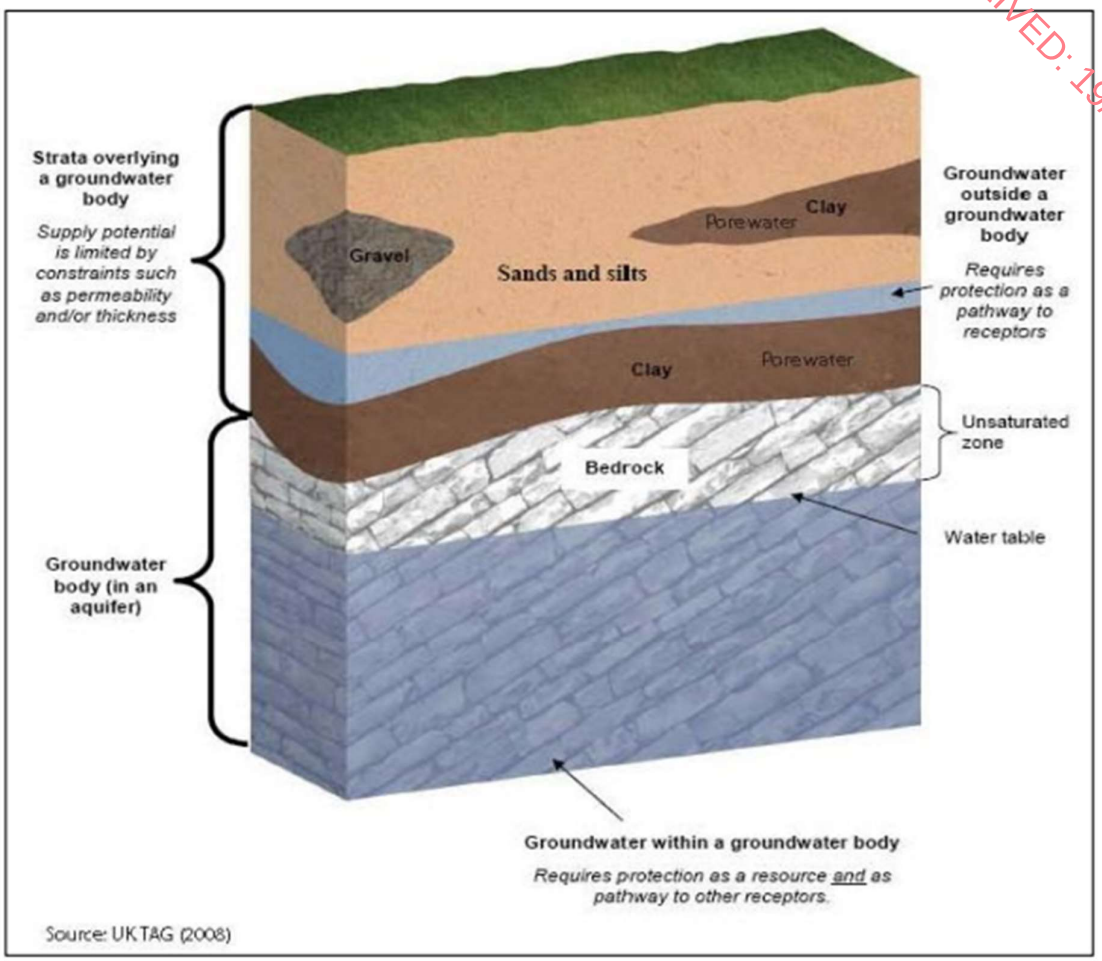
7.58 The GSI online map viewer shows the site is underlain by a locally important aquifer (Ll), Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones, see **Figure 7-1**. The aquifer has an area of 182 km^2.

7.59 The sand and gravel subsoils at the proposed development site are not defined by the GSI as an aquifer. A sand and gravel aquifer is defined by the GSI as being highly permeable, more than 10m thick or has a saturated thickness of at least 5m and having a continuous area of at least 1km^2. The superficial sand and gravel deposits at the site do not meet this criteria.

7.60 The EPA guidance on discharges to groundwater[1] defines the status of groundwater in strata overlying groundwater bodies, as shown in **Plate 7-2** below. Groundwater has a value as a lateral or vertical pathway to other receptors, and may be usable but only for local supplies <10m^3/d. **Plate 7-2** shows the scenario where groundwater is present outside a groundwater body, and separated from the underlying aquifer by a low permeability clay strata, as is the case for the proposed development site.

[1] EPA Guidance on the Authorisation of Discharges to Groundwater, V1 December 2011

Plate 7-2: Summary of Groundwater and Pore Water in Low Permeability Sediments



Groundwater Vulnerability

7.61 The GSI has developed a groundwater vulnerability classification for Ireland, refer to **Table 7-4** below. The groundwater vulnerability at a particular point is controlled by the natural geological and hydrogeological characteristics at that point. The vulnerability depends on the nature of the subsoils (i.e., their permeability characteristics), the type of recharge (point or diffuse) and the thickness of the unsaturated zone (depth to groundwater).

7.62 The groundwater vulnerability at the site is classed as High to Moderate, see **Figure 7-2,** indicating subsoil thickness of 3 - 10m.

Table 7-4: GSI Groundwater Vulnerability Rating

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			**Unsaturated Zone**	**Karst Features**
	High permeability (sand / gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/Gravel aquifers only)	(< 30 m radius)
Extreme (E)	0-3.0m	0-3.0m	0-3.0m	0-3.0m	-
High (H)	>3.0m	3.0-10.0m	3.0-5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0-10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (i) N/A= not applicable
(ii) Precise permeability value cannot be given at present.
(iii) Release point of contaminants is assumed to be 1-2m below ground surface.

7.63 According to the GSI online database, the hydrogeological setting of the proposed development is described as moderate permeability subsoil and overlain by well-drained soil. The effective rainfall (rainfall after evaporation) is 1,018 mm/yr. The groundwater recharge at the site is between 865 - 611 mm/yr, however a recharge cap applies to the site and the average recharge range is expected to be 151-200 mm/yr.

Groundwater Bodies

7.64 The proposed development is located within the Camross Groundwater Body (GWB). A description of the GWB is published by the GSI, and is summarised below and refers to the sandstone bedrock underlying the sand and gravel deposits at the site. Groundwater bodies are shown in **Figure 7-3.**

Camross GWB

7.65 This groundwater body is defined to the north by the boundary of the Nore River basin and to the south by the extent of the Cadamstown Sandstone. Most groundwater recharges in the north where subsoil thickness is lowest, then flows southeast. The rock units contained within this groundwater body area considered to be poor or locally important aquifers at best. Regional groundwater flow systems are not expected to develop. Discharge from the aquifer will be the nearest surface water feature in the area. Hydraulic gradients are likely to be high due to the elevated topography and therefore groundwater flow may be faster than anticipated from similar rock types located in low lying lands.

7.66 Groundwater will discharge locally to streams and rivers crossing the aquifer and also to small springs and seeps. Owing to the poor productivity of the aquifers in this body it is unlikely that any major groundwater - surface water interactions occur. Baseflow to rivers and streams is likely to be relatively low. This aquifer is considered to have low transmissivity and storativity.

7.67 In Slieve Bloom during the last glacial period, thick subsoils were deposited in the area occupied by the present day Delour Valley. The groundwaters in the bedrock are only moderately hard waters (220-240mg/l as CaCO3) but waters sampled from the recharging outcropping areas will be much softer. However, the bedrock waters have a high Mg/Ca

ratio, which reflects the lower levels of calcium and higher levels of magnesium in the strata. The groundwaters in this aquifer are mainly calcium/magnesium bicarbonate type waters. The average electrical conductivity is 374 (µs/cm). The bedrock strata in this aquifer is expected to be Siliceous, this is to be confirmed by the GSI.

Groundwater Monitoring Boreholes

7.68 An expansive network of groundwater monitoring boreholes, located in the shallow groundwater in the superficial deposits and the underlying sandstone bedrock aquifer, has been installed across the site. As the proposed extension lands are undulating, groundwater monitoring boreholes have been installed on the higher ground (BH08, see **Plate 7-3**), as well as on lower ground adjacent to the stream (BH06, see **Plate 7-4**).

Plate 7-3: BH08, located on higher ground

Plate 7-4: BH06, located on lower ground

7.69 There are nine groundwater monitoring wells at the site, see **Figure 7-4**. Borehole logs are presented in **Appendix 7-C**. BH01 – BH03 were installed in February 2023, BH04 and BH05 were installed in December 2023 and BH06 – BH9 were installed in February 2024. BH10 terminated at 7.80m bgl due to an obstruction when weathered bedrock was encountered. The borehole was dry and was backfilled. Boreholes BH01, BH02 and BH08 are located within the footprint of the proposed extraction area.

7.70 Drilling was carried out by Irish Drilling Ltd and Peterson Drilling Services Ltd and was supervised by SLR personnel.

7.71 All borehole installations included a gravel pack installed in the annular space between the slotted casing and the borehole; a bentonite seal was installed above the gravel pack to prevent the entry of surface water runoff from surrounding areas flowing directly into the boreholes. The boreholes were both fitted with a stand-up cover with a concrete surround. The borehole logs are included in **Appendix 7-C**.

7.72 Boreholes were drilled to a depth of between 4.0m bgl at BH06 (172.13 mOD), and 25.30m bgl at BH09 (175.82 mOD).

7.73 The boreholes encountered sands and gravels at all locations at the site, underlain by low permeability silt and clay. Sand and Gravel was underlain by low permeability silt and clay at BH1 - BH4 and BH7 - BH10. The ground conditions encountered during drilling are presented as an indicative Conceptual Site Model in **Plate 7-5** below.

7.74 Sand and Gravel was directly underlain by Sandstone at BH5 only, towards the west of the site and outside the extraction area. However, the Sand and Gravel strata overlying the Sandstone bedrock at BH5 was dry during drilling. The low lying BH6 to the south of the site encountered Cobbles underlain by Clay.

7.75 Details of groundwater monitoring boreholes installed on-site are presented in **Table 7-5**. Groundwater monitoring borehole locations are presented in **Figure 7-4**.

Plate 7-5: Conceptual Site Model

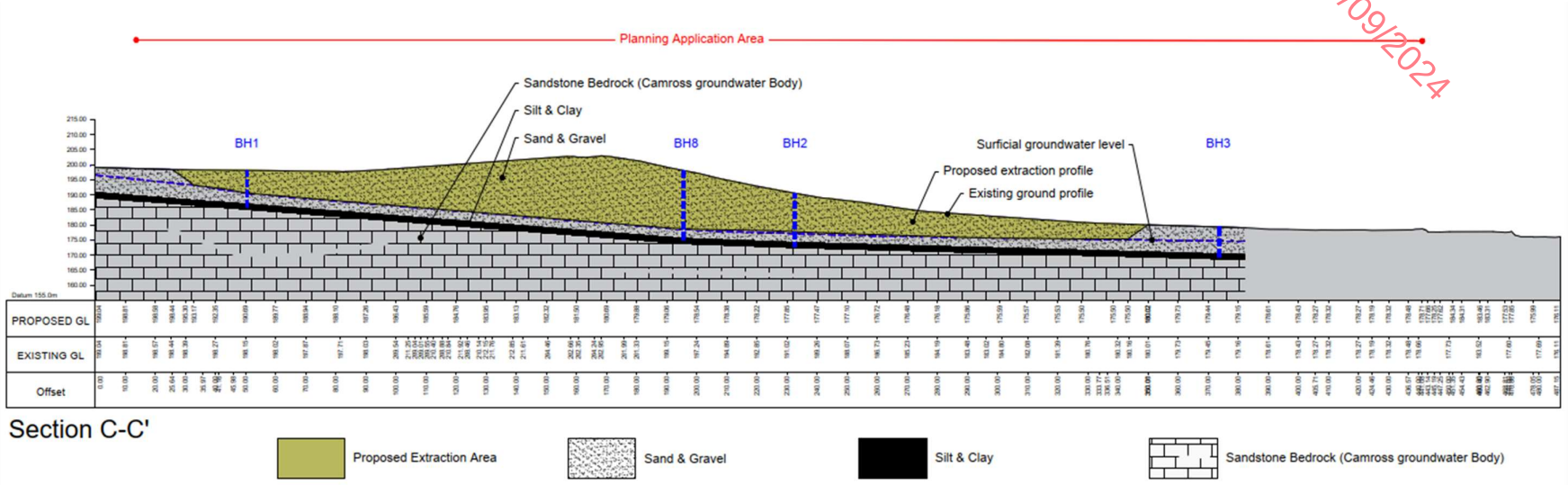


Table 7-5: Details of groundwater monitoring boreholes on-site

Borehole ID	Easting, Northing	Ground Level Elevation (m AOD)	Reference Level* Elevation (m AOD)	Depth (m bgl)	Elevation of base of borehole (m AOD)	Water strikes (m AOD)	Standpipe installation (m bgl)	Screened Strata
BH01	626571, 698126	197.52	197.8	11.5	186.02	No defined strikes	Plain 0 -2 Slotted 2 - 11.5	Sand and Gravel
BH02	626762, 698132	195.87	196.12	23.00	172.87	No defined strikes	Plain 0-2.9 Slotted 2.9 -23.0	Sand and Gravel
BH03	626900, 698105	181.38	181.67	12.00	169.38	No defined strikes	Plain 0-2.9 Slotted 2.9 -12.0	Sand and Gravel
BH04	626497, 698248	204.43	204.94	25.00	179.43	Water strike at 20m in fine grained sandstone - Medium inflow	Plain 0-14 Slotted 14 -25	Sandstone
BH05	626456, 698027	193.67	194.2	15.00	178.67	Water strike at 9.5m in fine grained sandstone - Slow inflow	Plain 0-9 Slotted 9 - 15.0	Sandstone
BH06	626763, 698015	176.30	176.79	4.00	172.30	Water strike at 2.2m in sandy cobbles - Medium inflow	Plain 0-2 Slotted 2 - 3.0	Clay and Cobbles
BH07	626497, 698248	208.52	208.77	6.20	202.32	Water strike at 3.0m in reddish brown sand - Medium inflow	Plain 0-2.2 Slotted 2.2 - 6.2	Sand

BH08	626721, 698126	199.31	199.60	24.20	175.71	No defined strikes	Plain 0-18 Slotted 18 – 24.2	Sand
BH09	626785, 698214	198.86	199.11	25.30	173.56	Water strike at 23.0m in brown silty sand - Slow inflow	Plain 0-19.3 Slotted 19.3– 25.3	Silty Sand
BH10	626537, 698138	198.09	-	7.80	190.29	No defined strikes	Dry - backfilled	No installation

Groundwater Levels

7.76 Manual groundwater levels were taken approximately every two weeks from February 2024 to August 2024 by Breedon Ireland and monthly by SLR personnel from April 2024 to July 2024. These were used to calibrate, verify and adjust the logger groundwater level data. Manual readings coupled with barometric data were used to correct the logger groundwater data for the site conditions.

7.77 Five water level loggers were placed in BH02, BH03, BH04, BH05 and BH06 on the 15th of April 2024 and set to record a groundwater level every hour. Groundwater level data from February 2024 to July 2024 is shown in **Figure 7-5** below.

7.78 A barometer was installed in borehole BH04 and set to take readings every hour. The barometer records variations in atmospheric pressure. One barometer is sufficing for a 25 km^2 area, therefore only one is needed for this site.

7.79 There is no rainfall gauging station nearby and therefore a rain gauge station was established on the site. The rain gauge was installed on 24th April 2024 at the entrance to the existing sand and gravel pit, see **Plate 7-1**.

7.80 Rainfall data is available from April 2024 to August 2024 and is graphed against groundwater levels in **Figure 7-5**. A summary of the groundwater levels recorded by the data loggers can be seen in **Table 7-6** below, the groundwater levels manually recorded are summarised in **Table 7-7** and a combination of the groundwater levels is summarised in **Table 7-8**. As previously noted, spring 2024 was one of the warmest and wettest springs on record. For the winter 2023 / 2024 season, nearly all rainfall totals were above their Long-Term Average 1981-2010.

7.81 There is minimal variation in groundwater levels in the Sand and Gravel deposits, for example in BH02 throughout the 2024 monitoring period minor variability was recorded, with a total variation of 1.13m, a maximum of 177.46m AOD and a minimum of 176.33m AOD.

7.82 The groundwater levels in the Sand and Gravel deposits at BH03 from the April 2024 to July 2024 monitoring period had a maximum of 174.69m AOD and a minimum of 174.36m AOD, showing a total variation of 0.33m. This is the smallest variation in all the monitoring wells.

7.83 The groundwater levels in the sandstone bedrock in BH04 have a total variation of 2.73m, with a maximum of 193.07m AOD and a minimum of 190.34m AOD. The sandstone bedrock at BH05 showed the maximum variation in all the wells with a total variation of 3.1m. The well reported a maximum of 189.92m AOD and a minimum of 186.82m AOD.

7.84 The groundwater levels in the Clay and Cobbles deposits near the stream at BH06 showed a minimal variation of 0.37m. This well reported a maximum groundwater level of 175.38m AOD and a minimum of 175.0m AOD.

7.85 It can be seen from the discussion above and **Figure 7-5** below, that there is very little variation in groundwater levels across the site. The gravel and sand strata across the site allow for intergranular groundwater flow and the storativity here is generally high. Water flow through this layer is generally quick leading to fast recharge rates.

7.86 Groundwater levels at each borehole do not vary greatly and do not seem to follow rainfall patterns due to high aquifer storativity. The manual groundwater levels trendlines have an average gradient of 0.01m. The highest trendline was recorded at BH05 (0.022m) and the lowest at BH03 (0.0018m).

7.87 Manual groundwater levels are graphed against rainfall in **Figure 7-5** below. The nearest Met Éireann rain gauging station is Slieve Bloom (Nealstown), located c. 8km to the south-west of the application site. Rainfall data is available at this station from February 2024 to April 2024 at the time of this report.

7.88 Rainfall from the Slieve Bloom rain gauging station and the onsite rain gauge was used in **Figure 7-6** below to create a time series of rainfall from February 2024 to August 2024.

7.89 Data from **Figure 7-6** shows that there has been little overall change to manual groundwater levels, but all wells have shown a decrease from February 2024 to August 2024. Groundwater levels have decreased no more than 3m since monitoring began.

7.90 **Figure 7-6** below shows that groundwater levels reached a peak in most wells between mid-March and early April. Groundwater levels had already begun to decrease before loggers were placed in some of the wells in April 2024. The lowest manual groundwater levels recorded were during the 9th July 2024 and 12th August 2024 monitoring rounds where both BH08 and BH09 were reported as dry.

7.91 Groundwater levels are highest in the north-west and lowest in the south-east of the site. These groundwater levels indicate that groundwater is flowing roughly in a south-easterly direction, towards the Killeen River as expected.

Table 7-6: Summary of groundwater level logger data (April 2024 – July 2024)

		BH02	BH03	BH04	BH05	BH06
Strata		Sand and Gravel	Sand and Gravel	Sandstone	Sandstone	Clay and Cobbles
mAOD	**Minimum**	176.33	174.37	190.34	186.82	175.00
	Average	176.87	174.56	191.31	188.05	175.18
	Maximum	177.26	174.70	192.64	189.66	175.38
m	**Range**	0.922	0.331	2.31	2.84	0.37

Table 7-7: Summary of manual groundwater levels (February 2024 – August 2024)

	Units	BH 01	BH 02	BH 03	BH 04	BH 05	BH 06	BH 07	BH 08	BH 09
Strata		Sand & Gravel	Sand & Gravel	Sand & Gravel	Sand-stone	Sand-stone	Clay & Cobbles	Sand	Sand	Silty Sand
Min	**m AOD**	188.41	176.39	174.23	190.43	186.84	174.53	205.16	176.93	176.59
Max	**m AOD**	190.50	177.46	174.84	193.07	189.92	175.66	207.60	178.37	177.35
Range	**m**	2.09	1.07	0.61	2.64	3.08	1.13	2.44	1.44	0.76

Table 7-8: Summary of combination of manual and logger groundwater levels

	Units	BH 01	BH 02	BH 03	BH 04	BH 05	BH 06	BH 07	BH 08	BH 09
Strata		Sand & Gravel	Sand & Gravel	Sand &Gravel	Sand-stone	Sand-stone	Clay & Cobbles	Sand	Sand	Silty Sand
Min	**m AOD**	188.41	176.33 (logger)	174.23	190.34 (logger)	186.82 (logger)	174.53	205.16	176.93	176.59
Max	**m AOD**	190.50	177.46	174.84	193.07	189.92	175.66	207.60	178.37	177.35
Range	**m**	2.09	1.13	0.61	2.73	3.1	1.13	2.44	1.44	0.76

Figure 7-5: Groundwater levels at on-site boreholes and on-site rainfall

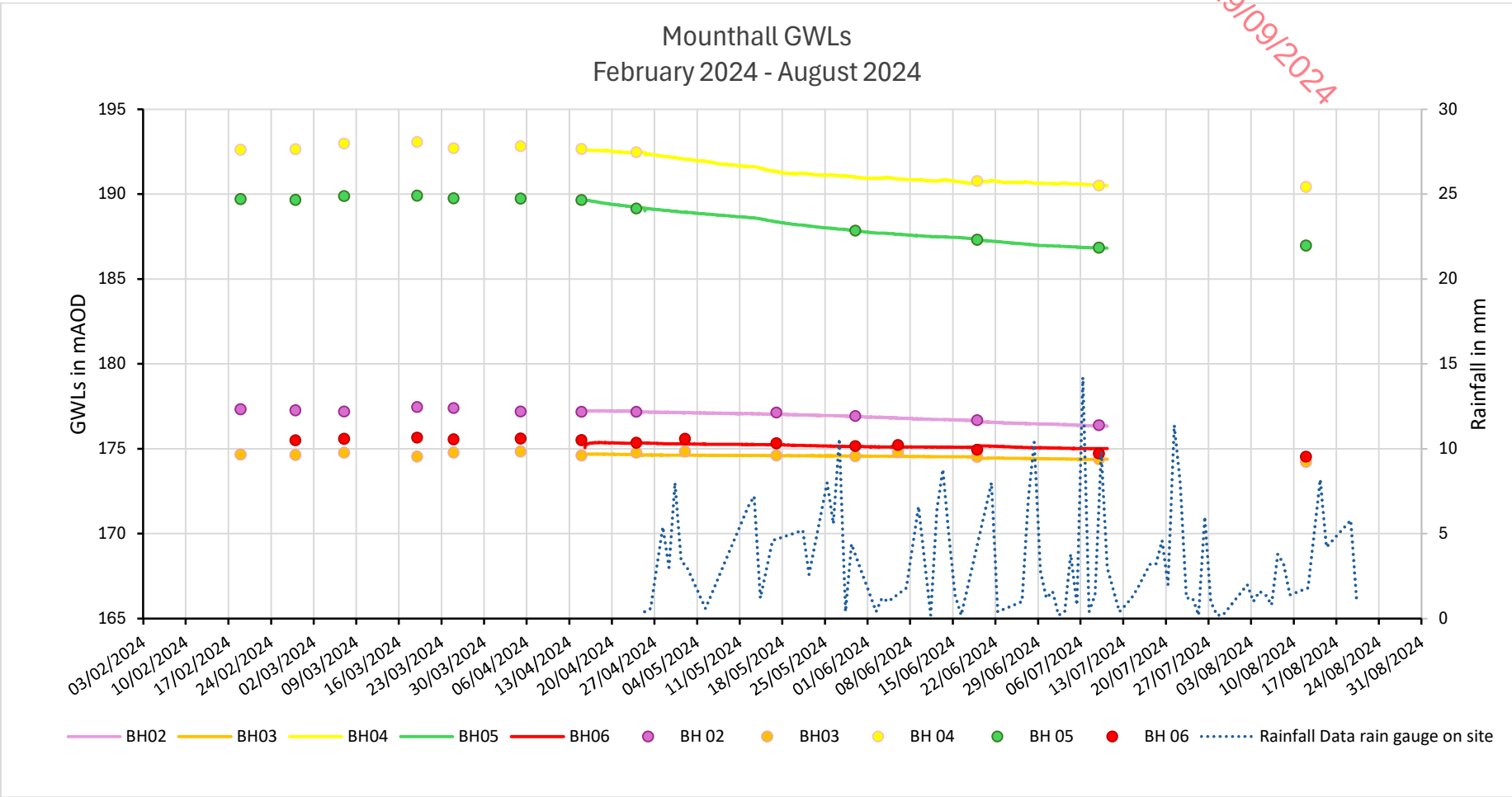
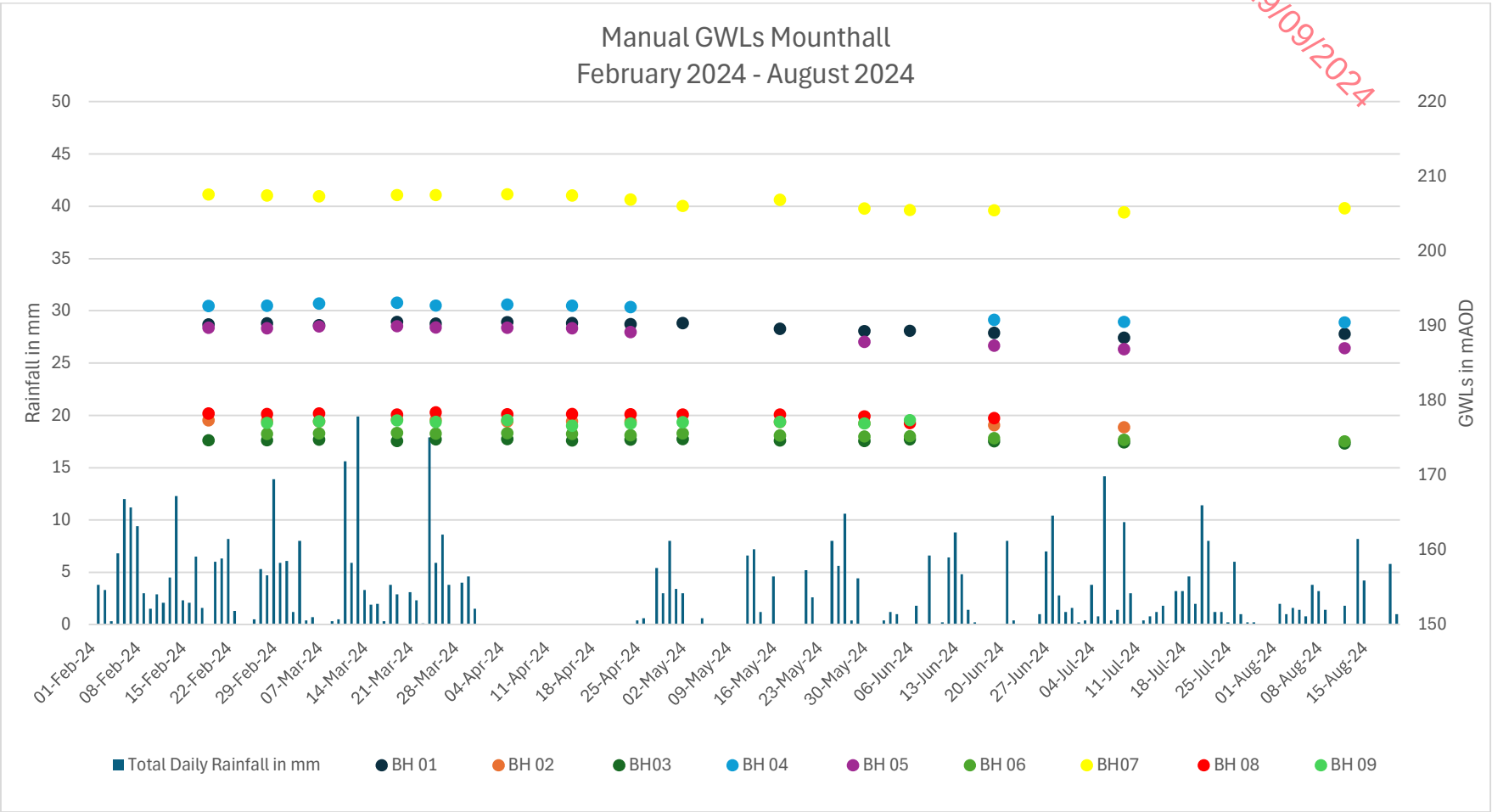


Figure 7-6: Manual groundwater levels at on-site boreholes and rainfall from Slieve Bloom and on-site rain gauge



Groundwater Quality

7.92 Groundwater quality monitoring was carried out on 24th April 2024, 18th June 2024 and 9th July 2024. The results were compared against Groundwater Regulations SI 366 of 2016, Drinking Water Regulations SI No 122 of 2014 and the EPA IGVs.

7.93 The results are presented in **Table 7-9** to **Table 7-11** and field record sheets are included in **Appendix 7-D**. A hydrocarbon sheen was noted at BH07 during all three monitoring rounds, and high silt content was noted at all monitoring locations.

7.94 The samples were collected by SLR personnel. A Waterra pump and tubing were used to pump water from depth in the borehole and ensure that recent surface water inflow was not collected. Each borehole was purged of three well volumes prior to taking the groundwater sample.

7.95 The samples were collected in the appropriate sample containers, which are supplied by the laboratory for the required analysis. Sample containers were filled so that there was minimum free air space. The containers were securely sealed so that there was no loss of volatile components such as moisture and no separation of components. All sample containers were clearly and uniquely labelled with details including ID and sampling date.

7.96 All samples were placed into a cooler box with ice packs to maintain a temperature at 5°C ± 3°C. The analysis required for each sample was listed on the Chain of Custody Record which accompanied samples. The samples were analysed at the ALS laboratories.

7.97 During the April round of monitoring, BH09 was dry and no sample could be obtained. In the other boreholes, there were several exceedances found. The pH level in BH01 was marginally lower than the Drinking Water Regulations, at 6.45 pH units compared to the assessment criteria of 6.5. In BH08, TPH exceeded the Groundwater Regulations concentration of 7.5µg/l, with a concentration of 2430 µg/l. At BH03, Naphthalene exceeded the EPA IGVs at a concentration of 1.39 µg/l and PAH exceeded the Groundwater Regulations SI 366 of 2016 with a concentration of 1.39 µg/l reported.

7.98 Similarly to the April monitoring round, BH09 was dry for the June monitoring round. The results of the June monitoring round featured no exceedances in the boreholes sampled.

7.99 During the July monitoring round, both BH08 and BH09 were dry. In contrast to the June monitoring round, several exceedances were noted. In BH06, aluminium exceeded the Groundwater Regulations with a concentration of 287 µg/l. Zinc exceeded the Groundwater Regulations with a concentration of 142 µg/l. In BH07, TPH exceeded the Groundwater Regs of 7.5 µg/l with a concentration of 2,230 µg/l. Acenaphthene exceeded the limit of detection at BH03 with 0.0159 µg/l reported and in BH07 with 0.0786 µg/l reported.

Table 7-9 Groundwater Quality (24th April 2024)

Parameter	Units	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08
Inorganics									
Ammoniacal Nitrogen as N (low level)	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ammoniacal Nitrogen as NH_3	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Fluoride	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloride	mg/l	3.9	7.9	4.9	12.1	9.5	8.8	5.8	7
Conductivity	mS/cm	0.157	0.399	0.443	0.463	0.364	0.31	0.485	0.418
Nitrate as NO_3	mg/l	2.9	4.61	5.34	10.6	2.97	8.65	1.01	7.02
pH	pH Units	6.45	7.77	7.61	7.32	7.66	7.21	7.25	7.69
Phosphate (Ortho as PO4)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/l	<2	2.7	<2	4.2	3.8	2.1	5.1	3.5
Filtered (Dissolved) Metals									
Aluminium	µg/l	<10	<10	<10	<60	<10	<10	<10	<10
Arsenic	µg/l	<0.5	<0.5	<0.5	<3	<0.5	<0.5	<0.5	<0.5
Cadmium	µg/l	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium	µg/l	<1	<1	<1	<6	<1	<1	<1	<1
Copper	µg/l	<0.3	<0.3	<0.3	<1.8	<0.3	1.27	1.29	0.672
Lead	mg/l	<0.2	<0.2	<0.2	<1.2	0.394	<0.2	<0.2	<0.2
Magnesium	µg/l	1.29	2.4	2.12	3.12	2	2.62	6.59	3.68
Mercury	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	µg/l	0.494	<0.4	0.53	<2.4	0.777	0.88	1.38	<0.4
Iron	µg/l	<0.019	<0.019	<0.019	<0.114	0.0315	<0.019	<0.019	<0.019

Zinc	µg/l	2.75	1.64	1.64	<6	1.74	5.87	5.5	3.05
Organics Above Detection Limit									
Aliphatics >C21-C35	ug/l	<10	<50	<100	<100	<100	<10	<100	**424**
Aromatics >EC21-EC35	ug/l	<10	<50	<100	<100	<100	<10	<100	**2010**
Total Aliphatics & Aromatics >C5-35	ug/l	<10	<10	<10	<10	<10	<10	<10	2430
Total Aliphatics >C12-C35	ug/l	<10	<50	<100	<100	<100	<10	<100	**424**
Total Aromatics >EC12-EC35	ug/l	<10	<50	<100	<100	<100	<10	<100	**2010**
Naphthalene	ug/l	<0.01	<0.01	1.39	<0.1	<0.01	<0.1	0.0131	<0.1
PAH, Total Detected USEPA 16	ug/l	<0.082	<0.082	1.39	<0.82	<0.082	<0.82	<0.082	<0.82

Highlighted yellow: exceedances assessment criteria; SI No 366 of 2016 (GW Regs), SI No 122 of 2014 (EC Drinking Water Regs), EPA IGVs (in that order)

Bold: Exceeds laboratory limit of detection for organics where no assessment criteria exists

Table 7-10 Groundwater Quality (18th June 2024)

Parameter	Units	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08
Inorganics									
Ammoniacal Nitrogen as N (low level)	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ammoniacal Nitrogen as NH_3	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Fluoride	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloride	mg/l	3.4	8.5	4.2	12.4	9.3	10.1	5.3	6.8
Conductivity	mS/cm	0.166	0.426	0.502	0.479	0.332	0.568	0.573	0.445
Nitrate as NO_3	mg/l	2.63	4.41	5.53	10.9	2.64	5.07	1.37	7.68
pH	pH Units	6.51	7.59	7.43	7.27	7.41	8	7.08	7.65
Phosphate (Ortho as PO4)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate	mg/l	<2	3.1	<2	4	3.4	6.7	5.3	3.7
Filtered (Dissolved) Metals									
Aluminium	µg/l	<10	<10	<10	<60	<10	<10	<10	<10
Arsenic	µg/l	<0.5	<0.5	<0.5	<3	<0.5	1.06	<0.5	<0.5
Cadmium	µg/l	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

Chromium	µg/l	<1	<1	<1	<6	<1	2.12	<1	<1
Copper	µg/l	3.23	0.55	0.566	2.25	3.15	3.2	1.95	0.378
Lead	mg/l	0.518	<0.2	<0.2	0.372	0.538	0.351	<0.2	<0.2
Magnesium	µg/l	1.27	2.96	2.48	3.41	1.94	2.9	8.99	2.86
Mercury	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	µg/l	0.494	<0.4	0.53	<2.4	0.777	0.88	1.38	<0.4
Iron	µg/l	<0.019	<0.019	<0.019	<0.114	0.0315	<0.019	<0.019	<0.019
Zinc	µg/l	2.75	1.64	1.64	<6	1.74	5.87	5.5	3.05

Exceedances assessment criteria; SI No 366 of 2016 (GW Regs), SI No 122 of 2014 (EC Drinking Water Regs), EPA IGVs (in that order)

No exceedances detected

Table 7-11 Groundwater Quality (9th July 2024)

Parameter	Units	BH01	BH02	BH03	BH04	BH05	BH06	BH07
Inorganics								
Ammoniacal Nitrogen as N (low level)	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ammoniacal Nitrogen as NH_3	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Fluoride	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloride	mg/l	3.7	7.8	4.3	12.5	9.5	9.5	6
Conductivity	mS/cm	0.162	0.415	0.535	0.495	0.312	0.473	0.607
Nitrate as NO_3	mg/l	2.88	4.62	6.43	10.8	2.78	5.11	0.38
pH	pH Units	6.6	7.65	7.37	7.25	7.42	7.57	7.1
Phosphate (Ortho as PO4)	mg/l	<0.05	<0.05	<0.05	<0.05	0.051	<0.05	<0.05
Sulphate	mg/l	<2	<2	<2	3.1	2.2	3.7	6.4
Filtered (Dissolved) Metals								
Aluminium	µg/l	<10	18.3	<10	11.1	<10	287	<10
Arsenic	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5	0.789	0.546
Cadmium	µg/l	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium	µg/l	<1	<1	<1	<1	<1	<1	<1

Copper	µg/l	2.77	0.455	2.18	1.28	4.25	16.5	13.4
Lead	mg/l	0.548	<0.2	0.452	<0.2	0.911	5.39	2.98
Magnesium	µg/l	1.32	2.62	2.44	3.14	1.83	4	8.7
Mercury	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	µg/l	0.952	<0.4	0.566	<0.4	0.768	3.33	3.79
Iron	µg/l	0.033	<0.019	<0.019	<0.019	<0.019	0.191	<0.019
Zinc	µg/l	20.4	10.1	7.93	25.1	17.3	142	32.5
Organics Above Detection Limit								
Aliphatics >C21-C35	ug/l	<100	<100	<50	<100	<10	<50	**2120**
Aromatics >EC21-EC35	ug/l	<10	<10	<10	<10	<10	<10	**109**
Total Aliphatics & Aromatics >C5-35	ug/l	<10	<10	<50	<100	<10	<50	2230
Total Aliphatics >C12-C35	ug/l	<100	<100	<50	<100	<10	<50	**2120**
Total Aromatics >EC12-EC35	ug/l	<100	<100	<50	<100	<10	<50	**109**
Acenaphthene	ug/l	<0.005	<0.005	**0.0159**	<0.01	<0.01	<0.005	**0.0786**
Naphthalene	ug/l	<0.01	<0.01	<0.01	<0.02	<0.02	<0.01	0.105

Highlighted yellow: exceedances assessment criteria; SI No 366 of 2016 (GW Regs), SI No 122 of 2014 (EC Drinking Water Regs), EPA IGVs (in that order)

Bold: Exceeds laboratory limit of detection for organics where no assessment criteria exists

Rising Head Tests

7.100 Rising head tests were carried out on 15th April 2024 at four locations, BH4, BH5, BH2 and BH3, and manual dips were taken. A longer test was taken at BH6, where recovery is slower, on 18th June 2024 using data loggers for measurement. The rising head test data is presented in **Appendix 7-E** and the calculation sheets are also presented.

7.101 The EPA defines high permeability subsoil as >1 x 10^{-4} m/s, moderate permeability subsoil as 1 x 10^{-4} to 1 x 10^{-8} m/s and low permeability subsoil as <1 x 10^{-8} m/s[2]. The results indicate that the Sand and Gravel, weathered Sandstone and Sandstone are moderate permeability, and the Clay and Cobbles strata are low permeability. The groundwater level at BH3 (Sand and Gravel) recovered almost immediately and so the permeability could not be estimated.

Table 7-12: Rising Head Test Results

Borehole	Strata	K (m/s)	K (m/d)	High / Moderate / Low Subsoil Permeability
BH4	Weathered Sandstone	2.47E-06	0.213	Moderate
BH5	Sandstone	7.72E-07	0.067	Moderate
BH2	Sand and Gravel	1.518E-06	0.131	Moderate
BH6	Clay and Cobbles	8.86E-09	0.00076	Low

Groundwater Supply Wells

7.102 Geological Survey Ireland (GSI) has an online database of wells and springs in Ireland. According to the GSI well database there are a number of wells within a 2 km radius of the site, these are shown on **Figure 7-7A**. The wells abstract from the locally important Lm bedrock aquifer. The distances below are taken from the centre of the locational accuracy radius.

7.103 The closest GSI recorded well are two domestic wells (GSI name 2019SEW014 and 2019SEW015), with the centre c. 300m east of the site, associated with the sand and gravel pit landowner's property. 2019SEW014 reports a depth of 21.3m with the depth to rock at 18.3m. The yield class is noted as poor (32.7 m³/day). 2019SEW015 reports a depth of 24.4m with the depth of rock at 18.3m. The yield class is also noted as poor (27.3 m³/day).

7.104 There are a number of other wells between 0.8km and 1km in the area that report similar depth and poor yields.

7.105 There is no Group Scheme Source Protection Areas near the site. The closest Group Water Scheme (GWS) is Clareen GWS c. 7 km west of the site. There is no public supply source protection area within the vicinity of the proposed sand and gravel extraction site, the closest is Knocks Public Water Supply (PWS) c. 10 km east of the site.

[2] EPA Water Framework Directive – Recharge and Groundwater Vulnerability Reference 2002-W-MS-16, dated 2008

Water Supply Well

7.106 As noted in Section 7.13, a water supply well will be required to provide water for the closed water recycling system for washing of sand and gravel aggregate and dust suppression. The water supply well will be located in the site facilities area and will abstract from the underlying sandstone bedrock locally important (Ll) aquifer.

7.107 Due to the closed loop water recycling system, the water requirement for top-up of the washing plant is considered to be minimal.

7.108 The Ll classification suggests that the bedrock aquifer is capable of supplying locally important abstraction of 100-400 m^3/d. Local shallow domestic boreholes suggest a yield of approximately 30m^3/d. The ongoing top-up requirement is expected to be easily accommodated by a water supply well abstracting from the sandstone aquifer.

7.109 The catchment area around a groundwater source, which contributes water to that source (ZoC), can be defined as a source protection zone (SPZ) when the Inner Protection Area (SI) and the Outer Protection Area (SO) are delineated. The SI is designed to protect the source against the effects of human activities that may have an immediate effect on the source, in particular in relation to microbiological pollution. It is defined by a 100-day time of travel (TOT) from any point below the water table to the source. The SO covers the remainder of the zone of contribution of the groundwater source. It is defined as the area needed to support an abstraction from long-term groundwater recharge.

7.110 The inner area of the water supply well can be estimated using the permeability estimates of the sandstone, which ranged from 0.213m/d to 0.067m/d. An inner area of between 21.3 – 6.7m is estimated for the water supply well.

Well Survey

7.111 A comprehensive domestic well survey was undertaken to supplement the available data and enhance the understanding of the regional hydrogeological regime in the context of the proposed water supply borehole. As detailed in Section 7.110, a 100-day time of travel around the proposed water supply borehole of 21.3m has been calculated. The location of the residential properties and 100-day time of travel radius is shown on **Figure 7-7B**.

7.112 The closest resident to the proposed water supply borehole is located 140m away, to the south at R1. The next closest residential location to the proposed water supply borehole is located 405m away, to the west at R10. As the residential location is located at distance from the estimated 100-day time of travel, minimal impact on any residential supply boreholes is anticipated.

7.113 A domestic well survey in the vicinity of the application site was carried out on 19th June 2024. The domestic well survey was carried out by SLR's project hydrogeologist, Mairéad Brown, and graduate hydrogeologist Michelle Sherry. The aerial photograph for the area surrounding the site indicates the presence of numerous one-off houses in the vicinity, particularly along the L1031 Killeen Road. Residence locations were numbered and properties within 500m of the proposed excavation area were surveyed.

7.114 A door-to-door survey was undertaken. Residential properties in the immediate vicinity of the site were surveyed, and the property locations are shown on **Figure 7-7B**. Where owners were not available for interview during the survey, a letter was left at the house.

7.115 The results of the survey are summarised in **Table 7-13** below. Interviews were carried out at residential properties 2/3, 8, 13, 11/12, 16 and 20. Monitoring boreholes were also identified and dipped.

7.116 Information from the residents indicates that most households have private wells, and in some instances a private well is shared between two household. The age of most of these wells is unknown.

7.117 A domestic supply borehole (Well 1) is present at R2/R3. The borehole is a pumped well and is used for both domestic and livestock use. The water level was measured at 12.20 m below ground level. The well was measured to be 17.87 m deep.

7.118 Well 2, a domestic supply borehole was dipped at residential property R8. The water level was 2.8 m below ground level. The well is used for domestic and livestock supply and is a pumped well.

7.119 A domestic supply borehole (Well 3) is present at R13. The borehole is a pumped well and is used for domestic use. The well was covered, and a water level measurement could not be obtained. The resident mentioned that the water had been tested a few years prior and the water quality was good.

7.120 Well 4, a domestic supply borehole was dipped at residential property R12. This is a pumped well and supplies R12, R11 and the farm. The water level was measured as 11.45 m below ground level and the well was measured to be 31 m deep.

7.121 Well 5, a domestic supply borehole was dipped at residential property R16. This is a pumped well and is used for domestic use. The water level was measured as 15.4 m below ground level and the well was measured to be 19.4 m deep.

7.122 A domestic supply borehole (Well 6) is present at R20. The borehole is a pumped well and is used for domestic use. The well was covered, and a water level measurement could not be obtained.

7.123 The closest identified domestic supply well to the proposed water supply well was Well 4 at R11, located 420m from the proposed water supply well location.

Table 7-13: Domestic Well Survey

Residence Ref	Well ID Number	Location	Property Type	Owner Interview / Letter	Outcome
R1		South of existing quarry, on minor access road	New	Letter	Assume private supply
R2 and R3	Well 1	Southeast of quarry on minor road	Established with farm	Interview	Both houses use same private well located in the garden of R2. Well is pumped and used for drinking water and livestock.
R4 and R14	Well 8	East – Southeast of quarry on minor road.	Established	Interview by phone	Both houses owned by same family. Private well located in a field between R4 and R14. Pumped well for domestic use. Resident noted that water pressure was low recently.
R5		South of quarry on L1031	Established	Letter	Assume private supply

Residence Ref	Well ID Number	Location	Property Type	Owner Interview / Letter	Outcome
R6		Southwest of quarry On minor access road off L1031	Appeared unoccupied	Letter	Pumphouse noted on site.
R7		Southwest of quarry on L1031	Established	Letter	Assume private supply
R8	Well 2	Southwest of quarry on L1031	Established with farm	Interview	Private well located in a field to the left of the property. Pumped well for domestic and livestock use.
R9		Southwest of quarry on L1031	Established	Letter	Assume private supply
R10		West of quarry on minor access road off L1031	Established	Letter	Assume private supply
R11 and R12	Well 4	Northeast of quarry on minor road	Established	Interview	Both houses use same private well located in the farmyard of R12. Well is pumped and used for drinking water and livestock.
R13	Well 3	East of quarry on minor road	Established	Interview	Private well located in the garden of R13 and to the left of the property. Pumped well for domestic use.
R15		Southeast of quarry on L1031 across the River Killeen	Appeared unoccupied	Letter	Assume private supply
R16	Well 5	Southeast of quarry on L1031 across the River Killeen	Established	Interview	Private well located in the garden of R16 and in front yard of the property. Pumped well for domestic use.
R17		Southeast of quarry on L1031 across the River Killeen	Established	Letter	Assume private supply
R19	Well 7	Southeast of quarry on L1031 across the River Killeen	Established	Interview by phone	Private well located in the garden of R19. Pumped well for domestic use.
R20	Well 6	Southeast of quarry on L1031 across the River Killeen	Established	Interview	Private well located in the garden of R20 and in the front garden of the property. Pumped well for domestic use.

Surface Water - Hydrology

Surface Water Bodies

7.124 Surface water bodies in the area are shown in **Figure 7-8**.

7.125 There is a small pond (c. 20m in diameter) located along the eastern site boundary, outside of the proposed extraction area which will be retained.

7.126 There is a small stream located along the southern boundary which is not shown on the EPA or GSI map viewer. This stream flows into the Killeen River from the southern boundary approx. 150m from the site.

7.127 There are two small streams located close to the proposed site, both of which flow into the Delour River.

- [DELOUR_10(IE_SE_15K010400) located northeast to the site; and
- DELOUR_30(IE_SE_15D010400) located southwest to the site.

7.128 The closest surface water body shown on the EPA online water maps is the Killeen River (IE_SE_15K010400), located 110 m (north east) from site entrance and 150 m (east).

Catchment

7.129 The site is located in the northern and upper part of the Nore Catchment (ID 15) which has an area of 2,585 km^2.

7.130 The catchment encompasses the region drained by the River Nore and all tributary streams eventually flow into tidal waters at Cheekpoint, County Waterford.

7.131 In terms of local catchments under the WFD, the site is situated in the Killeen (Delour) River Sub-Basin catchment, see **Figure 7-8**. The Killeen (Delour) River joins the River Nore c. 8km southeast of the site.

Flooding

7.132 The Office of Public Works (OPW) is the government agency with statutory responsibility for flooding in Ireland. The existing CFRAM and NIFM flood maps show that the site is at low risk of fluvial flooding (Flood Zone C). The available GSI data does not indicate that the site is vulnerable to groundwater flooding. Due to the location of the proposed sand and gravel pit, the risk of coastal flooding is also low (Flood Zone C). There are no records of historic flooding in the OPW database within 2 km of the site.

Surface Water Sampling

7.133 Surface water sampling was undertaken at three locations surrounding the site on a quarterly basis. The field record sheets are included in **Appendix 7-D**.

7.134 Two of these sampling locations are situated on the Killeen River. SW1 is located upstream of the site and SW2 is located downstream of the site. The third sampling location is located on the stream at the southern boundary which flows into the Killeen River c. 150m to the east of the site (SW3). SW2 is located near the EPA monitoring station on the Killeen River, Cardtown Br (NE of Cappanarrow). This station has been monitored since 1987.

7.135 These sample points are safe, with ease of access. These are grab sampling points only and a telescopic grab sampler was used to collect samples.

7.136 The samples were collected in the appropriate sample containers, which are supplied by the laboratory for the required analysis. Sample containers were filled so that there was minimum

free air space. The containers were securely sealed so that there was no loss of volatile components such as moisture and no separation of components. All sample containers were clearly and uniquely labelled with details including ID and sampling date.

7.137 All samples were placed into a cooler box with ice packs to maintain a temperature at 5°C ± 3°C. The analysis required for each sample was listed on the Chain of Custody Record which accompanied samples. The samples were analysed at ALS laboratories.

7.138 The following parameters are tested for:

- Metals: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Zinc.
- Inorganics: Alkalinity, Ammoniacal Nitrogen as N, Biological Oxygen Demand (BOD), Chloride, Conductivity, Nitrates, Nitrites, Orthophosphate, pH, Sulphate, Total Suspended Solids.
- Speciated Total Petroleum Hydrocarbons (TPH).
- Volatile Organic Compounds (VOCs,

7.139 Tree felling is occurring at and upstream of SW1. It was also noted during the June monitoring round that livestock had access to the stream on the southern boundary where SW3 is taken from, see **Plate 7-6** below.

Surface Water Quality

7.140 Surface water quality monitoring was carried out on 24th April 2024, 19th June 2024 and 10th July 2024. The results were compared against EQS for Inland Surface Water SI No. 272 of 2009 and SI No. 77 of 2019. The laboratory results are presented in **Appendix 7-F** and the screened results are presented in **Table 7-14** below.

7.141 During surface water sampling in the June monitoring round, livestock were observed to be entering the stream at SW3 for drinking water and waste from the livestock was observed adjacent to the stream (see **Plate 7-6** below).

7.142 There were no exceedances of the EQS assessment criteria. All hydrocarbons and volatiles were reported at less than detection limit. However, there is a notable increase in Ammoniacal Nitrogen as N concentrations at SW2, with the concentration exceeding the limit for High Status for Ammonia as N.

7.143 During the June monitoring round, no exceedances were detected. However, the Limit of Detection (LOD) of Ammoniacal Nitrogen as N concentrations in all three surface waterbodies exceeded the EQS assessment criteria for High Status at a concentration of <0.2 mg/l.

7.144 During the July monitoring period, no exceedances were detected.

Plate 7-6: Livestock at SW3

Table 7-14: Surface Water Quality

Parameter	EQS Inland Surface Waters (MACs)	Units	SW1	SW2	SW3	SW1	SW2	SW3	SW1	SW2	SW3
			24th April 2024			**18th June 2024**			**10th July 2024**		
Inorganics											
Alkalinity, as $CaCO_3$	Soft water (<100mg/l CaCO3): 4.5-9.0. Hard water (>100mg/l CaCO3): 6.0-9.0	mg/l	48.5	57.9	170	59.8	67.3	172	12.4	14.3	172
Ammoniacal Nitrogen as N	High status ≤0.040 (mean) or ≤0.090(95%ile). Good status ≤0.065 (mean) or ≤0.140 (95%ile) *	mg/l	0.012	**0.052**	0.026	<0.2	<0.2	<0.2	0.02	0.017	0.013
BOD	High Status ≤0.04 (mean) or ≤ 0.09 (95%). Good status ≤0.065 (mean) or ≤0.140 (95%)	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloride		mg/l	7.4	7.9	8.8	7.2	7.6	8.7	<10	<10	8.7
Conductivity @ 20 deg.C		mS/cm	0.123	0.141	0.342	0.136	0.151	0.336	0.0458	0.05	0.331
Nitrate as NO3		mg/l	1.95	2.51	6.33	1.64	1.44	6.81	<1.5	<1.5	6.46
Nitrite as NO2		mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.25	<0.05
pH		pH Units	7.75	7.9	8.21	7.78	7.91	8.31	6.71	6.88	8.23
Phosphate (Ortho as PO4)		mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.05
Sulphate		mg/l	<2	2	3.7	<2	2	4.6	<10	<10	3.7

Suspended solids		mg/l	<2	<2	<2	<2	<2	<2	8.2	10.6	<2
Filtered (Dissolved) Metals											
Arsenic		µg/l	<0.5	<5	<0.5	<0.5	<0.5	<0.5	0.527	<0.5	<0.5
Cadmium	≤0.45 -1.5, Class 3 (0.6)	µg/l	<0.08	<0.8	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium		µg/l	<1	<10	<1	<1	<1	<1	<1	<1	<1
Copper		µg/l	<0.3	<3	<0.3	<0.3	<0.3	<0.3	0.753	0.628	0.474
Lead		µg/l	<0.2	<2	<0.2	<0.2	<0.2	<0.2	0.428	0.36	<0.2
Mercury		µg/l	<0.01	<0.01	<0.01	0.0248	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel		µg/l	<0.4	<4	<0.4	<0.4	<0.4	<0.4	0.623	0.634	0.467
Selenium		µg/l	<1	<10	<1	<1	<1	<1	<1	<1	<1
Zinc		µg/l	1.37	<10	1.86	1.28	<1	1.6	5.04	3.42	2.27

*Ammonia as N

*Exceedances in **bold**

Surface Water Biological Quality in the Killeen (Delour)_010 River: Q Values

7.145 The surface water quality data of surface water bodies within the study area, was obtained from EPA web map. The EPA has a registered surface water monitoring stations through Ireland, which are continuously recording near real time river ecology monitoring results. The results are presented through "Q" values, that are reflecting average water quality at any location. These values are based primarily on the relative proportions of pollution sensitive to tolerant macroinvertebrates (the young stages of insects primarily but also snails, worms, shrimps etc.) resident at a river site. Results scores are in range from 1 to 5, from the lowest (1) to the highest (5) water quality rating.

7.146 The closest monitoring station encountered is Cardtown Br (NE of Cappanarrow), located southeast of the application site on the Killeen River, and is located at the same point as the SW2 monitoring location. The monitoring station is located downstream of SW3, where livestock were observed to be entering the stream.

7.147 The latest water quality reports a 4 Q value, meaning that the river is good and in satisfactory condition. The Killeen River has declined in status from 4-5 to 4 since 2013.

7.148 **Table 7-15** summarises the monitoring station data.

Table 7-15: EPA Biological Water Quality Ratings

Station ID	Station Name	Water-course	Distance	1987	1991	1995	1998	2001	2005	2007	2011	2013	2016	2019	2022
RS15K010200	Cardtown Br NE of Cappanarrow	Killeen (Delour)_010	c. 200 m east	5	5	4-5	4-5	4-5	4-5	4	4-5	4-5	4	4	4

Surface Water Flow

7.149 Surface water flow measurements have been carried out at the three surface water monitoring locations, SW1 – SW3. The results are presented in **Table 7-16.** The flow measurements have been conducted with a flow meter on three separate events. The flow meter measures the flow velocity of a watercourse, from which the flow rate can be calculated.

7.150 The results show that the flow is increasing moving downstream of the catchment. This is because the bigger area of the catchment is contributing to the flow. The flow rates in the Killeen River ranges from 0.037 - 0.057 m^3/s at SW1 located upstream of the site to 0.136 - 0.223 m^3/s at SW2 located downstream.

7.151 Flow in the stream on the southern boundary of the site, which flows into the Killeen River, was measured at 0.024 – 0.139m^3/s.

Table 7-16: Surface Water Flow Measurements

Location	Date	Flow (m^3/s)
SW1	20-May	0.037
SW2		0.136
SW3		0.024
SW1	19-Jun	0.057
SW2		0.223
SW3		0.037
SW1	10-Jul	NA*
SW2		1.149
SW3		0.139

'* too deep to use flowmeter

Water Framework Directive

7.152 A Water Framework Directive (WFD) Assessment report has been to support the Planning Application and EIAR for the proposed development. In summary, the report includes three stages, a screening stage, a scoping stage and an assessment stage.

7.153 The WFD assessment includes information from the EIAR for the planning application, which includes a Geophysical survey, a borehole ground investigation and groundwater monitoring. In addition, a baseline aquatic survey has been undertaken. An Appropriate Assessment Screening and Natura Impact Assessment Report has also been prepared for the proposed development.

7.154 The groundwater investigation undertaken at the site indicates a shallow layer of groundwater in the sand and gravel material underlain by a lower permeability clay layer and which sits above the bedrock aquifer.

7.155 A zone of influence was taken to be a 15 km radius from the site boundary. The assessment identified seven potential receptors: the Killeen River, the Delour River, the unnamed stream which is a tributary of the Killeen River, the Camross Groundwater body, the Barrow & Nore Special Area of Conservation, the Nore Special protection area and the Nore Salmonid waters.

7.156 In terms of hydrological links between the proposed development and the identified WFD receptors it is considered that:

i. there is no direct hydrological pathway between the proposed development and the adjacent surface water courses as there will be no abstraction of surface water or discharge to surface watercourses;

ii. there is no direct hydrological pathway between the proposed extraction and the bedrock aquifer as the sand and gravel is underlain by a low permeability clay layer;

iii. There is an indirect hydrological pathway via the shallow groundwater in the sand and gravel which discharges as groundwater to adjoining surface water courses; and

iv. there is a direct hydrological pathway between the proposed development and the River Barrow & River Nore SAC, the Nore SPA and the Nore Salmonid waters via the shallow groundwater in the sands and gravels and the adjacent surface water courses.

7.157 Mitigation measures will be embedded within the proposed development to protect surface water and groundwater and the identified WFD receptors. The measures for the proposed development will be secured via any future planning permission and associated conditions relating to an approval.

7.158 It is considered here, that based on the nature of the proposed development and with the designed embedded mitigation measures on place there will be no deterioration in the status of the identified WFD receptors.

7.159 The proposed development will result in the removal of livestock from the lands at the site. This will eliminate cattle poaching of the stream banks of the unnamed stream along the southern boundary of the site. This measure will result in a reduction in eutrophication and siltation pressures on the stream and will be a positive contribution to the RBMP objectives.

7.160 Based on the findings from the WFD screening, scoping and assessment, it is considered that the proposed development, with the embedded mitigation measures in place, will not result in a deterioration of the existing status of the identified WFD receptors and it will not be a factor in the receptors failing to achieve their status objectives.

Protected Areas

7.161 There are three Natura 2000 sites (SAC or SPA) within 5km of the site.

- Slieve Bloom Mountains SPA (004160), located directly north of the site;
- Slieve Bloom Mountains SAC (000412), located 1.5 km north;
- River Barrow & River Nore SAC 000412 located 2.4 km east.

Water Environment Receptors

7.162 From the baseline study undertaken here, the following water environment sensitive receptors have been identified in the receiving environment:

- The Killeen River, located c. 110m[3] northeast of the site;
- Downstream Delour River, confluence with Killeen River located c. 3km southeast of the site;
- Locally important sandstone bedrock aquifer (within the Camross GWB), separated from overlying sand and gravel superficial deposits by low permeability silt and clay;
- Private groundwater supply wells; and
- River Barrow & River Nore SAC 000412 located 2.4 km east;

[3] Distance measured at its closest point

7.163 For each identified receptor, the significance and sensitivity of the receptor is assessed in **Table 7-17** below and a rating (High / Medium / Low / Negligible) applied, based on the methodology outlined in existing guidance and reproduced in **Appendix G**.

Table 7-17: Existing Environment - Significance and Sensitivity / Importance

No.	Existing Environment	Significance	Sensitivity	Existing Environment Significance / Sensitivity Rating (H/M/L/N)
1	Killeen River	Surface watercourse c. 110m northeast of the site. Site is within Killeen catchment.	A small stream located along the southern boundary flows into the Killeen River approx. 150m from the site. River is assumed to be in hydraulic continuity with the site through groundwater. Killeen River is classified as "At Risk" (WFD Third Cycle May 2024). Killeen River is classified as "Good" quality but has declined in status from 4-5 to 4 since 2013	**Medium** – Attribute has a medium quality or value on a local scale
2	Delour River	Downstream surface watercourse, confluence with Killeen River located c. 3km southeast. The Delour River flows into the Nore River.	Downstream river. Delour River 030 is classified as "At Risk" (WFD Third Cycle May 2024)	**Medium** – Attribute has a medium quality or value on a local scale
3	Locally important Sandstone bedrock aquifer	Sandstone bedrock aquifer is within the Camross GWB which has a good status (2016 - 2021). **Note** that the overall Camross GWB is classified as a poorly productive aquifer.	Bedrock aquifer underlying sand and gravel superficial deposits and separated by low permeability silt and clay. Sand and gravel deposits are not classified as an aquifer.	**Medium** – Attribute has a medium quality or value on a local scale (Locally Important Aquifer)
4	Private Groundwater Supplies	All local residents are assumed to have a private water supply and a well survey has been undertaken, with six residential locations within 250m of the site.	The private wells will supply <50 homes and may be sensitive to changes at the local scale.	**Low** - Attribute has a low quality or value on a local scale (potable water source supplying <50 homes)

No.	Existing Environment	Significance	Sensitivity	Existing Environment Significance / Sensitivity Rating (H/M/L/N)
5	River Barrow & River Nore SAC 000412	The River Barrow & River Nore is located 2.4 km east. The SAC is downstream of the Killeen River, and located just past the confluence with the Delour River c. 3km southeast.	Downstream SAC. The SAC is located within the Delour 030 subbasin and is classified as "At Risk" (see above).	**High -** Attribute has a high quality or value on an international scale (SAC status)

Receiving Environment - Baseline Summary

7.164 The site is underlain by sandstone bedrock of the Cadamstown Formation and by sand and gravel subsoils which are glacial tills chiefly derived from Devonian sandstone and glaciofluvial sands and gravels chiefly derived from Devonian sandstone.

7.165 The bedrock aquifer underlying sand and gravel superficial deposits is protected by low permeability silt and clay. The sand and gravel deposits proposed for extraction are not classified as an aquifer.

7.166 The site is within the Water Framework Directive (WFD) Nore Catchment and in the Killeen (Delour) River Sub-Basin catchment Boyne Sub-Catchment.

7.167 The closest surface water body to the site comprises a stream at the southern border of the site, this stream flows east into the Killeen River approx. 150m from the site.

7.168 Under the WFD classification, the Killeen River is 'At Risk' status due to sediment and oxygenation caused by a number of significant pressures such as nearby agricultural activity, forestry and domestic wastewater.

7.169 There are no recorded flood events at or near the site, nor is there any risk of potential flooding.

7.170 The site is located within the Camross Groundwater Body (GWB). This aquifer which underlies the site is protected by a low permeability layer of silt and clay. The rock units contained within this groundwater body area considered to be poor or locally important aquifers. This GWBs is classified as being good status under the WFD classification.

7.171 The groundwater vulnerability at the site is classed as high to moderate.

7.172 Nine groundwater monitoring boreholes (BH01 - BH09) have been installed on-site. To date, the maximum manual groundwater level monitored at the wells is 207.60m AOD (0.92m bgl) at BH07. The minimum level recorded is at 174.23m AOD (6.6m bgl) at BH03.

7.173 The sand and gravel extension area pit floor levels will be maintained above the high groundwater level.

7.174 A well survey has been carried out as there are a number of wells within the vicinity of the site, which are mostly private wells. The closest identified private residential well is 420m away from the proposed water supply borehole. The closest residential property to the proposed water supply borehole is located 140m away. As the residential location is located

at distance from the estimated 100-day time of travel, a minimal impact on any residential supply boreholes is anticipated.

Impact Assessment

Evaluation Methodology

7.175 The potential direct and indirect impacts to surface water and groundwater associated with the proposed sand and gravel pit continued use and extension at Mounthall are initially assessed in this chapter without any mitigation measures in place.

7.176 The methodology applied here is a qualitative risk assessment methodology in which the nature of the potential impacts are described in terms of the character, magnitude, duration, probability and consequence of the impact are considered. The terms used to describe the potential hydrological and hydrogeological impact or effects are explained in tables reproduced in . The cumulative impact of any potential impacts is also assessed.

7.177 The description of the potential impact is then screened against the significance and sensitivity of the receiving environment to establish the overall significance of the potential impact (without mitigation). The classification of the impact significance is determined using the matrix from the EPA Guidelines (2022) which is reproduced in **Appendix I**.

7.178 This approach provides a mechanism for identifying the key areas where mitigation measures are required, and for identifying mitigation measures appropriate to the risk presented by the proposed development. Following consideration of mitigation measures (existing and proposed) an assessment of the residual impacts arising from the proposed development is provided.

7.179 The following sections identify the potential impacts of the proposed development on the hydrogeological and hydrological environments. It also assesses the likelihood of occurrence of each identified impact. As previously noted, the impacts are initially assessed with no mitigation or design measures incorporated to reduce the risk.

7.180 The potential direct and indirect impacts to surface waters and groundwater during the Construction Stage (site preparation), the Operation Stage (extraction and processing) and Post Operational Stage (site restoration) are discussed below.

Construction Stage (No Mitigation)

7.181 The potential direct and indirect construction stage impacts to surface waters and groundwater are discussed below. In the context of the proposed sand and gravel pit continued use and extension, the construction stage is taken to comprise the stripping stage where in-situ soils and subsoils are removed and stockpiled before extraction activities can commence, as well as some limited activity setting up required site infrastructure.

Direct Impacts

Surface Water

7.182 There is no discharge from the proposed sand and gravel pit site to the stream on the southern boundary or the Killeen River and therefore there are no direct negative impacts on surface water quality or quantity during this stage.

7.183 The construction stage of the development of the sand and gravel pit will result in livestock being removed from the site. Currently, livestock are entering the stream on the southern boundary of the proposed development area and causing a direct contact with livestock waste. The stream flows directly into Killeen River which has declining status and has

recently been classified as “at risk” due to “significant pressures such as nearby agricultural activity”.

Groundwater

7.184 The stripping and storage of topsoil and subsoils, where present, could result in sediment run-off in recharge to the shallow groundwater in the sand and gravel superficial deposits, which could migrate into the underlying bedrock aquifer. Accidental leaking or spillage of fuel and/or other petroleum-based products could also impact on groundwater in the bedrock aquifer. However, the bedrock aquifer is separated from the shallow groundwater in the superficial deposits by low permeability silt and clay which protects the underlying bedrock aquifer.

7.185 Extraction will comprise dry working above the groundwater level in the superficial deposits, therefore there will be no dewatering associated with the proposed development and therefore there will be no impact on groundwater flows or quantities during this stage.

Indirect Impacts

Surface Water

7.186 The stripping and storage of topsoil and subsoils, where present, could result in sediment being carried in recharge impacting the underlying shallow groundwater and locally important bedrock aquifer which, in turn, could potentially impact the Killeen River which is in hydraulic connection with it. Accidental leaking or spillage of fuel and/or other petroleum-based products could also impact on the Killeen River. It is noted the bedrock aquifer is separated from the shallow groundwater in the superficial deposits by low permeability silt and clay.

7.187 Any impact on the Killeen River could impact the downstream surface water bodies, i.e. the Delour River, at distance from the site.

Groundwater

7.188 Any impact from the stripping and storage of topsoil and subsoils, where present, could result in sediment being carried in recharge to the shallow groundwater, which could migrate into the underlying bedrock aquifer and this in turn could indirectly impact the local water supplies in the area. Accidental leaking or spillage of fuel and/or other petroleum-based products could also indirectly impact on local water supplies. However, the bedrock aquifer is separated from the shallow groundwater in the superficial deposits by low permeability silt and clay.

Protected Areas

7.189 The River Barrow & River Nore SAC is located downstream of the Killeen River, and is located just past the confluence with the Delour River c. 3km downstream to the southeast. Any indirect impact on Killeen River could impact on the River Barrow & River Nore SAC, located at distance downstream.

Operational Stage Impacts

7.190 There is the potential for direct impacts on groundwater and indirect impacts on surface water and groundwater arising from the proposed sand and gravel pit extension during the operational stage. Potential impacts on surface water and groundwater have been identified and are outlined below.

Direct Impacts

Surface Water

7.191 There will be no discharge from the proposed sand and gravel pit extension to the Killeen River and there will therefore be no direct impacts on surface water quality or quantity during the construction stage.

7.192 The development of the sand and gravel pit will result in livestock being removed from the site. Currently, livestock are entering the stream on the southern boundary of the proposed development area and causing a direct contact with livestock waste. The stream flows directly into Killeen River which has declining status and has recently been classified as “at risk” due to “significant pressures such as nearby agricultural activity”.

Groundwater

7.193 There is a potential impact on groundwater quality from elevated levels of suspended solids generated during the excavation and transfer of sand and gravel materials. This could result in sediment being carried in recharge to shallow groundwater in superficial deposits, which could migrate into the underlying bedrock aquifer and this in turn could indirectly impact the local water supplies in the area. The bedrock aquifer is separated from the shallow groundwater in the superficial deposits by low permeability silt and clay. Accidental leaking or spillage of fuel and/or other petroleum-based products could also impact on groundwater in the bedrock aquifer.

7.194 The proposed sand and gravel pit will be worked at all times above the shallow groundwater in the sand and gravel deposits, meaning there will be no requirement for dewatering of shallow groundwater to facilitate aggregate extraction. As there is no dewatering associated with the proposed development, there will be no impact on shallow groundwater flow or quantity.

7.195 There will be a limited impact on groundwater in the bedrock beneath the site from the proposed water supply borehole. The required volumes are low, and so there will be a localised impact only on the groundwater flow and quantity in the bedrock aquifer. A 100-day time of travel around the proposed water supply borehole of 21m has been estimated.

Indirect Impacts

Surface Water

7.196 There is a potential impact from elevated suspended solids generated during the excavation during the sand and gravel pit extension. This could result in sediment carried in recharge impacting the underlying locally important bedrock aquifer which, in turn, could impact on Killeen River in hydraulic connection with it. The bedrock aquifer is separated from the shallow groundwater in the superficial deposits by low permeability silt and clay. Accidental leaking or spillage of fuel and/or other petroleum-based products could also impact on the Killeen River.

Groundwater

7.197 Any impact from elevated suspended solids generated during the removal of materials, resulting in sediment carried in recharge to shallow groundwater, which could migrate into the underlying bedrock aquifer and this in turn could indirectly impact the local water supplies in the area. The bedrock aquifer is separated from the shallow groundwater in the superficial deposits by low permeability silt and clay. Accidental leaking or spillage of fuel and/or other petroleum-based products could also impact on groundwater in the bedrock aquifer.

7.198 The localised impact on groundwater flow and quantity in the bedrock aquifer could indirectly impact the local well supplies in the area. A 100-day time of travel around the proposed water supply borehole of 21m has been calculated, and is at distance from residential locations.

Protected Areas

7.199 The River Barrow & River Nore SAC is located downstream of the Killeen River, and is located just past the confluence with the Delour River c. 3km downstream to the southeast. Any indirect impact on the Killeen River could impact on the River Barrow & River Nore SAC, located at distance downstream.

Post – Operational Stage Impacts

Direct Impacts

7.200 A restoration scheme has been prepared for the proposed site and will be implemented following permanent cessation of extraction activities, refer to Chapter 2 of the EIAR for details.

7.201 There are no anticipated direct impacts from the post – operational stage.

Indirect Impacts

7.202 There are no anticipated indirect impacts from the post – operational stage.

'Do-nothing Scenario'

7.203 If the proposed development is not permitted, the existing sand & gravel pit will remain and the proposed extension area will remain in agricultural use. The natural aggregate resource will remain in the ground and alternative pit development will be required at other locations.

7.204 The status of the Killeen River is in decline, and in May 2024 was classified as 'At Risk' due to sediment and oxygenation caused by a number of significant pressures such as nearby agricultural activity, forestry and domestic wastewater.

7.205 The proposed development will remove the direct impact of livestock on the stream over the duration of the project. If the development does not proceed, there will be no surface water monitoring programme implemented to assess the water quality of the stream which flows into the Killeen River and no groundwater monitoring programme to assess groundwater quality.

Rating of Identified Potential Impacts

7.206 The potential impacts outlined above during the construction and operational stages have been described in terms of the character, magnitude, duration, probability and consequence, and each impact is rated in terms of High (H), Medium (M), Low (L) and Negligible (N) based on the magnitude, extent, duration and consequence of the identified effects.

7.207 The description of the effects and rating for each identified impact is shown in **Table 7-18** below.

Significance of Impacts

7.208 The significance of impacts is based on the significance and sensitivity of the existing environment (**Table 7-17** above), and the description of identified potential impacts with likely significant effects outlined in **Table 7-18** below. The significance of Impact is determined from the Classification of the Significance of Impacts in **Appendix 7-I**.

Table 7-18: Classification of Significance of Impacts (**No Mitigation**)

No.	Potential Impacts	Impact Rating (No Mitigation)	Significance of Impact (No Mitigation)
Construction Stage – Direct – Surface Water			
1	Improvement in surface water quality due to removal of livestock from site.	**Low.** Potential to improve surface quality in stream by removing livestock entering stream and causing a direct contact with livestock waste. Stream flows directly into Killeen River which has declining status and has recently been classified as "at risk" due to "significant pressures such as nearby agricultural activity".	**Slight Positive**
Construction Stage – Direct - Groundwater			
2	Reduction in groundwater quality in bedrock aquifer from increase in suspended solids in shallow groundwater, which could migrate into the underlying bedrock aquifer	**Low** to **Negligible.** Potential to affect groundwater quality in bedrock underlying shallow groundwater through vertical migration. Migration limited by low permeability deposits between bedrock and sand and gravel deposits. Any impact to groundwater will be limited due to short term nature of works.	**Slight**
3	Reduction in groundwater quality in bedrock aquifer from accidental fuel leakage/ spillage, which could migrate into the underlying bedrock aquifer	**Low** to **Negligible.** Potential to affect groundwater quality in bedrock underlying shallow groundwater through vertical migration. Migration limited by low permeability deposits between bedrock and sand and gravel deposits. Any impact to groundwater will be limited due to short term nature of works. Any leakage / spillage would be accidental only and of limited volume.	**Slight**
Construction Stage – Indirect – Surface Water			
4	Impact on surface water quality in the Killeen River and downstream Delour River and SAC via groundwater baseflow to the watercourse	**Low** to **Negligible.** Potential to affect surface water quality (fuel / suspended solids) in the Killeen River, through groundwater baseflow to the watercourse. Impact is unlikely on the Killeen River due to short term nature of works. Any leakage / spillage would be accidental only and of limited volume. An impact on the Delour River and SAC located downstream is unlikely.	**Slight - Not Significant**

Construction Stage – Indirect – Groundwater			
5	Impact on groundwater quality in bedrock aquifer could indirectly impact the local water supplies in the area.	**Low** to **Negligible.** Potential to affect groundwater quality in bedrock aquifer (fuel / suspended solids) which could migrate to local water supplies. Migration limited by low permeability deposits between bedrock and sand and gravel deposits. Any impact on groundwater in the bedrock aquifer will be limited due to short term nature of works. Any leakage / spillage would be accidental only and of limited volume.	**Slight - Not Significant**
Operational Stage *– Direct – Surface Water*			
6	Improvement in surface water quality due to removal of livestock from site.	**Medium** to **Low.** Potential to improve surface quality in stream over medium term by removing livestock entering stream and causing a direct contact with livestock waste. Stream flows directly into Killeen River which has declining status and has recently been classified as “at risk” due to “significant pressures such as nearby agricultural activity”.	**Moderate Positive-Slight Positive**
Operational Stage *– Direct – Groundwater*			
7	Reduction in groundwater quality in bedrock aquifer from increase in suspended solids in shallow groundwater, which could migrate into the underlying bedrock aquifer	**Low** to **Negligible.** Potential to affect groundwater quality in bedrock underlying shallow groundwater through vertical migration. Migration limited by low permeability deposits between bedrock and sand and gravel deposits. Any impact to groundwater will be limited due to short term nature of works.	**Slight - Not Significant**
8	Reduction in groundwater quality in bedrock aquifer from accidental fuel leakage/ spillage, which could migrate into the underlying bedrock aquifer	**Low** to **Negligible.** Potential to affect groundwater quality in bedrock underlying shallow groundwater through vertical migration. Migration limited by low permeability deposits between bedrock and sand and gravel deposits. Any impact to groundwater will be limited due to short term nature of works. Any leakage / spillage would be accidental only and of limited volume.	**Slight - Not Significant**
9	Impact on groundwater flow and quantity in bedrock aquifer from proposed water supply borehole	**Low** to **Negligible.** Potential to impact on groundwater in the bedrock beneath the site from the proposed water supply borehole. The required volumes are low, and so there will be a localised impact on the groundwater flow and quantity in the bedrock aquifer only. The nearest residential location is at distance from the estimated 100-day travel time for the water supply borehole.	**Slight - Not Significant**

Operational Stage *– Indirect – Surface Water*			
10	Impact on surface water quality in the Killeen River and downstream Delour River and SAC via groundwater baseflow to the watercourse	**Low.** Potential to affect surface water quality (fuel / suspended solids) in the Killeen River, downstream Delour River and SAC through groundwater baseflow to the watercourse. Any leakage / spillage would be accidental only and of limited volume.	**Slight**
Operational Stage *– Indirect - Groundwater*			
11	Impact on groundwater quality in bedrock aquifer could indirectly impact the local water supplies in the area.	**Low** to **Negligible.** Potential to affect groundwater quality in bedrock aquifer (fuel / suspended solids) which could migrate to local water supplies. Migration limited by low permeability deposits between bedrock and sand and gravel deposits. Any impact on groundwater in the bedrock aquifer will be limited due to short term nature of works. Any leakage / spillage would be accidental only and of limited volume.	**Slight - Not Significant**
12	Impact on groundwater flow and quantity in bedrock aquifer from proposed water supply borehole could indirectly impact on the local water supplies in the area.	**Low - Negligible.** Potential to impact on groundwater in the bedrock beneath the site from the proposed water supply borehole. The required volumes are low, and so there will be a localised impact on the groundwater flow and quantity in the bedrock aquifer only.	**Slight - Not Significant**

Mitigation Measures

Construction & Operational Stages

7.209 The sand and gravel pit will establish an environmental management system (EMS).

7.210 Environmental water monitoring will be carried out on a regular basis to demonstrate that the sand and gravel pit is not having any significant adverse effects on the surrounding environment.

7.211 In order to mitigate against the risk of pollution to groundwater and surface water occurring at the site the following management measures will be implemented.

- Rain falling across hardstanding areas will percolate downwards and recharge to the underlying sand and gravel. There will be little or no surface water run-off or overground flow across the site;
- There will be no off-site discharge from the proposed development to any surface watercourse in the locality;
- Outside of impermeable surface areas at the site, all surface water percolates naturally to the ground;
- No re-fuelling (or servicing) of excavation plant will occur at extraction areas. Refuelling will take place adjacent to the bunded fuel storage area on a concrete pad with associated hydrocarbon interceptor attached;
- Fuel and oils will be stored in bunded fuel tanks, which will be covered and enclosed to prevent the build-up of potentially contaminated water within the bund arising from rainfall. A build-up of rainwater in the bund could also reduce the holding capacity of the bund. The bund capacity will be in excess of 110% of the combined volume of the tank(s);
- Final floor levels at the proposed pit excavations will be maintained above the underlying (seasonal maximum) groundwater level and any rain falling across the pit will percolate naturally through unsaturated ground to the underlying shallow groundwater in the superficial deposits;
- A number of spill kits will be available on-site to stop the migration of any minor accidental leakages or spillages should they arise;
- The incidence of fugitive dust outside of the operation will be reduced by the proposal to locate mobile crushing and screening plant within the pit void;
- In order to control dust emissions, water will be sprayed from a tractor drawn bowser on dry exposed surfaces and stockpiles (paved roads, unsealed haul roads and hardstand areas) as required;
- Areas of bare or exposed soils will, insofar as practicable, be kept to a minimum during the extraction operations;
- All HGVs exiting the site will be routed through the proposed wheelwash. This will minimise the transport of fines by HGVs over the access / egress road and the public road network;
- Periodic sweeping of the internal paved site access road and surrounding public roads will be carried out as required by a mechanical road sweeper, and;

- Breedon Ireland environmental team undertake quarterly environmental audits at the site to ensure that compliance with all planning consents, licences and site environmental management system, which is accredited to ISO 14 001 standard, is both maintained and enhanced.

7.212 The water requirement at the site is minimal, and will be reduced further through monitoring water use and by promoting recycling and water efficient practices.

7.213 Implementation of these measures at the application site will further reduce the potential impacts identified above to neutral.

Post – Operational Stage

7.214 As noted previously, the principal activity which will be undertaken at the application site is the extraction and processing of the in-situ sand and gravel with ultimate restoration of lands returned to an agricultural after-use and for the most part will merge back into the surrounding pastoral landscape.

7.215 The final phase of the restoration will start when all the accessible sand and gravel deposits have been exhausted. All plant associated solely with extraction and processing activities will be removed from site. The remaining pit slopes and material used in the construction of the silt lagoon and screening berms will also be regraded and the general area returned to a beneficial agricultural use over the pit floor.

7.216 A layer of overburden/silt material will be spread over the worked out pit floor as a sub-base in the progressive restoration area. On completion of the extraction works the sand and gravel pit will be restored to an agricultural use.

Assessment of Impacts with Mitigation Measures in Place

7.217 With the above mitigation measures in place at the application site, it is projected that the following reduction in the assessed significance of impacts will result:

- Reduction of the potential impact on groundwater quality in the bedrock aquifer from suspended solids during the construction stage from “slight” to “slight – not significant” (No. 2).
- Reduction of the potential impact on groundwater quality in the bedrock aquifer from accidental fuel leakage/ spillage during the construction stage from “slight” to “slight – not significant” (No. 3).
- Reduction of the potential impact on surface water quality in the Killeen River and downstream Delour River and SAC via groundwater baseflow to the Killeen River during the operational stage from “slight” to “slight – not significant” (No. 10).
- The significance of all other potential impacts during the construction and operational stage will be “slight - negligible” or lower to the water environment receptors.
- The potential positive impact of removing livestock from the stream will be “slight positive” to the Killeen River.

Residual Impact Assessment

7.218 Following the implementation of mitigation measures, a residual impact assessment has been undertaken. An assessment of the impacts with mitigation measures in place is presented in **Table 7-19** and **Table 7-20** above, and the residual impact for all potential impacts is assessed as “**neutral**”.

7.219 Examination of the identified potential impacts on the receiving environment show that with the mitigation measures in place, there are no significant residual impacts with respect to groundwater and surface water during the construction / operational / post operational stages of the proposed sand and gravel pit development.

7.220 Following mitigation, the significance of all potential negative impacts identified will be reduced to "**slight**" or lower.

7.221 The potential positive impact of removing livestock from the stream will be "**slight positive**" to the Killeen River.

Monitoring

7.222 Development of the sand and gravel pit presents an opportunity to improve surface water quality in a sub catchment where the surface water quality has been decreasing in recent years. The proposed monitoring program will allow for the following data collection in this sensitive sub catchment.

7.223 An expansive network of groundwater monitoring boreholes, located in the shallow groundwater in the superficial deposits, has been installed across the site.

7.224 The following monitoring activities will be carried out to demonstrate that the development is not having an adverse impact on the surrounding environment and will document any improvements in water quality.

- surface water quality monitoring to be undertaken on a quarterly basis for the duration of the proposed development. Improvements in surface water quality are expected at location SW2 in particular.
- groundwater levels in all boreholes will be monitored on a quarterly basis for the duration of the proposed development;
- groundwater loggers installed in the five selected boreholes will continue to provide for continuous groundwater level monitoring and logger downloads will be undertaken on a quarterly basis for the duration of the proposed development; and
- groundwater quality monitoring to be undertaken on an annual basis for the duration of the proposed development.

Table 7-19: Residual Impact with **Mitigation** Measures

Activity	Existing Environment	Character of Impact	Mitigation Measures	Residual Impact
Construction Stage				
Accidental fuel leakage / spillage	Groundwater quality in bedrock aquifer Killeen River and downstream Delour River and SAC via groundwater baseflow to the watercourse	Accidental fuel leakage/ spillage during construction works could affect groundwater quality in bedrock underlying shallow groundwater through vertical migration. Potential to affect surface water quality in the Killeen River, downstream Delour River and SAC through groundwater baseflow to the watercourse. Migration limited by low permeability deposits between bedrock and sand and gravel deposits. Any impact will be limited due to short term nature of works. Any leakage / spillage would be accidental only and of limited volume.	**Mitigation measures required.** No re-fuelling (or servicing) of excavation plant will occur at extraction areas. Refuelling will take place adjacent to the bunded fuel storage area on a concrete pad with associated hydrocarbon interceptor attached. Mobile plant and machinery will not be serviced / maintained within the sand and gravel pit to minimise the risk of uncontrolled release of polluting liquids to groundwater. A number of spill kits will be available on-site to stop the migration of any minor accidental leakages or spillages should they arise. Fuel and oils will be stored in bunded fuel tanks.	**Neutral**
Increase in suspended solids	Groundwater quality in bedrock aquifer Killeen River and downstream Delour River and SAC via groundwater baseflow to the watercourse	Reduction in groundwater quality in bedrock aquifer from increase in suspended solids in shallow groundwater, which could migrate into the underlying bedrock aquifer. Potential to affect surface water quality in the Killeen River, downstream Delour River and SAC through groundwater baseflow to the watercourse.	**Mitigation measures required.** The incidence of fugitive dust outside of the operation will be reduced by the proposal to locate mobile crushing and screening plant within the pit void. In order to control dust emissions, water will be sprayed from a tractor drawn bowser on dry exposed surfaces and stockpiles (paved roads, unsealed haul roads and hardstand areas) as required.	**Neutral**

		Migration limited by low permeability deposits between bedrock and sand and gravel deposits. Any impact will be limited due to short term nature of works.	Areas of bare or exposed soils will, insofar as practicable, be kept to a minimum through the phased extraction proposals. All HGVs exiting the site will be routed through the proposed wheelwash. This will minimise the transport of fines by HGVs over the access / egress road and the public road network. Periodic sweeping of the internal paved site access road and surrounding public roads will be carried out as required by a mechanical road sweeper.	
Operational Stage				
Accidental fuel leakage / spillage	Groundwater quality in bedrock aquifer Killeen River and downstream Delour River and SAC via groundwater baseflow to the watercourse	Accidental fuel leakage/ spillage during construction works could affect groundwater quality in bedrock underlying shallow groundwater through vertical migration. Migration limited by low permeability deposits between bedrock and sand and gravel deposits. Any leakage / spillage would be accidental only and of limited volume.	**Mitigation measures required.** No re-fuelling (or servicing) of excavation plant will occur at extraction areas. Refuelling will take place adjacent to the bunded fuel storage area on a concrete pad with associated hydrocarbon interceptor attached. Mobile plant and machinery will not be serviced / maintained within the sand and gravel pit to minimise the risk of uncontrolled release of polluting liquids to groundwater. A number of spill kits will be available on-site to stop the migration of any minor accidental leakages or spillages should they arise. Fuel and oils will be stored in bunded fuel tanks.	**Neutral**

Increase in suspended solids	Groundwater quality in bedrock aquifer Killeen River and downstream Delour River and SAC via groundwater baseflow to the watercourse	Reduction in groundwater quality in bedrock aquifer from increase in suspended solids in shallow groundwater, which could migrate into the underlying bedrock aquifer. Potential to affect surface water quality in the Killeen River, downstream Delour River and SAC through groundwater baseflow to the watercourse. Migration limited by low permeability deposits between bedrock and sand and gravel deposits.	**Mitigation measures required.** The incidence of fugitive dust outside of the operation will be reduced by the proposal to locate mobile crushing and screening plant within the pit void. In order to control dust emissions, water will be sprayed from a tractor drawn bowser on dry exposed surfaces and stockpiles (paved roads, unsealed haul roads and hardstand areas) as required. Areas of bare or exposed soils will, insofar as practicable, be kept to a minimum through the phased extraction proposals. All HGVs exiting the site will be routed through the proposed wheelwash. This will minimise the transport of fines by HGVs over the access / egress road and the public road network. Periodic sweeping of the internal paved site access road and surrounding public roads will be carried out as required by a mechanical road sweeper.	**Neutral**
Abstraction from proposed water supply borehole	Groundwater flow and quantity in bedrock aquifer	Potential to impact on groundwater in the bedrock beneath the site from the proposed water supply borehole.	The required volumes are low, and so there will be a localised impact on the groundwater flow and quantity in the bedrock aquifer only. Residential properties at distance from estimated 100-day time of travel around the proposed water supply borehole.	**Neutral**

Table 7-20: Summary of Residual Effects

No.	Potential Impacts	Impact Rating (No Mitigation)	Mitigation Required	Residual Effect
Construction Stage – Direct – Surface Water				
1	Improvement in surface water quality due to removal of livestock from site.	**Low.**	**No**	**Neutral**
Construction Stage – Direct - Groundwater				
2	Reduction in groundwater quality in bedrock aquifer from increase in suspended solids in shallow groundwater, which could migrate into the underlying bedrock aquifer	**Low** to **Negligible.**	**Yes**	**Neutral**
3	Reduction in groundwater quality in bedrock aquifer from accidental fuel leakage/ spillage, which could migrate into the underlying bedrock aquifer	**Low** to **Negligible.**	**Yes**	**Neutral**
Construction Stage – Indirect – Surface Water				
4	Impact on surface water quality in the Killeen River and downstream Delour River and SAC via groundwater baseflow to the watercourse	**Low** to **Negligible.**	**Yes**	**Neutral**
Construction Stage – Indirect – Groundwater				
5	Impact on groundwater quality in bedrock aquifer could indirectly impact the local water supplies in the area.	**Low** to **Negligible.**	**Yes**	**Neutral**
Operational Stage – Direct – Surface Water				
6	Improvement in surface water quality due to removal of livestock from site.	**Medium** to **Low.**	**No**	**Neutral**
Operational Stage – Direct – Groundwater				
7	Reduction in groundwater quality in bedrock aquifer from increase in suspended solids in shallow groundwater, which could migrate into the underlying bedrock aquifer	**Low** to **Negligible.**	**Yes**	**Neutral**

8	Reduction in groundwater quality in bedrock aquifer from accidental fuel leakage/ spillage, which could migrate into the underlying bedrock aquifer	**Low** to **Negligible.**	**Yes**	**Neutral**
9	Impact on groundwater flow and quantity in bedrock aquifer from proposed water supply borehole	**Low** to **Negligible.**	**Yes**	**No**
Operational Stage – Indirect – Surface Water				
10	Impact on surface water quality in the Killeen River and downstream Delour River and SAC via groundwater baseflow to the watercourse	**Low.**	**Yes**	**Neutral**
Operational Stage – Indirect - Groundwater				
11	Impact on groundwater quality in bedrock aquifer could indirectly impact the local water supplies in the area.	**Low** to **Negligible.**	**Yes**	**Neutral**
12	Impact on groundwater flow and quantity in bedrock aquifer from proposed water supply borehole could indirectly impact on the local water supplies in the area.	**Low** to **Negligible.**	**Yes**	**Neutral**

Figures

622000 E | 623000 E | 624000 E | 625000 E | 626000 E | 627000 E | 628000 E | 629000 E

702000 N | 701000 N | 700000 N | 699000 N | 698000 N | 697000 N | 696000 N

N

Notes:

1. Extract from Ordnance Survey Discovery Series Map No. 54
2. Extract from GSI Bedrock Aquifer © GSI

Legend:

- Landowner Boundary (c.32.1 Hectares)
  Third party landowner's land interest
- Planning Application Area (c.12.2 Hectares)
- Applicants Land Interest Area (c.12.4 Hectares)
  under lease agreement from landowner
- LI - Locally important aquifer - bedrock which is moderately productive only in local zones
- Pl - Poor aquifer - bedrock which is generally unproductive except for local zones
- Rf - Regionally important aquifer - fissured bedrock

Scale 1:25,000

0 | 500 | 1000 | 1500 | 2000 | 2500m

Rev	Amendments	Date	By	Chk	Auth

SLR

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Client: Breedon Ireland

Project: Sand and Gravel Pit Extension Development, Mounthall, Camross, Co. Laois

Figure Title: Bedrock Aquifer Map

Scale		SLR Project No.	
1:25,000	@ A3	501.00584.065036	
Designed	Drawn	Checked	Authorised
NB	NB	DB	DB
Date	Date	Date	Date
03/24	03/24	09/24	09/24

Figure Number: **Figure 7-1** | Rev.: **R0**

28/08/2024

S:\SLR Projects\00584 Lagan Materials Ltd\065036 Mounthall S&G Pit Development\EIAR\Volume-2 EIAR Report Figs Appends\07 Water\Dwgs\CAD\Wa\reg\Figure 7-1 Bedrock Aquifer.dwg

CYAL50381397
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622000 E | 623000 E | 624000 E | 625000 E | 626000 E | 627000 E | 628000 E | 629000 E

702000 N | 701000 N | 700000 N | 699000 N | 698000 N | 697000 N | 696000 N

N

RECEIVED: 19/09/2024

Gorteennameale | Clear Lake | Barcam | Moher East | Cummer | Glendine | Glendine Gap | Monasop | Johnsborough | Moher West | Arderin 527 | Glenamoon | Mounthall | Glennaglass | Drimhill or Quarryfarm | Cardtown | Monelly | Glenall | Glenkitt | Ballina | Northgrove | Srahanboy | Knockannagad | Cappanarrow Br | Killeen | Dernamanagh | Cappanarrow | Derrycarrow Br | Gortnaglogh | Aghduff | Garrafin | Carrowreagh | Derrycarrow | Longford Hill | Derrinduff | Rossnacreena

0 500 1000 1500 2000 2500m

Scale 1:25,000

Notes:

1. Extract from Ordnance Survey Discovery Series Map No. 54
2. Extract from GSI Groundwater Vulnerability © GSI

Legend:

- Landowner Boundary (c.32.1 Hectares) *Third party landowner's land interest*
- Planning Application Area (c.12.2 Hectares)
- Applicants Land Interest Area (c.12.4 Hectares) *under lease agreement from landowner*
- Rock at or near surface or karst
- Extreme vulnerability
- High vulnerability
- Moderate vulnerability
- Low vulnerability

Rev	Amendments	Date	By	Chk	Auth

SLR

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Client: Breedon Ireland

Project: Sand and Gravel Pit Extension Development, Mounthall, Camross, Co. Laois

Figure Title: Groundwater Vulnerability Map

Scale	SLR Project No.
1:25,000 @ A3	501.00584.065036

Designed	Drawn	Checked	Authorised
NB	NB	DB	DB
Date 03/24	Date 03/24	Date 09/24	Date 09/24

Figure Number: **Figure 7-2** Rev.: **R0**

28/08/2024

S:\SLR Projects\00584 Lagan Materials Ltd\065036 Mounthall S&G Pit Development\EIAR\Volume-2 EIAR Report Figs Appends\07 Water\Dwgs\CAD\Wking\Figure 7-2 GW Vulnerability.dwg

CYAL50381397

622000 E | 623000 E | 624000 E | 625000 E | 626000 E | 627000 E | 628000 E | 629000 E

702000 N | 701000 N | 700000 N | 699000 N | 698000 N | 697000 N | 696000 N

N

RECEIVED: 19/09/2024

Gorteennamaale | Clear Lake | Barcam | Moher East | Cummer | Glendine | Glendine Gap | Monasop | Johnsborough | Moher West | Arderin 527 | Glenamoon | Glennaglass | Drimhill or Quarryfarm | Mounthall | Camross | Cardtown | Lacca Br | Monelly | Glenall | Glenkitt | Ballina | Cardtown Br | Northgrove | Srahanboy | Knockannagad | Cappanarrow Br | Killeen | Dernamanagh | Cappanarrow | Derrycarrow Br | Gortnaglogh | Aghduff | Garrafin | Carrowreagh | Derrycarrow | Longford Hill | Derrinduff | Rossnacreena | Birchgrove | Tinnakill

Delour River

0 | 500 | 1000 | 1500 | 2000 | 2500m

Scale 1:25,000

Notes:

1. Extract from Ordnance Survey Discovery Series Map No. 54
2. Extract from EPA Groundwater Body © EPA

Legend:

- Landowner Boundary (c.32.1 Hectares)
  Third party landowner's land interest
- Planning Application Area (c.12.2 Hectares)
- Applicants Land Interest Area (c.12.4 Hectares)
  Under lease agreement from landowner
- Camross
- Slieve Bloom South
- Coolrain

Rev	Amendments	Date	By	Chk	Auth

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Client: Breedon Ireland

Project: Sand and Gravel Pit Extension Development, Mounthall, Camross, Co. Laois

Figure Title: Groundwater Body Map

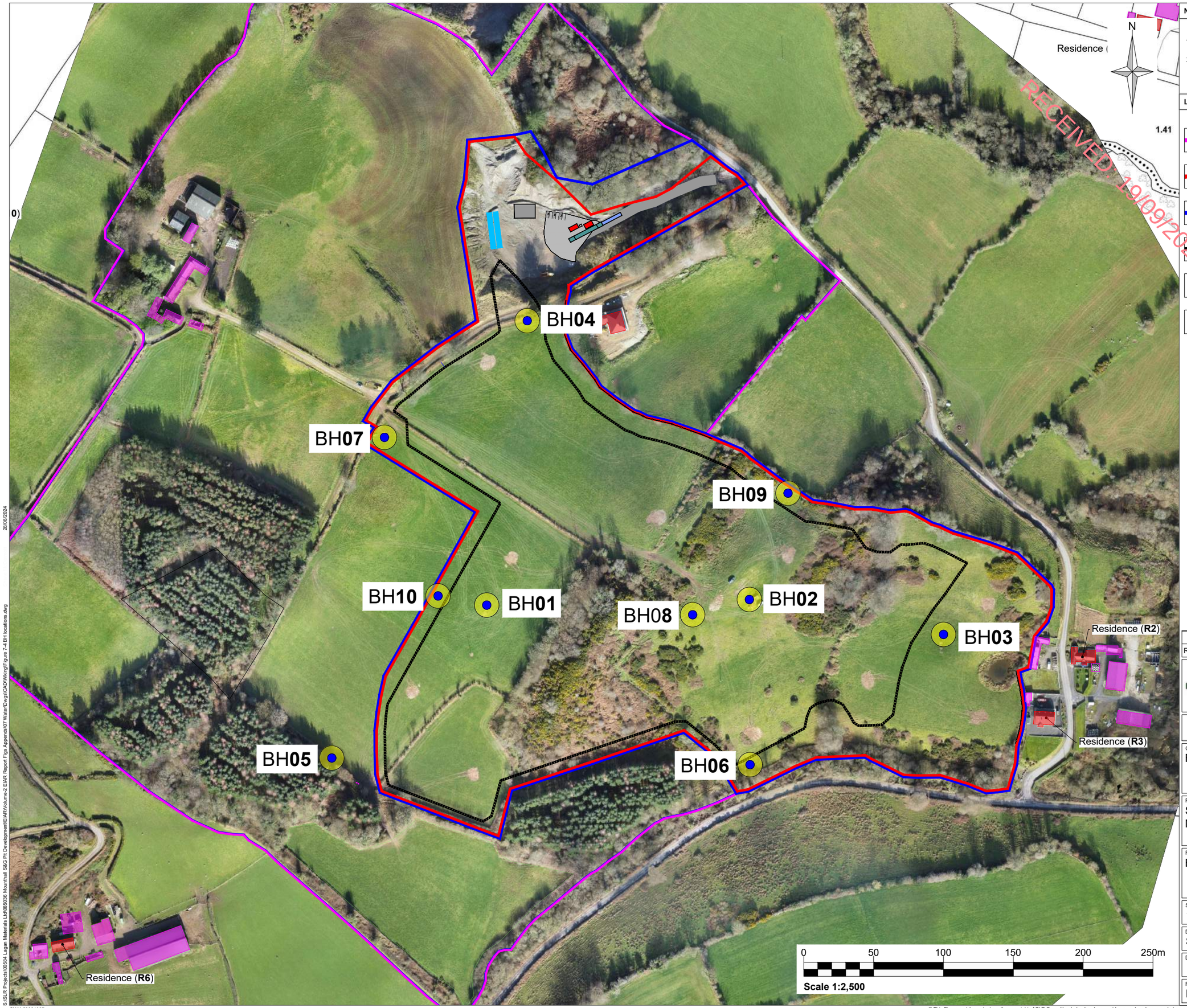
Scale		SLR Project No.	
1:25,000	@ A3	501.00584.065036	
Designed	Drawn	Checked	Authorised
NB	NB	DB	DB
Date	Date	Date	Date
03/24	09/24	09/24	09/24

Figure Number: **Figure 7-3** | Rev.: **R0**

28/08/2024

S:\SLR Projects\00594 Lagan Materials Ltd\065036 Mounthall S&G Pit Development\EIAR\Volume-2 EIAR Report Figs Appends\07 Water\Dwgs\CAD\Wking\Figure 7-3 Groundwater Body Map.dwg

CYAL50381397



Notes:

1. Extract from Ordnance Survey Discovery Series Map No. 54.
2. Extract from drone survey.

Legend:

- Landowner Boundary (c.32.1 Hectares) *Third party landowner's land interest*
- Planning Application Area (c.12.2 Hectares)
- Applicants Land Interest Area (c.12.4 Hectares) *under lease agreement from landowner*
- Proposed S&G Extraction Area (c.8 hectares)
- Residential property
- Agricultural shed / other building (non-residential)

Rev	Amendments	Date	By	Chk	Auth

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7 DUNDRUM BUSINESS PARK,
WINDY ARBOUR,
DUBLIN,
IRELAND,
D14 N2Y7

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Client: Breedon Ireland

Project: Sand and Gravel Pit Extension Development, Mounthall, Camross, Co. Laois

Figure Title: Borehole Locations Map

Scale	SLR Project No.
1:2,500 @ A3	00584.065036

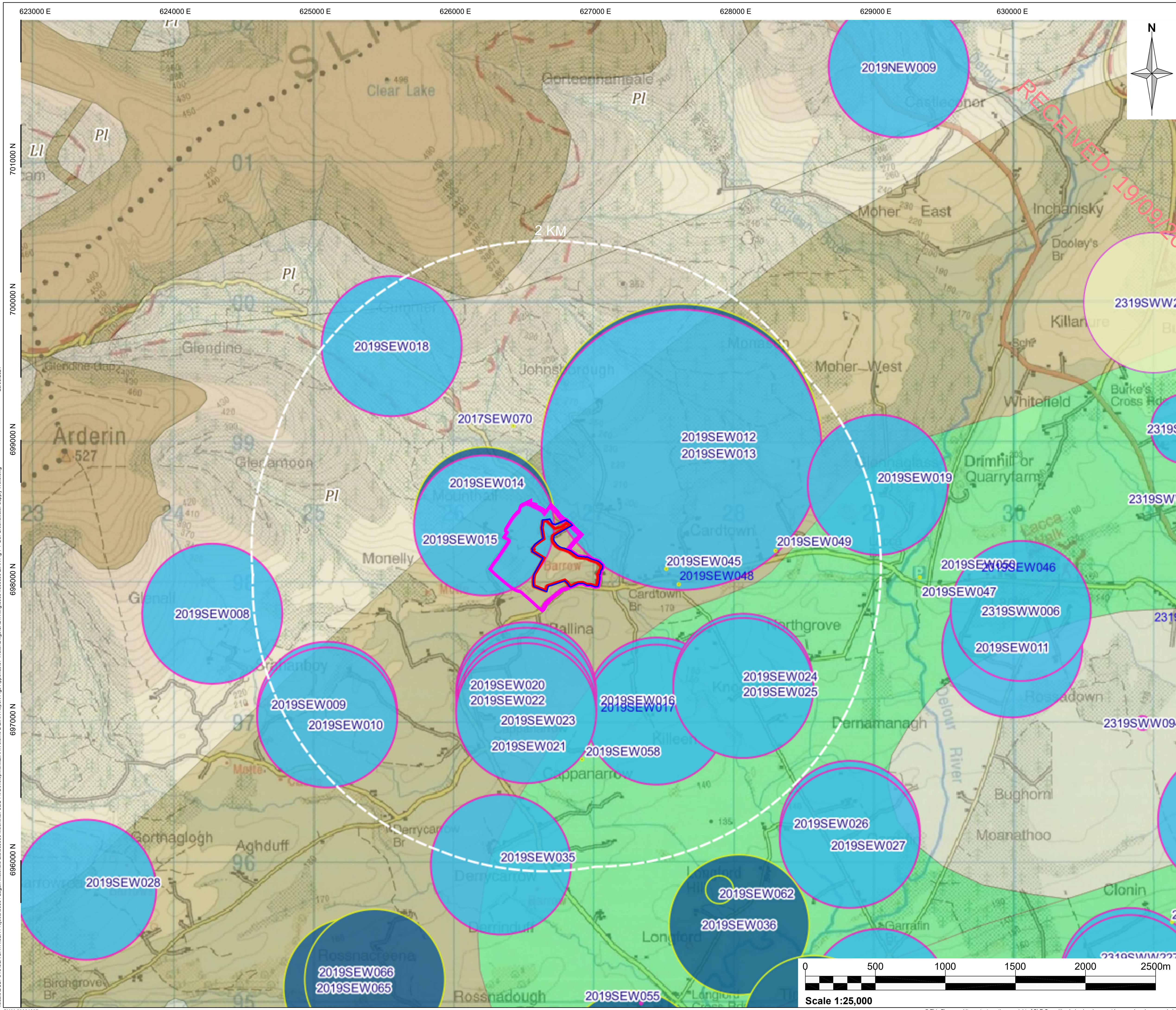
Designed	Drawn	Checked	Authorised
SMcD	SMcD	DB	DB
Date	Date	Date	Date
	02/24	09/24	09/24

Figure Number: **Figure 7-4** Rev.: **R1**

28/08/2024

S:\SLR Projects\00584 Lagan Materials Ltd\065036 Mounthall S&G Pit Development\EIAR\Volume-2 EIAR Report Figs Appends\07 Water\Dwgs\CAD\Wkng\Figure 7-4 BH locations.dwg

CYAL50381397



Notes:

1. Extract from Ordnance Survey Discovery Series Map No. 54
2. Extract from GSI BEDROCK AQUIFER & GROUNDWATER WELLS © GSI

Legend:

LANDOWNER BOUNDARY (C.32.1 HECTARES)
Third party landowner's land interest

PLANNING APPLICATION AREA (C.12.2 HECTARES)

APPLICANTS LAND INTEREST AREA (C.12.4 HECTARES)
under lease agreement from landowner

GSI WELLS:

WELLS FOR DOMESTIC USE ONLY

WEELS FOR AGRICULTURAL & DOMESTIC USE

UNSPECIFIED USE IN GSI DATABASE

GSI BEDROCK AQUIFERS:

PL - POOR AQUIFER, BEDROCK WHICH IS GENERALLY UNPRODUCTIVE

LI - LOCALLY IMPORTANT AQUIFER - BEDROCK WHICH IS MODERATELY PRODUCTIVE ONLY IN LOCAL ZONES

Rf- REGIONALLY IMPORTANT AQUIFER - FISSURED BEDROCK

Rev	Amendments	Date	By	Chk	Auth

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Client
Breedon Ireland

Project
Sand and Gravel Pit Extension Development, Mountahall, Camross, Co. Laois

Figure Title
GSI Groundwater Supply Wells

Scale	SLR Project No.		
1:25,000 @ A3	501.00584.065036		
Designed	Drawn	Checked	Authorised
NB	NB	PG	PG
Date	Date	Date	Date
03/24	03/24	07/24	07/24

Figure Number: FIGURE 7-7A — Rev. R0

\\euafs\DUBFS1\SLR DATA\SLR Projects\00584 Lagan Materials Ltd\065036 Mounthall S&G Pit Development\EIAR\Volume-2 EIAR Report Figs Appendix\07 Water\Dwgs\CAD\Wong\065036 EIAR Fig 7-7 GSI Groundwater Supply Wells.dwg 29/08/2024

CYAL50381397
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N

500m

250m

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Baile Sheáin
Johnsborough

Inner source protection area

Proposed water supply well for top-up

Residence (**R10**)

Residence (**R1**)

Residence (**R11**)

Residence (**R12**)

Residence (**R13**)

Residence (**R14**)

Well 4

Well 3

Well 8

Well 7

Residence (**R20**)

Residence (**R21**)

Residence (**R4**)

Well 6

Residence (**R19**)

Residence (**R18**)

Residence (**R17**)

Residence (**R15**)

Residence (**R16**)

Well 5

PHASE 3

PHASE 2

PHASE 1

Well 1

Residence (**R2**)

Residence (**R3**)

Residence (**R6**)

Residence (**R5**)

Residence (**R8**)

Well 2

Residence (**R7**)

Residence (**R9**)

An Cillín
Killeen

Béal an Átha
Ballina

Baile an Chardt

Knocka

0 100 200 300 400 500m

Scale 1:5,000

Notes:

1. Extract from Ordnance Survey 5,000 scale mapping - sheet numbers 3880, 3881, 3937, 3938

Legend:

- Landowner Boundary (c.32.1 Hectares)
  Third party landowner's land interest
- Planning Application Area (c.12.2 Hectares)
- Applicants Land Interest Area (c.12.4 Hectares)
  under lease agreement from landowner
- Proposed S&G Extraction Area (c.8 Hectares)
- Residential Property
- Agricultural Shed / Other Building (non-residential)
- Proposed borehole for water supply top-up
- Wells where access was gained for Well Survey (within 500m)

Rev	Amendments	Date	By	Chk	Auth

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Client
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Project
Sand and Gravel Pit Extension Development, Mounthall, Camross, Co. Laois

Figure Title
Local Residence Well Survey (within 500m)

Scale	SLR Project No.
1:2,500 @ A3	00584.065036

Designed	Drawn	Checked	Authorised
SMcD	SMcD	DB	DB
Date: Jan 2024	Date: Jan 2024	Date: 09/24	Date: 09/24

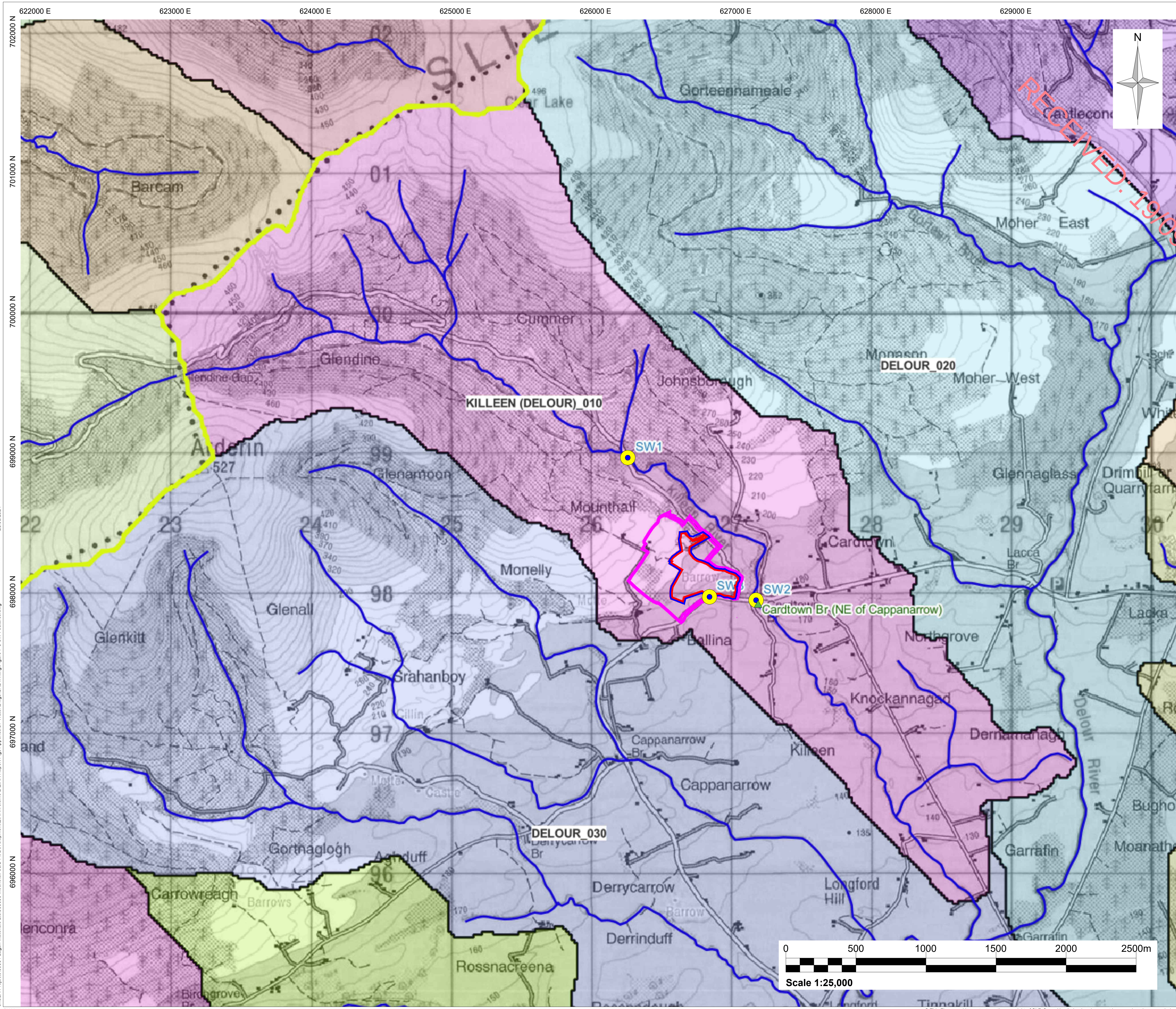
Figure Number
Figure 7-7B

Rev.

30/08/2024

S:\SLR Projects\00584 Lagan Materials Ltd\065036 Mounthall S&G Pit Development\EIAR\Volume-2 EIAR Report Figs Appends\07 Water\Dwgs\CADWkingFigure 7-7B Local Well Survey.dwg

CYAL50381397



Notes:

1. Extract from Ordnance Survey Discovery Series Map No. 54
2. Extract from WFD Catchments © EPA

Legend:

- Landowner Boundary (c.32.1 Hectares) *Third party landowner's land interest*
- Planning Application Area (c.12.2 Hectares)
- Applicants Land Interest Area (c.12.4 Hectares) *under lease agreement from landowner*
- Catchment Boundary
- Subcatchment Boundary
- River Flow
- Surface water sampling points
- EPA Monitoring station, cardtown br (NE of Cappanarrow)

Catchments (WFD Sub-Catchments):

- Killeen (Delour)_010
- Delour_020
- Delour_030
- Camcor_010
- Glenfelly Stream_010
- Roscomore Stream_010
- Tonet_020

Rev	Amendments	Date	By	Chk	Auth

SLR

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Client
Breedon Ireland

Project
Sand and Gravel Pit Extension Development, Mounthall, Camross, Co. Laois

Figure Title
Surface Water Features

Scale	SLR Project No.		
1:25,000 @ A3	501.00584.065036		
Designed NB	Drawn NB	Checked DB	Authorised DB
Date 03/24	Date 03/24	Date 09/24	Date 09/24

Figure Number: Figure 7-8 — Rev. R0

S:\SLR Projects\00584 Lagan Materials Ltd\065036 Mounthall S&G Pit Development\EIAR\Volume-2 EIAR Report Figs Appendix\07 Water\Dwgs\CAD\Wkng\Figure 7-8 SW Features.dwg
28/08/2024

CYAL50381397

Appendices

Appendix 7-A
EU Directives / National Legislation and Regulations / Guidelines / Technical Standards

European Directives

- Environmental Impact Assessment. Directive (2011/92/EU) on the assessment of the effects of certain public and private projects on the environment;
- Environmental Impact Assessment Directive (2014/52/EU) on the assessment of the effects of certain public and private projects on the environment;
- Water Framework Directive (2000/60/EC);
- Groundwater Directive (2006/118/EC);
- Flooding Directive (2007/60/EC)
- Integrated Pollution and Prevention Control Directive (2008/1/EC); and
- The management of waste from extractive industries (2006/21/EC).

Irish Government Acts, National Legislation and Regulations

- S.I. No. 349 of 1989, European Communities (Environmental Impact Assessment) Regulations, and subsequent amendments (S.I. No. 84 of 1994, S.I. No. 352 of 1998, S.I. No. 93 of 1999, S.I. No. 450 of 2000 and S.I. No. 538 of 2001);
- The Planning and Development Acts, 2000 to 2009, The Planning and Development (Amendment) Act 2010, S.I. 600 of 2001 Planning and Development Regulations and subsequent amendments including, S.I. No. 364 of 2005 and S.I. 685 of 2006.

National legislation on the protection of the water environment. Since 2000 water management in EU member states has primarily been directed by the Water Framework Directive (2000/60/EC) and the associate 'daughter' Groundwater Directive (2006/118/EC). Irish legislation implementing these, and other relevant directives currently includes:

- S.I. No. 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations 2010 and amendments (S.I. No. 389 of 2011 and S.I. No. 149 of 2012);
- European Union (Drinking Water) Regulations 2014 (S.I. No. 122 of 2014);
- S.I. No. 278 of 2007 European Communities (Drinking Water) (No. 2) Regulations;
- S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations 2009 and amendment (S.I. No. 327 of 2012);
- S.I. No. 684 of 2007 Waste Water Discharge (Authorisation) Regulations, 2007, as amended (S.I. No. 231 of 2010);
- S.I. No. 122 of 2010 European Communities (Assessment and Management of Flood Risks) Regulations 2010;
- S.I. No. 457 of 2008 European Communities (Environmental Liability) Regulations which bring into force the European Liability Directive (2004/35/EC);
- European Union (Planning and Development) (Environmental Impact Assessment) (No. 2) Regulations 2018 (S.I. No. 404 of 2018);
- Local Government (Water Pollution) Acts 1977 to 1998;
- European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293 of 1988);
- European Communities (Quality of Shellfish Waters) Regulations, 2006 (S.I. No. 268 of 2006) and amendments (S.I No. 55 and 464 of 2009), and;

- Bathing Water Quality Regulations, 2008 (S.I. No. 79 of 2008) and amendments (S.I No. 351 of 2011 and S.I. No. 163 of 2016);

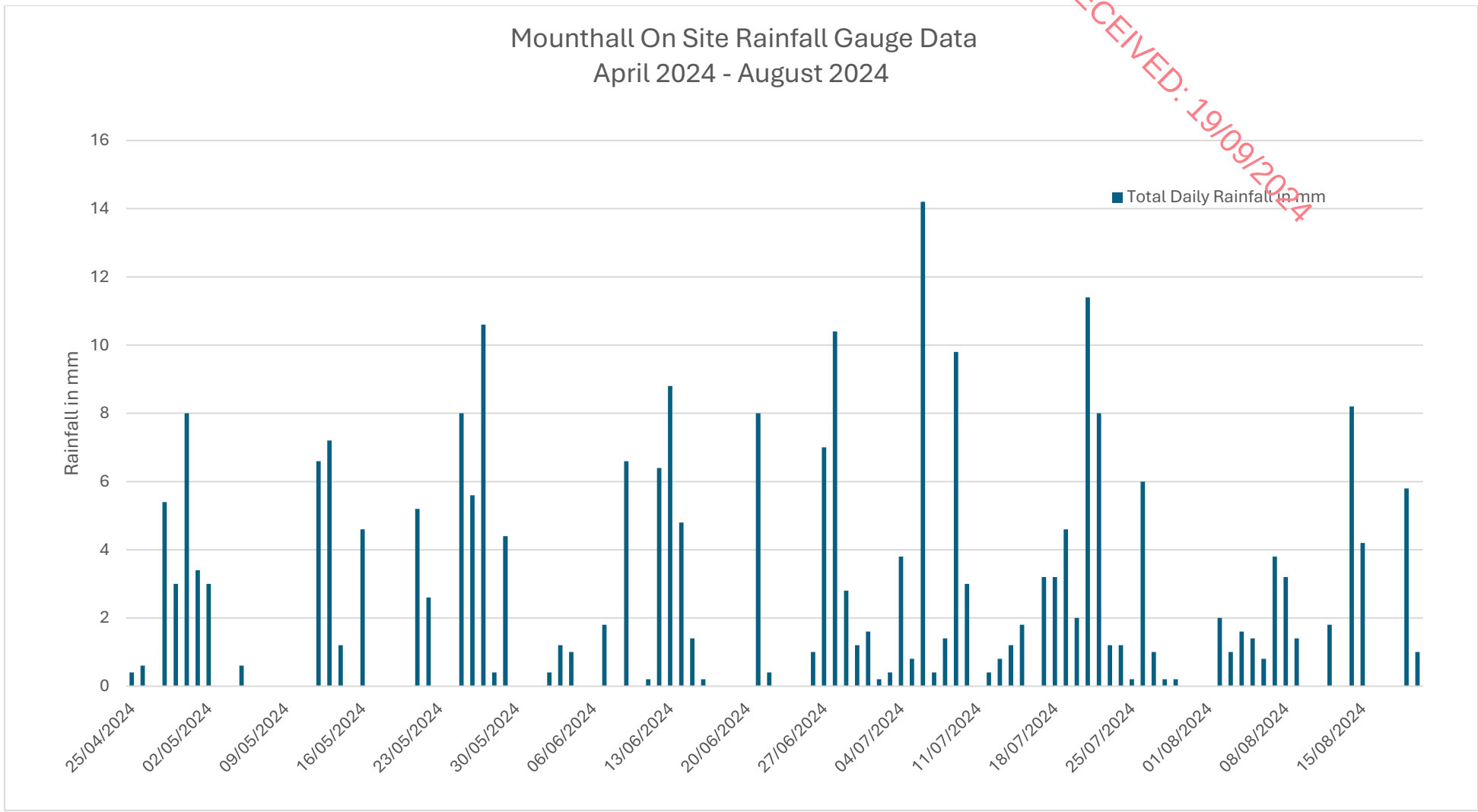
Guidelines

- CIS (2007). Common Implementation Strategy (CIS) for the Water Framework Directive (2000/60/EC) Guidance on preventing or limiting direct and indirect inputs in the context of the Groundwater Directive 2006/118/EC. Guidance Document No. 17.
- CIS (2010). Common Implementation Strategy (CIS) for the Water Framework Directive (2000/60/EC). Guidance on risk assessment and the use of conceptual models for groundwater. Guidance document No. 26.
- DEHLG (2004). National Urban Waste Water Study. National Report.
- DEHLG (2009). Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities.
- DELG/EPA/GSI (1999). Groundwater Protection Schemes. Document prepared jointly by the Geological Survey of Ireland (GSI), the Environmental Protection Agency, and the Department of Environment, Heritage and Local Government.
- EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- EPA (2010b). Methodology for Establishing Groundwater Threshold Values and the Assessment of Chemical and Quantitative Status of Groundwater, Including and Assessment of Pollution Trends and Trend Reversal.
- EPA (2011). Guidance on the Authorisation of Discharges to Groundwater. Version 1, December 2011.
- EPA (2003). Towards Setting Guideline Values for the Protection of groundwater in Ireland. Interim Report.
- EPA (2006). Ireland Water Framework Directive Monitoring Programme.
- Fitzsimons, V., Daly, D. and Deakin, J. (2003). Draft GSI guidelines for assessment and mapping of groundwater vulnerability to contamination. Groundwater Chapter, Geological Survey of Ireland.
- GSI (2006). Criteria used in aquifer classification. 1Available from http://www.gsi.ie/Programmes/Groundwater/Aquifer+Classification.htm
- IGI (2007). Guidelines on Water Well Construction. Available from http://www.igi.ie/assets/files/Water%20Well%20Guidelines/Guidelines.pdf
- Kilroy, G., Dunne, F., Ryan, J., O'Connor, A., Daly, D., Craig, M., Coxon, C., Johnston, P. and Moe, H. (2008). A Framework for the Assessment of Groundwater – Dependent Terrestrial Ecosystems under the Water Framework Directive. Environmental Research Centre Report Series No. 12.
- Institute of Geologists of Ireland, 2007. Recommended collection, presentation and interpretation of geological and hydrogeological information for quarry developments.

Technical Standards

- British Standards (2015). Code of Practice for Ground Investigations BS5930:2015;.
- CIRIA (2007). The SuDS Manual. (C697). CIRIA publication, February 2007.

Appendix 7-B
On Site Rain Gauge Daily Readings



Appendix 7-C
Borehole Logs

BOREHOLE LOG

BOREHOLE No
BH 01

Client:
Breedon Ireland

SLR

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	15/02/2023	197.52m	E626571 N698126

Project:
Mounthall S&G Pit

Sheet
1 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument / Backfill
					197.02		(0.50) 0.50	Grass over brown TOPSOIL	
							(4.00)	Brown fine and medium SAND (dry).	
								3.00 Brown gravelly silty fine and medium SAND.	
					193.02		4.50		
							(6.00)	Damp brown slightly gravelly fine and medium SAND. Gravel is rounded.	
								6.00 Yellowish brown silty very sandy medium and coarse GRAVEL	
								9.00 Brown silty very gravelly medium SAND	

Borehole Continued on Next Page

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	
15/02/2023	4.50									50mm standpipe installed. Response zone 2.00m to 11.50m bgl. Bentonite (0.5 - 2.0m).
16/02/2023	11.50	11.00		Dry						

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 01

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	15/02/2023	197.52m	E626537 N698139

Project:
Mounthall S&G Pit

Sheet
2 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
					187.02		10.50	Damp brown slightly gravelly fine and medium SAND. Gravel is rounded.	
11					186.02		(1.00) 11.50	Stiff reddish brown slightly sandy slightly gravelly SILT/CLAY with medium cobble content.	
								Borehole Complete at 11.50m	
12									
13									
14									
15									
16									
17									
18									
19									

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	50mm standpipe installed. Response zone 2.00m to 11.50m bgl. Bentonite (0.5 - 2.0m).

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 02

Client:
Breedon Ireland

SLR

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	20/02/2023	195.87m AOD	E626762 N698132

Project:
Mounthall S&G Pit

Sheet
1 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
					195.37		(0.50) 0.50	Grass over brown TOPSOIL	
							(4.00)	Brown fine and medium SAND with medium cobble content (dry).	
								3.00 Orange brown gravelly silty medium SAND.	
					191.37		4.50	Brown sandy GRAVEL with medium cobble content. Gravel is rounded.	
								7.50 Brown slightly sandy slightly gravelly SILT.	

Borehole Continued on Next Page

Boring Progress and Water Observations				
Date	Depth	Casing Dpt	Casing Dia	Water Dpt
20/02/2023	4.00			
21/02/2023	15.00			
22/02/2023	23.00	22.00		Dry

Chiselling			Water Added	
From	To	Hours	From	To
15.60	16.50	02:00		

General Remarks

50mm standpipe installed response zone 2.90m to 23.00m bgl.

Bentonite (0.4 -2.9m).

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 02

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	20/02/2023	195.87m AOD	E626760 N698136

Project:
Mounthall S&G Pit

Sheet
2 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
								Brown sandy GRAVEL with medium cobble content. Gravel is rounded.	
							(11.10)	*13.50 Bluish brown slightly silty very sandy GRAVEL.*	
					180.27		15.60		
							(0.90)	Brown rounded and subrounded GRAVEL and COBBLES with low boulder content.	
					179.37		16.50		
							(3.10)	Brown coarse SAND. *18.00 Greyish brown gravelly silty medium and coarse SAND.*	
					176.27		19.60		
								Dense brown sandy GRAVEL.	
								Borehole Continued on Next Page	

Boring Progress and Water Observations				
Date	Depth	Casing Dpt	Casing Dia	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
15.60	16.50	02:00		

General Remarks

50mm standpipe installed response zone 2.90m to 23.00m bgl.

Bentonite (0.4 -2.9m).

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No **BH 02**

Client: **Breedon Ireland**

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	20/02/2023	195.87m AOD	E626760 N698136

Project: **Mounthall S&G Pit**

Sheet 3 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
							(1.90)	Dense brown sandy GRAVEL. *21.00 Light brown very silty GRAVEL and SAND.*	
					174.37		21.50		
							(1.50)	Stiff reddish brown slightly sandy slightly gravelly SILT/CLAY with medium cobble content.	
					172.87		23.00		
								Borehole Complete at 23.00m	

21 22 23 24 25 26 27 28 29

Boring Progress and Water Observations				
Date	Depth	Casing Dpt	Casing Dia	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
15.60	16.50	02:00		

General Remarks

50mm standpipe installed response zone 2.90m to 23.00m bgl.

Bentonite (0.4 -2.9m).

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 03

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	07/02/2024	181.38m AOD	E626900 N698105

Project:
Mounthall S&G Pit

Sheet
1 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument / Backfill
							(3.40)	Brown fine and medium SAND with medium cobble content (dry).	
								3.00 Orange brown silty very sandy GRAVEL. Sand is medium and coarse	
					177.98		3.40		
							(0.60)	Dense brown sandy GRAVEL and COBBLES with medium boulder content. Boulders are angular.	
					177.38		4.00		
							(4.90)	Dense brown SAND and GRAVEL with medium cobble content.	
								6.00 Light brown silty very sandy medium and coarse GRAVEL.	
					172.48		8.90		
							(1.60)	Wet reddish brown fine and medium SAND.	

Borehole Continued on Next Page

Boring Progress and Water Observations				
Date	Depth	Casing Dpt	Casing Dia	Water Dpt
23/02/2023	4.00			
24/02/2023	12.00	11.00		Dry

Chiselling			Water Added	
From	To	Hours	From	To
3.50	4.00	01:00		
6.80	7.30	01:00		

General Remarks

50mm standpipe installed - response zone 2.90m to 11.00m bgl.

Bentonite (0.5 -2.9m).

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 03

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	07/02/2024	181.38m AOD	E626899 N698111

Project:
Mounthall S&G Pit

Sheet
2 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
					170.88		10.50	Wet reddish brown fine and medium SAND.	
11							(1.50)	Firm reddish brown slightly sandy slightly gravelly SILT/CLAY.	
12					169.38		12.00	Borehole Complete at 12.00m	
13									
14									
15									
16									
17									
18									
19									

Boring Progress and Water Observations				
Date	Depth	Casing Dpt	Casing Dia	Water Dpt

Chiselling			Water Added	
From	To	Hours	From	To
3.50	4.00	01:00		
6.80	7.30	01:00		

General Remarks

50mm standpipe installed - response zone 2.90m to 11.00m bgl.

Bentonite (0.5 -2.9m).

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 04

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	04/12/2023	204.43m AOD	E626497 N698248

Project:
Mounthall S&G Pit

Sheet
1 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument / Backfill
					204.23		0.20	Firm brown sandy TOPSOIL	
								Loose coarse brown gravelly SAND	
				▼			(7.20)		
					197.03		7.40		
								Firm to stiff brown very sandy gravelly SILT possible highly weathered Rock	
							(1.90)		
					195.13		9.30		
								Weak highly weathered brownish red fine grained SANDSTONE	

Borehole Continued on Next Page

Boring Progress and Water Observations

Date	Depth	Casing Dpt	Casing Dia	Water Dpt
04/12/2023	25.00	25.00		6.00
04/12/2023	25.00	25.00		20.00

Chiselling

From	To	Hours

Water Added

From	To

General Remarks

50mm standpipe installed response zone 14.00m to 25.00m bgl. There is airlift development.

Bentonite (10.0-13.5m).

All dimensions in metres	Contractor: Peterson Drilling Services Ltd	Method: Rotary open hole	Logged By:	Approved By:
Scale 1:66	Plant: Knebel HY79	Hole Size: 120mm	SP	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 04

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	04/12/2023	204.43m AOD	E626601 N698336

Project:
Mounthall S&G Pit

Sheet
2 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument / Backfill
							(3.70)	Weak highly weathered brownish red fine grained SANDSTONE	
					191.43		13.00		
							(12.00)	Strong brown fine grained SANDSTONE occasional highly weathered layers	
								Borehole Continued on Next Page	

11 12 13 14 15 16 17 18 19

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	50mm standpipe installed response zone 14.00m to 25.00m bgl. There is airlift development. Bentonite (10.0-13.5m).

All dimensions in metres	Contractor: Peterson Drilling Services Ltd	Method: Rotary open hole	Logged By:	Approved By:
Scale 1:66	Plant: Knebel HY79	Hole Size: 120mm	SP	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 04

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	04/12/2023	204.43m AOD	E626601 N698336

Project:
Mounthall S&G Pit

Sheet
3 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
21								Strong brown fine grained SANDSTONE occasional highly weathered layers	
22									
23									
24									
25					179.43		25.00		
								Borehole Complete at 25.00m	
26									
27									
28									
29									

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	50mm standpipe installed response zone 14.00m to 25.00m bgl. There is airlift development. Bentonite (10.0-13.5m).

All dimensions in metres	Contractor: Peterson Drilling Services Ltd	Method: Rotary open hole	Logged By:	Approved By:
Scale 1:66	Plant: Knebel HY79	Hole Size: 120mm	SP	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No **BH 05**

Client: **Breedon Ireland**

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	05/12/2023	193.67m AOD	E626456 N698027

Project: **Mounthall S&G Pit**

Sheet 1 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument / Backfill
					193.47		0.20	Soft to firm brown TOPSOIL	
							(1.60)	Medium dense brown very silty gravelly SAND	
					191.87		1.80		
							(2.80)	Medium dense brown silty gravelly SAND	
					189.07		4.60		
							(2.90)	Loose medium coarse brownish gravelly SAND	
					186.17		7.50		
							(1.90)	Weak highly weathered brownish red SANDSTONE	
				▼	184.27		9.40		
								Strong brown fine grained SANDSTONE with occasional weathered layers	

Borehole Continued on Next Page

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	
05/12/2023	15.00	15.00		9.5						50mm standpipe installed response zone 9.00m to 15.00m bgl. There is airlift development. Bentonite (5.50-8.50m).

All dimensions in metres	Contractor: Peterson Drilling Services Ltd	Method: Rotary open hole	Logged By:	Approved By:
Scale 1:66	Plant: Knebel HY79	Hole Size: 120mm	SP	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No **BH 05**

Client: **Breedon Ireland**

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	05/12/2023	193.67m AOD	E626461 N698023

Project: **Mounthall S&G Pit**

Sheet 2 of 2

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
							(5.60)	Strong brown fine grained SANDSTONE with occasional weathered layers	
					178.67		15.00	Borehole Complete at 15.00m	

11 12 13 14 15 16 17 18 19

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	50mm standpipe installed response zone 9.00m to 15.00m bgl. There is airlift development. Bentonite (5.50-8.50m).

All dimensions in metres	Contractor: Peterson Drilling Services Ltd	Method: Rotary open hole	Logged By:	Approved By:
Scale 1:66	Plant: Knebel HY79	Hole Size: 120mm	SP	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 06

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	21/02/2024	176.299m AOD	E626763 N698015

Project:
Mounthall S&G Pit

Sheet
1 of 1

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
					181.53		(0.60) 0.60	Grass over soft to firm brown sandy CLAY	
				▼	179.13		(2.40) 3.00	Brown sandy COBBLES	
					178.13		(1.00) 4.00	Stiff brown sandy CLAY with cobbles.	
								Borehole Complete at 4.00m	

1 2 3 4 5 6 7 8 9

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	
21/02/2024	4.00	4.00		2.2	3.50	4.00	01:00			50mm standpipe installed response zone 2.00m to 04.00m bgl. Bentonite (1.5 -3.0m)

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 07

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	07/02/2024	208.52m	E626499 N698252

Project:
Mounthall S&G Pit

Sheet
1 of 1

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
							(1.20)	Grass over firm brown sandy CLAY with cobbles.	
					207.32		1.20		
								Reddish brown SAND	
				▼			(4.20)		
					203.12		5.40		
					202.82		5.70	Stiff reddish brown sandy gravelly CLAY with cobbles and boulders.	
							(0.50)	Grey siltstone.	
					202.32		6.20		
								Borehole Complete at 6.20m	

Boring Progress and Water Observations				
Date	Depth	Casing Dpt	Casing Dia	Water Dpt
07/02/2024	6.20	6.00		3.00

Chiselling			Water Added	
From	To	Hours	From	To
4.10	4.50	01:00		
6.00	6.20	01:00		

General Remarks

BH terminated at 6.20 mbgl. Obstruction as weathered rock. 50mm standpipe installed response zone 2.20m to 6.20m bgl. Bentonite (1.5 - 2.2m).

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 08

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	09/02/2024	199.31m AOD	E626721 N698126

Project:
Mounthall S&G Pit

Sheet
1 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument / Backfill
					198.71		(0.60) 0.60	Grass over firm brown sandy CLAY.	
							(5.40)	Brown SAND with cobbles.	
					193.31		6.00		
					191.81		(1.50) 7.50	Brown SAND.	
								Brown sandy GRAVEL.	

Borehole Continued on Next Page

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	
09/02/2023	5.00									BH terminated at 24.20m bgl on REs instruction. 50mm standpipe installed response zone 18.00m to 24.20m bgl.
12/02/2024	14.00									
13/02/2024	21.00	24.00		Dry						Bentonite (16.0 - 17.0m)

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 08

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	09/02/2024	199.31m AOD	E626719 N698125

Project:
Mounthall S&G Pit

Sheet
2 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
							(9.00)	Brown sandy GRAVEL.	
					182.81		16.50	Brown silty SAND.	
								Borehole Continued on Next Page	

11 12 13 14 15 16 17 18 19

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	BH terminated at 24.20m bgl on REs instruction. 50mm standpipe installed response zone 18.00m to 24.20m bgl. Bentonite (16.0 - 17.0m)

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 08

Client:
Breedon Ireland

SLR

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	09/02/2024	199.31m AOD	E626719 N698125

Project:
Mounthall S&G Pit

Sheet
3 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
							(7.10)	Brown silty SAND.	
					175.71		23.60		
							(0.60)	Brown neo-brown CLAY	
					175.11		24.20		
								Borehole Complete at 24.20m	

21 22 23 24 25 26 27 28 29

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	BH terminated at 24.20m bgl on REs instruction. 50mm standpipe installed response zone 18.00m to 24.20m bgl. Bentonite (16.0 - 17.0m)

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 09

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	15/02/2024	198.858m AOD	E626785 N698214

Project:
Mounthall S&G Pit

Sheet
1 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument / Backfill
					197.92		(0.70) 0.70	Grass over soft to firm brown sandy CLAY.	
							(15.50)	Brown SAND	
								Borehole Continued on Next Page	

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	50mm standpipe installed response zone 19.30m to 25.30m bgl. Bentonite (17.30 -18.30m).
15/02/2024	10.00									
16/02/2024	18.00									
19/02/2024	25.30	24.50		23.0						

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No **BH 09**

Client: **Breedon Ireland**

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	15/02/2024	198.62m AOD	E626788 N698212

Project: **Mounthall S&G Pit**

Sheet 2 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
								Brown SAND	
					182.42		16.20		
							(1.80)	Brown coarse SAND with cobbles.	
					180.62		18.00		
							(1.50)	Brown coarse sandy GRAVEL with cobbles.	
					179.12		19.50		
								Brown silty SAND.	
								Borehole Continued on Next Page	

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	50mm standpipe installed response zone 19.30m to 25.30m bgl. Bentonite (17.30 -18.30m).

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 09

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	15/02/2024	198.62m AOD	E626788 N698212

Project:
Mounthall S&G Pit

Sheet
3 of 3

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
							(4.50)	Brown silty SAND.	
					174.62		24.00		
							(1.30)	Firm reddish brown sandy gravelly CLAY with cobbles and boulders	
					173.32		25.30		
								Borehole Complete at 25.30m	

21 22 23 24 25 26 27 28 29

Boring Progress and Water Observations					Chiselling			Water Added		General Remarks
Date	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Hours	From	To	50mm standpipe installed response zone 19.30m to 25.30m bgl. Bentonite (17.30 -18.30m).

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

BOREHOLE LOG

BOREHOLE No
BH 10

Client:
Breedon Ireland

Project No:	Date:	Ground Level:	Co-ordinates:
501.065036.00001	08/02/2024	198.09m AOD	E626537 N698139

Project:
Mounthall S&G Pit

Sheet
1 of 1

SAMPLES & TESTS				Water	STRATA				
Depth	Type No	Test Type	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Instrument Backfill
					197.29		(0.80) 0.80	Grass over soft to firm brown sandy CLAY.	
					192.29		(5.00) 5.80	Brown SAND with cobbles.	
					191.19		(1.10) 6.90	GRAVEL with bands of fine sand.	
					190.89		7.20	Stiff reddish brown silty CLAY.	
					190.29		(0.60) 7.80	Weathered rock.	
								Borehole Complete at 7.80m	

Boring Progress and Water Observations				
Date	Depth	Casing Dpt	Casing Dia	Water Dpt
08/02/2024	7.80			Dry

Chiselling			Water Added	
From	To	Hours	From	To
7.70	7.80	01:00		

General Remarks
BH terminated at 7.80m bgl. Obstruction as weathered rock. BH backfilled.

All dimensions in metres	Contractor: Irish Drilling Ltd	Method: Cable percussion (shell and auger)	Logged By:	Approved By:
Scale 1:66	Plant: Dando 2000	Hole Size: 203mm	BT	DB

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015+A2:2020

Appendix 7-D
Groundwater and Surface Water Field Record Sheets

Field Record Sheet

Groundwater Sampling Field Record Sheet

Date:	24 April 2024	**Time:**	8.30 – 16.00 on site	**Location:**	Mounthall, Co. Laois
Staff:	Mairéad Brown			**SLR Project No.:**	501.065477.00001
Equipment	Dip meter, Aquatroll, Watterra, Scoop				

Table 1- Water Measurements

	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09
Groundwater level (m bgl)	7.33	18.66	6.69	11.94	4.56	1.19	1.66	21.25	21.94
Total depth (m)	11.19	22.93	11.3	24.9	15.45	3.13	6.21	22.87	23.1
Volume of water in borehole (litres)	21.23	23.49	25.36	71.28	60	10.67	25	8.91	6.38
Volume purged (L)	30	30	30	75	68	15	37.5	15	-
Waterra / Bailer	Waterra	Waterra	Waterra	Waterra	Waterra	Bailer	Waterra	Bailer	-

Table 2 – Visual field parameters

Parameter	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09
Odour	No	No	No	No	No	No	No	No	-
Sheen	No	No	No	No	No	No	Slight Hydrocarbon sheen	No	-
Silt	Low	Medium	High	Medium	High	High	High	V. High	-
Colour	Light brown, opaque	Light brown, opaque	Brown, opaque	Brown, opaque	Light brown, opaque	Brown, opaque	Brown, opaque	Brown, opaque	-
Free product	No	No	No	No	No	No	No	No	-

Field Record Sheet

Table 3 – Aquatroll Field Parameters

Parameter	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09
Temperature (°C)	10.44	10.65	10.66	10.66	10.5	9.64	10.47	11.54	-
Specific conductivity (µS/cm)	157.1	421.39	477.32	472.17	364.11	331.55	481.33	429.83	-
Salinity (PSU)	0.07	0.2	0.23	0.23	0.17	0.16	0.23	0.21	-
pH	6.37	7.38	7.33	7.13	7.21	6.07	6.73	7.35	-
Total Dissolved Solids (ppt)	0.10	0.27	0.31	0.31	0.24	0.22	0.31	0.28	-
Turbidity (NTU)	245.71	3704.56	6923.43	2916.5	1937	2539.80	6369.58	3131.87	-
RDO Concentration (mg/L)	8.79	10.13	9.76	7.55	5.96	7.8	2.66	10.58	-

Other field observations:

BH06 – Pump refuelled >10m away.

BH07 – Pump refuelled >10m away.

BH09 – Unable to get a sample from BH09 due to low water volumes and heavy sediment, borehole was pumped and bailed to try to obtain a sample.

Field Record Sheet

Surface Water Sampling Field Record Sheet

Date:	25 April 2024	**Time:**	8.30– 16.00 on site	**Location:**	Mounthall, Co. Laois
Staff:	Mairéad Brown			**SLR Project No.:**	501.065477.00001
Equipment	Aquatroll, Scoop				

Table 1 – Visual Field Parameters

Parameter	SW1	SW2	SW3
Odour	No	No	No
Sheen	No	No	No
Silt	No silt	No silt	No silt
Colour	Slightly yellow/ Transparent	Clear/Transparent	Clear/ Transparent
Free product	No	No	No

Table 2 – Aquatroll Field Parameters

Parameter	SW1	SW2	SW3
Temperature (°C)	8.73	9.47	9.19
Specific conductivity (µS/cm)	120.88	144.14	348.05
Salinity (PSU)	0.06	0.07	0.17
pH	7.69	7.81	7.88
Total Dissolved Solids (ppt)	0.08	0.09	0.23
Turbidity (NTU)	0.37	0.11	0.97
RDO Concentration (mg/L)	11.37	11.40	11.14

Other field observations:

Groundwater Sampling Field Record Sheet

Date:	19 June 2024	**Time:**	8.30 – 16.00 on site	**Location:**	Mounthall, Co. Laois
Staff:	Mairéad Brown, Michelle Sherry			**SLR Project No.:**	501.065477.00001
Equipment	Dip meter, Aquatroll, Watterra, Scoop				

Table 1- Water Measurements

	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09
Groundwater level (m bgl)	8.08	19.13	6.77	13.65	6.38	1.09	2.58	21.21	Dry
Total depth (m)	11.19	22.93	11.3	24.9	15.45	3.13	6.21	22.87	23.1
Volume of water in borehole (litres)	17.11	20.9	24.92	61.88	49.89	11.22	19.97	9.13	-
Volume purged (L)	30	37.5	112.5	75	60	15	27.27	45	-
Waterra / Bailer	Waterra	Waterra	Waterra	Waterra	Waterra	Bailer	Waterra	Waterra	-

Table 2 – Visual field parameters

Parameter	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09
Odour	No	No	No	No	No	No	No	No	-
Sheen	No	No	No	No	No	No	No	No	-
Silt	V. High	Medium	High	V. High	V. High	V. High	Low	V. High	-
Colour	Brown/ orange, opaque	Brown/ orange, opaque	Brown/ orange, opaque	Brown/ orange, opaque	Brown/ orange, opaque	Light milky brown, opaque	Brown/ orange, opaque	Brown/ orange, opaque	-
Free product	No	No	No	No	No	No	No	No	-

Table 3 – Aquatroll Field Parameters

Field Record Sheet

Parameter	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09
Temperature (°C)	10.75	10.5	10.47	10.56	10.48	11.94	11.18	10.61	-
Specific conductivity (µS/cm)	159.4	455.93	546.46	497.06	347.80	752.41	613.70	477.7	-
Salinity (PSU)	0.07	0.22	0.26	0.24	0.17	0.37	0.3	0.23	-
pH	5.25	6.56	6.52	6.17	6.34	7.86	6.3	6.70	-
Total Dissolved Solids (ppt)	0.1	0.3	0.36	0.32	0.23	0.49	0.4	0.31	-
Turbidity (NTU)	5364.19	6132.41	2196.22	1964.92	4080.35	5308.41	5739.31	6522.82	-
RDO Concentration (mg/L)	7.83	9.65	9.3	6.25	5.46	5.35	0.7	9.87	-

Other field observations:

BH03 – Pump refuelled >10m away.

BH09 – Unable to get a sample from BH09 due to low water volumes and heavy sediment, borehole was pumped and bailed to try to obtain a sample.

Field Record Sheet

Surface Water Sampling Field Record Sheet

Date:	19 June 2024	**Time:**	8.30– 16.00 on site	**Location:**	Mounthall, Co. Laois
Staff:	Mairéad Brown, Michelle Sherry			**SLR Project No.:**	501.065477.00001
Equipment	Aquatroll, Scoop				

Table 1 – Visual Field Parameters

Parameter	SW1	SW2	SW3
Odour	No	No	No
Sheen	No	No	No
Silt	No silt	No silt	No silt
Colour	Slightly yellow/ Transparent	Slightly yellow /Transparent	Clear/ Transparent
Free product	No	No	No

Table 2 – Aquatroll Field Parameters

Parameter	SW1	SW2	SW3
Temperature (°C)	9.94	11.7	-
Specific conductivity (µS/cm)	144.94	159.24	-
Salinity (PSU)	0.08	0.08	-
pH	6.9	7.24	-
Total Dissolved Solids (ppt)	0.09	0.1	-
Turbidity (NTU)	2.9	0.23	-
RDO Concentration (mg/L)	11.16	10.81	-

Other field observations:

SW3 - Cows have access to stream and use it as drinking water.

SW3 - No Aquatroll data as it was being used for BH06 during purging.

Field Record Sheet

Groundwater Sampling Field Record Sheet

Date:	9 July 2024	**Time:**	8.30 – 16.00 on site	**Location:**	Mounthall, Co. Laois
Staff:	Michelle Sherry			**SLR Project No.:**	501.065477.00001
Equipment	Dip meter, Aquatroll, Watterra, Scoop				

Table 1- Water Measurements

	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09
Groundwater level (m bgl)	8.68	18.01	6.61	13.95	6.83	1.29	2.84	Dry	Dry
Total depth (m)	11.19	22.93	11.3	24.9	15.45	3.13	6.21	22.87	23.1
Volume of water in borehole (litres)	13.81	27.06	25.8	60.23	47.41	10.12	18.54	-	-
Volume purged (L)	150	112.5	75	100	37.5	25	112.5	-	-
Waterra / Bailer	Waterra	Waterra	Waterra	Waterra	Waterra	Bailer	Waterra	-	-

Table 2 – Visual field parameters

Parameter	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09
Odour	No	No	No	No	No	No	No	-	-
Sheen	No	No	No	No	No	No	Slight hydrocarbon sheen	-	-
Silt	Medium silt	Medium silt	Medium silt	Very high silt	Very high silt	Very high silt	Very high silt	-	-
Colour	Brown	Light brown	Brown	Brown	Brown	Light brown/ cream	Brown	-	-
Free product	No	No	No	No	No	No	No	-	-

Table 3 – Aquatroll Field Parameters

Parameter	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09
Temperature (°C)	12.65	10.65	10.59	10.62	10.5	12.55	11.36	-	-
Specific conductivity (µS/cm)	161.1	434.26	559.04	493.5	320.28	673.75	631.19	-	-
Salinity (PSU)	0.08	0.21	0.27	0.24	0.15	0.33	0.31	-	-
pH	6.23	7.36	7.05	6.1	6,91	7.92	6.01	-	-
Total Dissolved Solids (ppt)	0.1	0.28	0.36	0.32	0.21	0.44	0.41	-	-
Turbidity (NTU)	1090.77	3613.71	2635.94	3381.5	3047.71	5206.36	1174.78	-	-
RDO Concentration (mg/L)	8.84	9.52	9.23	6.13	5.81	5.77	0.62	-	-

Other field observations:
BH05 – Pump refuelled >10m away.

BH07 – Pump refuelled >10m away.

BH08 – Pump refuelled >10m away.

BH08 – Unable to get a sample from BH09 due to low water volumes and heavy sediment, borehole was pumped and bailed to try to obtain a sample.

BH09 – Unable to get a sample from BH09 due to low water volumes and heavy sediment, borehole was pumped and bailed to try to obtain a sample.

Surface Water Sampling Field Record Sheet

Date:	10 July 2024	**Time:**	8.30– 16.00 on site	**Location:**	Mounthall, Co. Laois
Staff:	Michelle Sherry			**SLR Project No.:**	501.065477.00001
Equipment	Aquatroll, Scoop				

Table 1 – Visual Field Parameters

Parameter	SW1	SW2	SW3
Odour	No	No	No
Sheen	No	No	No
Silt	No	No	No
Colour	Light yellow	Dark yellow	Clear
Free product	No	No	No

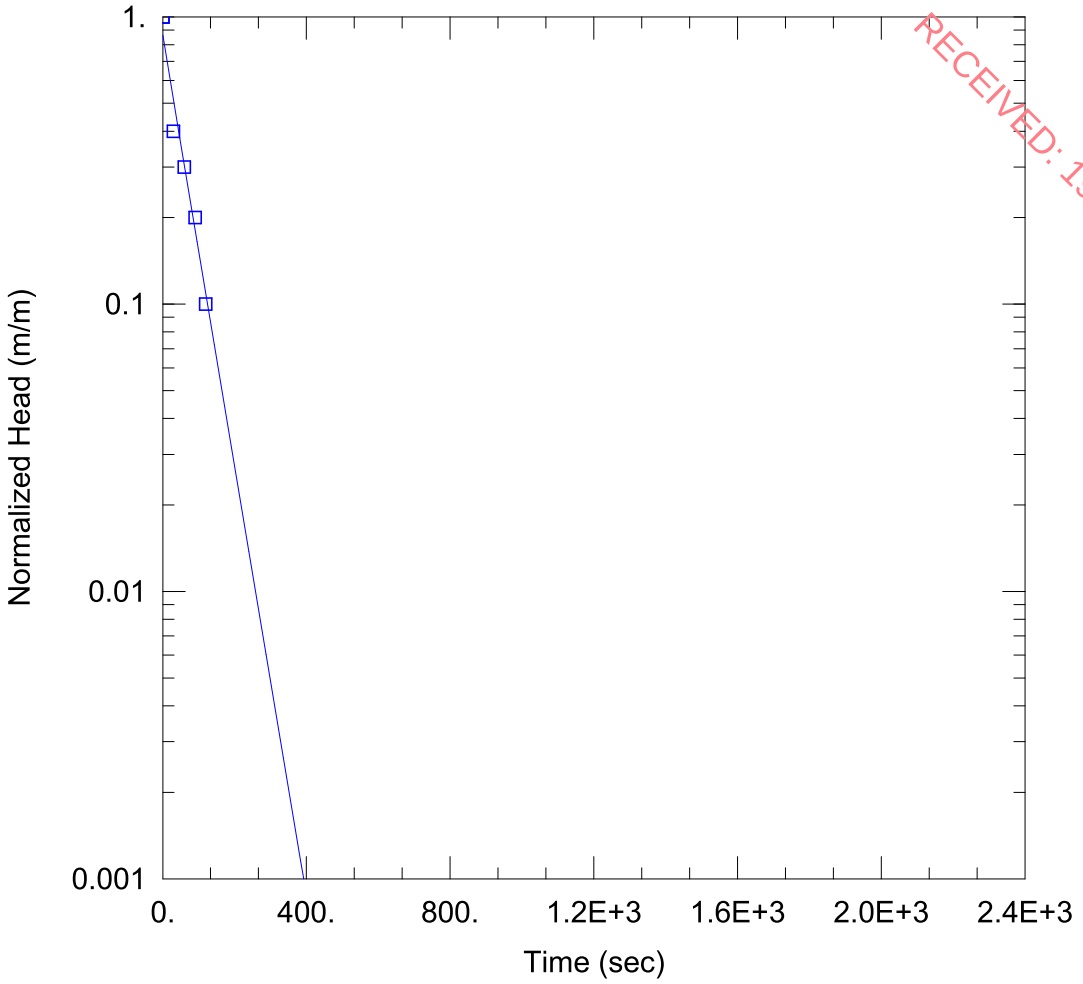
Table 2 – Aquatroll Field Parameters

Parameter	SW1	SW2	SW3
Temperature (°C)	11.46	11.15	11.32
Specific conductivity (µS/cm)	49.42	46.95	342.82
Salinity (PSU)	0.02	0.02	0.16
pH	6.99	6.79	8.17
Total Dissolved Solids (ppt)	0.03	0.03	0.22
Turbidity (NTU)	11.06	9.56	0.54
RDO Concentration (mg/L)	10.82	10.86	10.59

Other field observations:

SW1 & SW2 – River level and flow was notably higher and faster than last sample collection.
SW3 - Cows have access to stream and use it as drinking water.

Appendix 7-E
Rising Head Test Data



INITIAL GROUNDWATER INVESTIGATION

Data Set: C:\...\Slug tests_Mounthall_BH2.aqt
Date: 05/17/24 Time: 13:43:33

PROJECT INFORMATION

Company: SLR Consulting Ltd
Client: Lagan Materials Ltd
Project: 501.065477.0001
Location: Mounthall
Test Well: BH2
Test Date: 15/04/20242

AQUIFER DATA

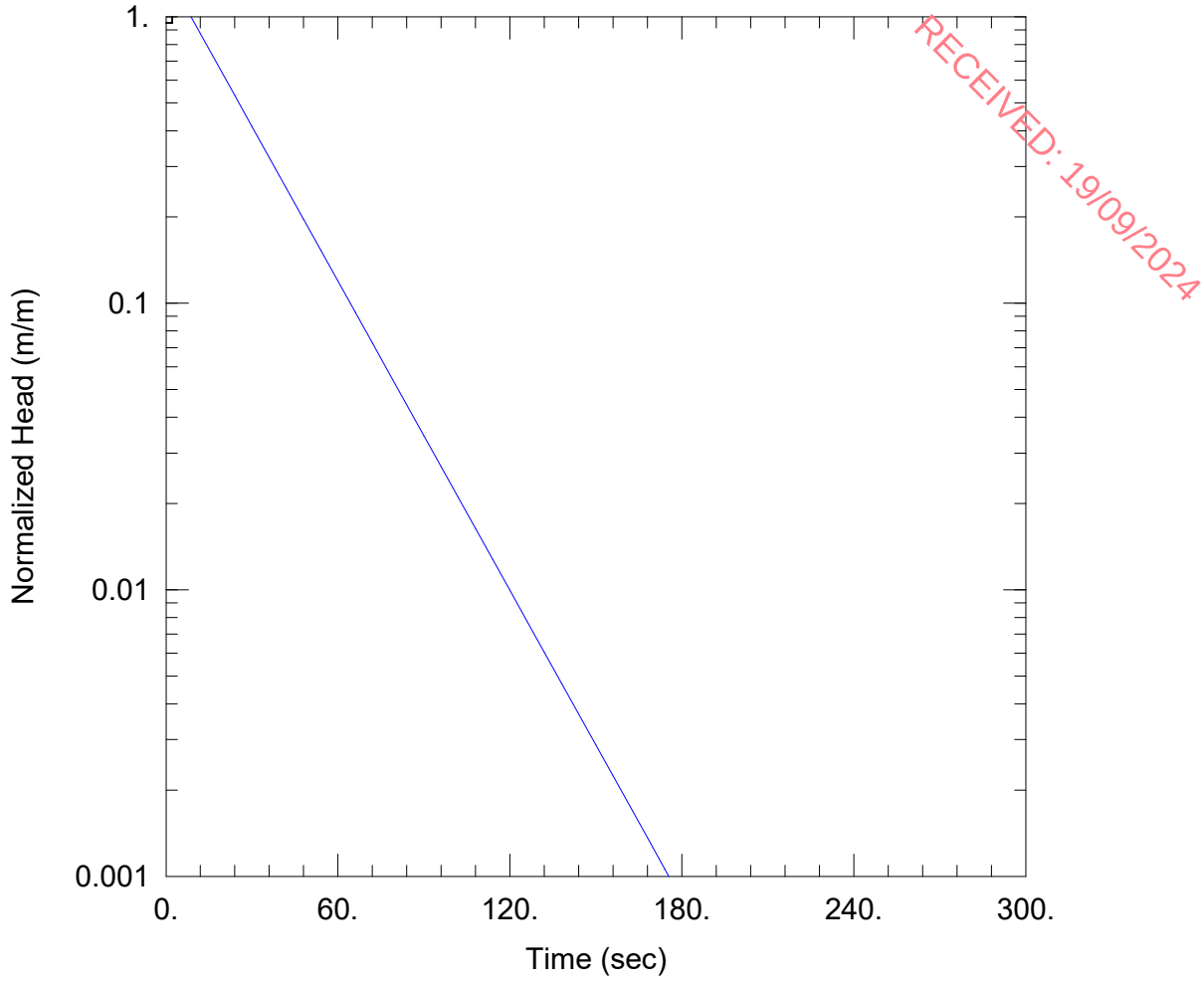
Saturated Thickness: 18.8 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH2)

Initial Displacement: 0.1 m
Total Well Penetration Depth: 23. m
Casing Radius: 0.025 m
Static Water Column Height: 1.4 m
Screen Length: 20. m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 1.518E-6 m/sec
y0 = 0.08635 m



INITIAL GROUNDWATER INVESTIGATION

Data Set: C:\...\Slug tests_Mounthall_BH3.aqt
Date: 05/17/24 Time: 13:42:33

PROJECT INFORMATION

Company: SLR Consulting Ltd
Client: Lagan Materials Ltd
Project: 501.065477.0001
Location: Mounthall
Test Well: BH3
Test Date: 15/04/20242

AQUIFER DATA

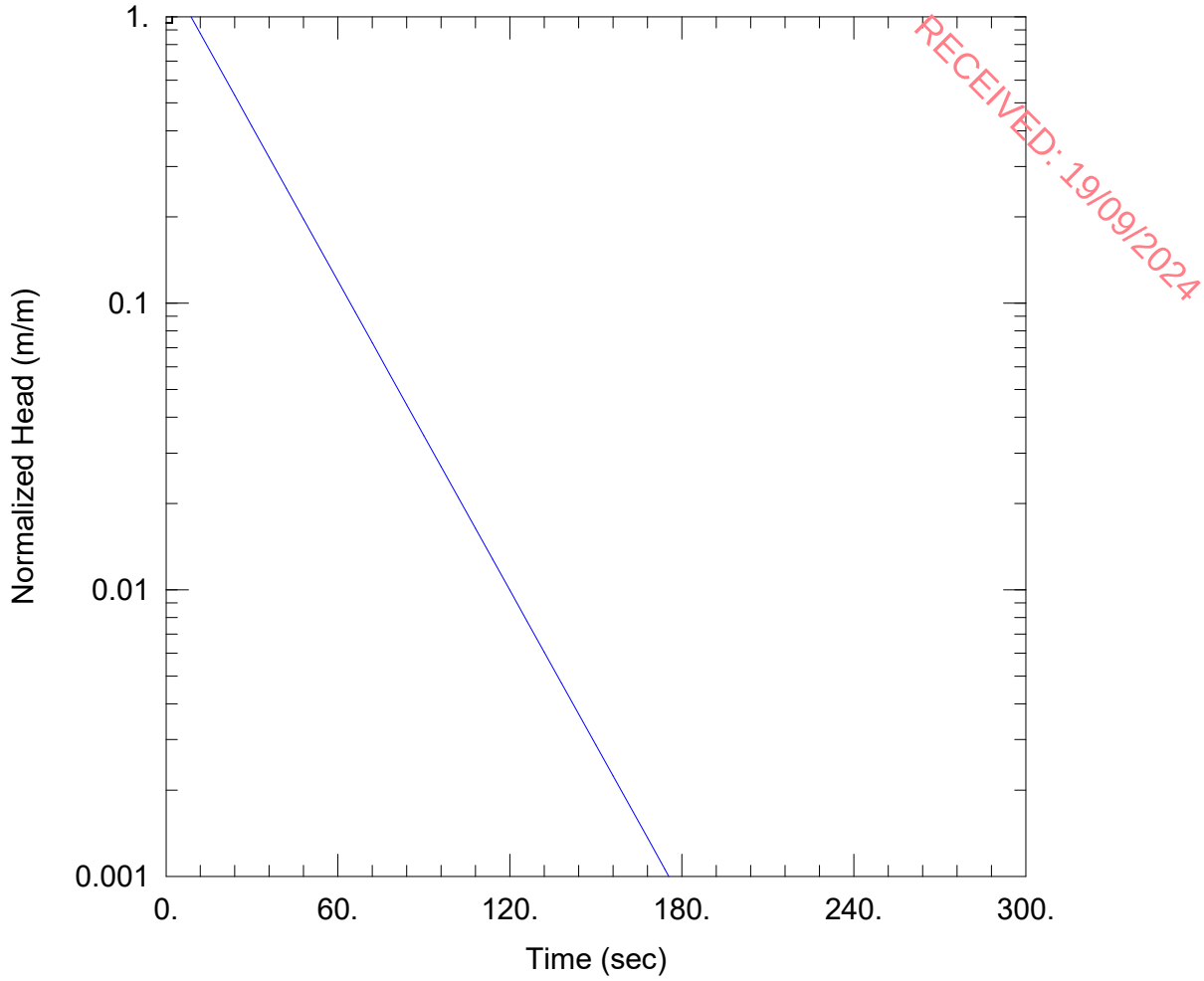
Saturated Thickness: 18.8 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH3)

Initial Displacement: 0.11 m
Total Well Penetration Depth: 23. m
Casing Radius: 0.025 m
Static Water Column Height: 13.31 m
Screen Length: 20. m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 3.649E-6 m/sec
y0 = 0.1581 m



INITIAL GROUNDWATER INVESTIGATION

Data Set: C:\...\Slug tests_Mounthall_BH3.aqt
Date: 05/17/24 Time: 13:42:33

PROJECT INFORMATION

Company: SLR Consulting Ltd
Client: Lagan Materials Ltd
Project: 501.065477.0001
Location: Mounthall
Test Well: BH3
Test Date: 15/04/20242

AQUIFER DATA

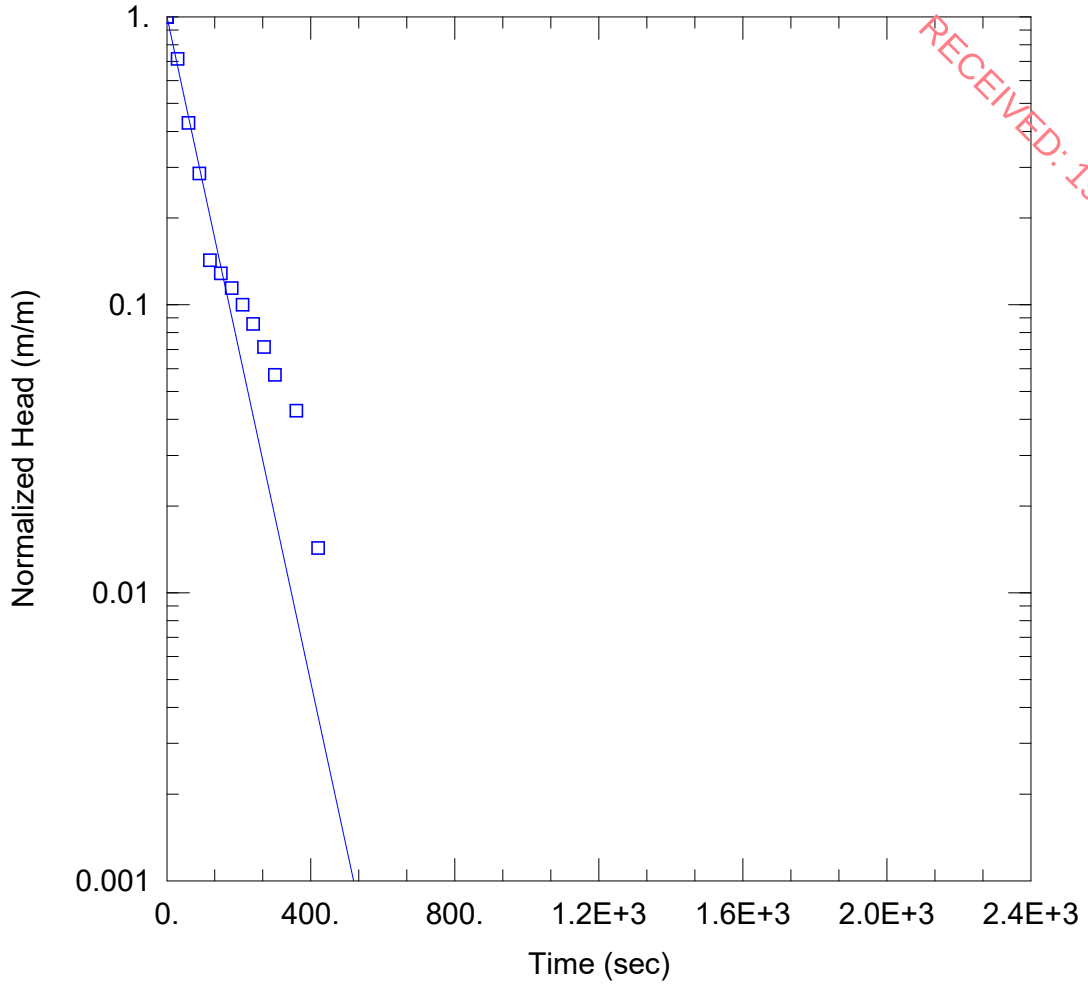
Saturated Thickness: 18.8 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH3)

Initial Displacement: 0.11 m
Total Well Penetration Depth: 23. m
Casing Radius: 0.025 m
Static Water Column Height: 13.31 m
Screen Length: 20. m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 3.649E-6 m/sec
y0 = 0.1581 m



INITIAL GROUNDWATER INVESTIGATION

Data Set: C:\...\Slug tests_Mounthall_BH4.aqt
Date: 05/24/24 Time: 15:40:38

PROJECT INFORMATION

Company: SLR Consulting Ltd
Client: Lagan Materials Ltd
Project: 501.065477.0001
Location: Mounthall
Test Well: BH4
Test Date: 15/04/20242

AQUIFER DATA

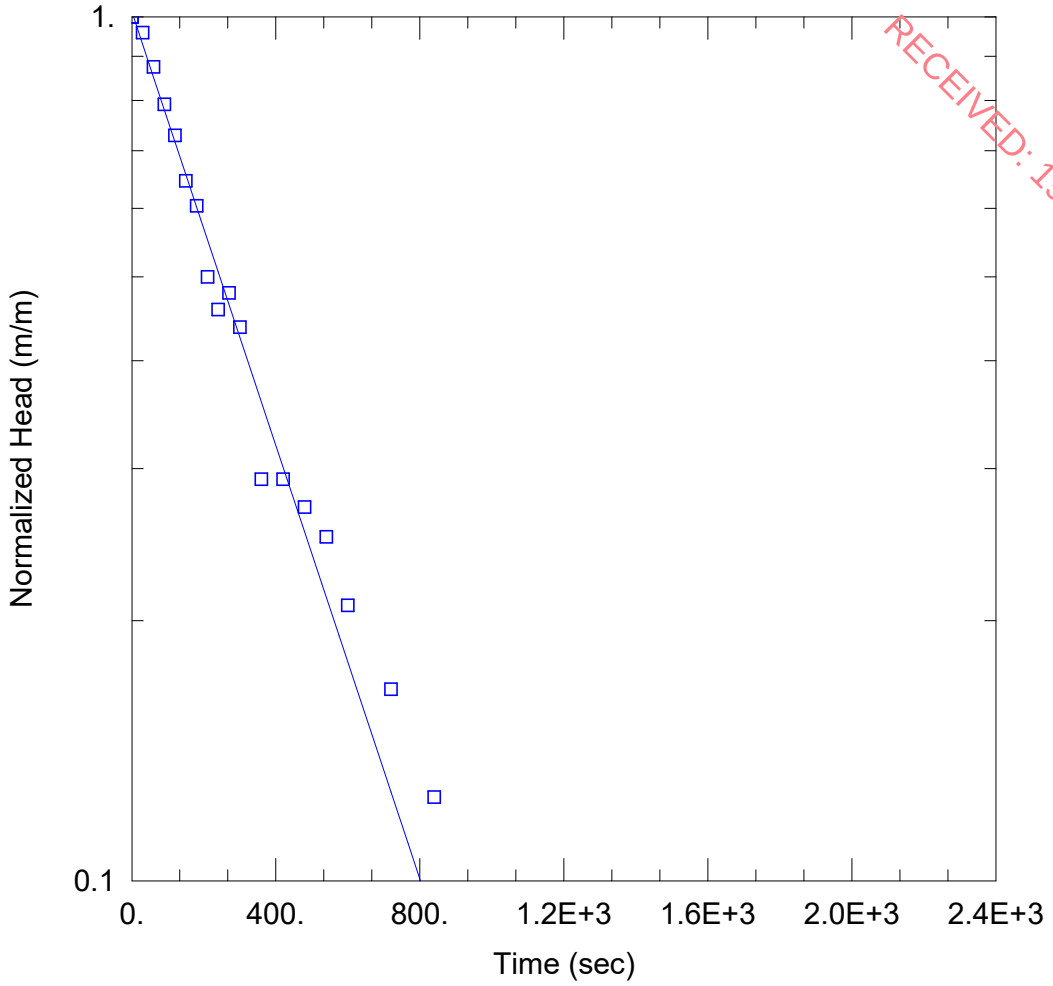
Saturated Thickness: 18.8 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH4)

Initial Displacement: 0.07 m
Total Well Penetration Depth: 25. m
Casing Radius: 0.025 m
Static Water Column Height: 8.25 m
Screen Length: 11.5 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 2.469E-6 m/sec
y0 = 0.0704 m



INITIAL GROUNDWATER INVESTIGATION

Data Set: C:\...\Slug tests_Mounthall_BH5.aqt
Date: 05/24/24 Time: 15:41:08

PROJECT INFORMATION

Company: SLR Consulting Ltd
Client: Lagan Materials Ltd
Project: 501.065477.0001
Location: Mounthall
Test Well: BH5
Test Date: 15/04/20242

AQUIFER DATA

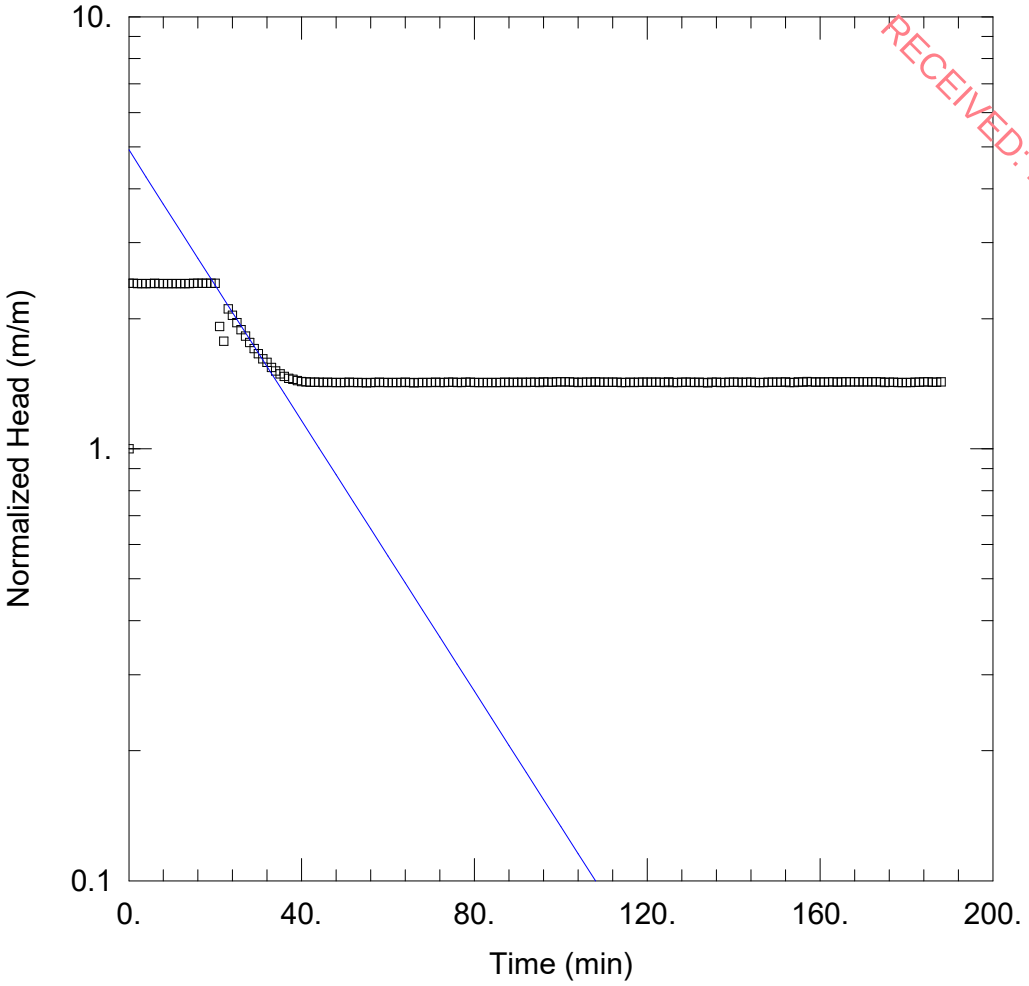
Saturated Thickness: 18.8 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH5)

Initial Displacement: 0.24 m
Total Well Penetration Depth: 15. m
Casing Radius: 0.025 m
Static Water Column Height: 15.94 m
Screen Length: 6.5 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 7.719E-7 m/sec
y0 = 0.2432 m



WELL TEST ANALYSIS

Data Set: C:\...\Mounthall pumping tests_July.aqt
Date: 08/13/24 Time: 15:53:21

PROJECT INFORMATION

Company: SLR Consulting Ltd
Client: Lagan Materials Ltd
Project: 501.065477.0001
Location: Mounthall
Test Well: BH6
Test Date: 01/07/2024

AQUIFER DATA

Saturated Thickness: 4. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH6)

Initial Displacement: 1.104 m
Total Well Penetration Depth: 8. m
Casing Radius: 0.0225 m
Static Water Column Height: 1.566 m
Screen Length: 4. m
Well Radius: 0.08 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 5.315E-7 m/min
y0 = 5.429 m

Appendix 7-F
Surface Water and Groundwater Laboratory Results

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528777
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

SLR Consulting Ireland
CSA House
Unit 7
Dundrum Business Park
Windy Harbour
Dublin
Dublin14

Attention: Mairead Brown

CERTIFICATE OF ANALYSIS

Date of report Generation:	12 May 2024
Customer:	SLR Consulting Ireland
Sample Delivery Group (SDG):	240430-69
Your Reference:	501.065477.0001
Location:	Mounthall, Co. Laois
Report No:	728374
Order Number:	1200

We received 8 samples on Tuesday April 30, 2024 and 8 of these samples were scheduled for analysis which was completed on Sunday May 12, 2024. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan
Operations Manager

CERTIFICATE OF ANALYSIS

SDG: 240430-69 **Report Number:** 728374 **Superseded Report:**
Client Ref.: 501.065477.0001 **Location:** Mounthall, Co. Laois

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
29727199	2023BH01		0.00 - 0.00	24/04/2024
29727213	2023BH02		0.00 - 0.00	24/04/2024
29727223	2023BH03		0.00 - 0.00	25/04/2024
29727239	2023BH04		0.00 - 0.00	25/04/2024
29727247	2023BH05		0.00 - 0.00	25/04/2024
29727255	2024BH03		0.00 - 0.00	24/04/2024
29727231	2024BH06		0.00 - 0.00	24/04/2024
29727264	2024BH08		0.00 - 0.00	24/04/2024

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

Validated

CERTIFICATE OF ANALYSIS

SDG: 240430-69 **Report Number:** 728374 **Superseded Report:**
Client Ref.: 501.065477.0001 **Location:** Mounthall, Co. Laois

RECEIVED: 19/09/2024

Results Legend

X Test

N No Determination Possible

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

			Lab Sample No(s)																			
			29727199					29727213					29727223					29727239				
			Customer Sample Reference																			
			2023BH01					2023BH02					2023BH03					2023BH04				
			AGS Reference																			
			Depth (m)					0.00 - 0.00					0.00 - 0.00					0.00 - 0.00				
			Container	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)
			Sample Type	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 8				X					X					X						X	
Anions by Kone (w)	All	NDPs: 0 Tests: 8			X						X					X						X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 8					X					X					X						X
EPH and CWG by FID	All	NDPs: 0 Tests: 8	X					X					X					X					
Fluoride	All	NDPs: 0 Tests: 8		X					X					X						X			
GRO by GC-FID (W)	All	NDPs: 0 Tests: 8					X					X					X						
Mercury Dissolved	All	NDPs: 0 Tests: 8				X					X					X						X	
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 8	X					X					X					X					
pH Value	All	NDPs: 0 Tests: 8		X					X					X						X			
Phosphate by Kone (w)	All	NDPs: 0 Tests: 8		X					X					X						X			
TPH CWG (W)	All	NDPs: 0 Tests: 8	X					X					X					X					
VOC MS (W)	All	NDPs: 0 Tests: 8					X					X					X						

29727264	2024BH08		0.00 - 0.00	Vial (ALE297)	GW								X										X
				HNO3 Filtered (ALE204)	GW				X						X								
				H2SO4 (ALE244)	GW		X																
				500ml Plastic (ALE208)	GW			X				X							X		X		
				0.5l glass bottle (ALE227)	GW						X							X				X	
29727231	2024BH06		0.00 - 0.00	Vial (ALE297)	GW								X										X
				HNO3 Filtered (ALE204)	GW				X						X								
				H2SO4 (ALE244)	GW		X																
				500ml Plastic (ALE208)	GW			X				X							X		X		
				0.5l glass bottle (ALE227)	GW						X							X				X	
29727255	2024BH03		0.00 - 0.00	Vial (ALE297)	GW								X										X
				HNO3 Filtered (ALE204)	GW				X						X								
				H2SO4 (ALE244)	GW		X																
				500ml Plastic (ALE208)	GW			X				X							X		X		
				0.5l glass bottle (ALE227)	GW						X							X				X	
29727247	2023BH05		0.00 - 0.00	Vial (ALE297)	GW								X										X
				HNO3 Filtered (ALE204)	GW				X						X								
				H2SO4 (ALE244)	GW		X																
				500ml Plastic (ALE208)	GW			X				X							X		X		
				0.5l glass bottle (ALE227)	GW						X							X				X	
29727239	2023BH04		0.00 - 0.00	Vial (ALE297)	GW								X										X

Validated

CERTIFICATE OF ANALYSIS

SDG: 240430-69 **Report Number:** 728374 **Superseded Report:**
Client Ref.: 501.065477.0001 **Location:** Mounthall, Co. Laois

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	2023BH01	2023BH02	2023BH03	2023BH04	2023BH05	2024BH03
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	24/04/2024	24/04/2024	25/04/2024	25/04/2024	25/04/2024	24/04/2024
			Sample Time	.	.	.	.	.	.
			Date Received	30/04/2024	30/04/2024	30/04/2024	30/04/2024	30/04/2024	30/04/2024
			SDG Ref	240430-69	240430-69	240430-69	240430-69	240430-69	240430-69
			Lab Sample No.(s)	29727199	29727213	29727223	29727239	29727247	29727255
			AGS Reference						
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #
Ammoniacal Nitrogen as NH3	<0.2 mg/l	TM099		<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #
Fluoride	<0.5 mg/l	TM104		<0.5 #	<0.5 #	<0.5 #	<0.5 #	<0.5 #	<0.5 #
Aluminium (diss.filt)	<10 µg/l	TM152		<10 #	<10 #	<10 #	<60 #	<10 #	<10 #
Arsenic (diss.filt)	<0.5 µg/l	TM152		<0.5 #	<0.5 #	<0.5 #	<3 #	<0.5 #	<0.5 #
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #	<0.08 #	<0.08 #	<0.08 #	<0.08 #
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #	<1 #	<6 #	<1 #	<1 #
Copper (diss.filt)	<0.3 µg/l	TM152		<0.3 #	<0.3 #	<0.3 #	<1.8 #	<0.3 #	1.29 #
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	<0.2 #	<0.2 #	<1.2 #	0.394 #	<0.2 #
Nickel (diss.filt)	<0.4 µg/l	TM152		0.494 #	<0.4 #	0.53 #	<2.4 #	0.777 #	1.38 #
Zinc (diss.filt)	<1 µg/l	TM152		2.75 #	1.64 #	1.64 #	<6 #	1.74 #	5.5 #
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		1.29 #	2.4 #	2.12 #	3.12 #	2 #	6.59 #
Iron (Dis.Filt)	<0.019 mg/l	TM152		<0.019 #	<0.019 #	<0.019 #	<0.114 #	0.0315 #	<0.019 #
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 #
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184		<0.05 #	<0.05 #	<0.05 #	<0.05 #	<0.05 #	<0.05 #
Sulphate	<2 mg/l	TM184		<2 #	2.7 #	<2 #	4.2 #	3.8 #	5.1 #
Chloride	<2 mg/l	TM184		3.9 #	7.9 #	4.9 #	12.1 #	9.5 #	5.8 #
Nitrate as NO3	<0.3 mg/l	TM184		2.9 #	4.61 #	5.34 #	10.6 #	2.97 #	1.01 #
pH	<1 pH Units	TM256		6.45 #	7.77 #	7.61 #	7.32 #	7.66 #	7.25 #
Conductivity @ 20 deg.C	<0.02 mS/cm	TM256		0.157 #	0.399 #	0.443 #	0.463 #	0.364 #	0.485 #

CERTIFICATE OF ANALYSIS

SDG: 240430-69 **Report Number:** 728374 **Superseded Report:**
Client Ref.: 501.065477.0001 **Location:** Mounthall, Co. Laois

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	2024BH06	2024BH08				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Ground Water (GW)	Ground Water (GW)				
			Date Sampled	24/04/2024	24/04/2024				
			Sample Time	-	-				
			Date Received	30/04/2024	30/04/2024				
			SDG Ref	240430-69	240430-69				
			Lab Sample No.(s)	29727231	29727264				
			AGS Reference						
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		<0.2 #	<0.2 #				
Ammoniacal Nitrogen as NH3	<0.2 mg/l	TM099		<0.2 #	<0.2 #				
Fluoride	<0.5 mg/l	TM104		<0.5 #	<0.5 #				
Aluminium (diss.filt)	<10 µg/l	TM152		<10 #	<10 #				
Arsenic (diss.filt)	<0.5 µg/l	TM152		<0.5 #	<0.5 #				
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #				
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #				
Copper (diss.filt)	<0.3 µg/l	TM152		1.27 #	0.672 #				
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	<0.2 #				
Nickel (diss.filt)	<0.4 µg/l	TM152		0.88 #	<0.4 #				
Zinc (diss.filt)	<1 µg/l	TM152		5.87 #	3.05 #				
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		2.62 #	3.68 #				
Iron (Dis.Filt)	<0.019 mg/l	TM152		<0.019 #	<0.019 #				
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #	<0.01 #				
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184		<0.05 #	<0.05 #				
Sulphate	<2 mg/l	TM184		2.1 #	3.5 #				
Chloride	<2 mg/l	TM184		8.8 #	7 #				
Nitrate as NO3	<0.3 mg/l	TM184		8.65 #	7.02 #				
pH	<1 pH Units	TM256		7.21 #	7.69 #				
Conductivity @ 20 deg.C	<0.02 mS/cm	TM256		0.31 #	0.418 #				

CERTIFICATE OF ANALYSIS

SDG: 240430-69 **Report Number:** 728374 **Superseded Report:**
Client Ref.: 501.065477.0001 **Location:** Mounthall, Co. Laois

PAH Spec MS - Aqueous (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4♦§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	2023BH01	2023BH02	2023BH03	2023BH04	2023BH05	2024BH03
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	24/04/2024	24/04/2024	25/04/2024	25/04/2024	25/04/2024	24/04/2024
			Sample Time	.	.	.	.	.	.
			Date Received	30/04/2024	30/04/2024	30/04/2024	30/04/2024	30/04/2024	30/04/2024
			SDG Ref	240430-69	240430-69	240430-69	240430-69	240430-69	240430-69
			Lab Sample No.(s)	29727199	29727213	29727223	29727239	29727247	29727255
			AGS Reference						
Naphthalene (aq)	<0.01 µg/l	TM178		<0.01 #	<0.01 #	1.39 @ #	<0.1 #	<0.01 #	0.0131 #
Acenaphthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Acenaphthylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Phenanthrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Fluorene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Chrysene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Pyrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178		<0.002 #	<0.002 #	<0.02 @ #	<0.02 #	<0.002 #	<0.002 #
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.05 @ #	<0.05 #	<0.005 #	<0.005 #
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178		<0.082 #	<0.082 #	1.39 @ #	<0.82 #	<0.082 #	<0.082 #

CERTIFICATE OF ANALYSIS

SDG: 240430-69 **Report Number:** 728374 **Superseded Report:**
Client Ref.: 501.065477.0001 **Location:** Mounthall, Co. Laois

PAH Spec MS - Aqueous (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4♦§@ Sample deviation (see appendix)

Customer Sample Ref.	2024BH06	2024BH08
Depth (m)	0.00 - 0.00	0.00 - 0.00
Sample Type	Ground Water (GW)	Ground Water (GW)
Date Sampled	24/04/2024	24/04/2024
Sample Time	.	.
Date Received	30/04/2024	30/04/2024
SDG Ref	240430-69	240430-69
Lab Sample No.(s)	29727231	29727264
AGS Reference		

Component	LOD/Units	Method		
Naphthalene (aq)	<0.01 µg/l	TM178	<0.1 #	<0.1 #
Acenaphthene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Acenaphthylene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Fluoranthene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Anthracene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Phenanthrene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Fluorene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Chrysene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Pyrene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	<0.02 #	<0.02 #
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	<0.05 #	<0.05 #
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	<0.82 #	<0.82 #

CERTIFICATE OF ANALYSIS

SDG: 240430-69 **Report Number:** 728374 **Superseded Report:**
Client Ref.: 501.065477.0001 **Location:** Mounthall, Co. Laois

TPH CWG (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	2023BH01	2023BH02	2023BH03	2023BH04	2023BH05	2024BH03
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	24/04/2024	24/04/2024	25/04/2024	25/04/2024	25/04/2024	24/04/2024
			Sample Time	.	.	.	.	.	.
			Date Received	30/04/2024	30/04/2024	30/04/2024	30/04/2024	30/04/2024	30/04/2024
			SDG Ref	240430-69	240430-69	240430-69	240430-69	240430-69	240430-69
			Lab Sample No.(s)	29727199	29727213	29727223	29727239	29727247	29727255
			AGS Reference						
GRO Surrogate % recovery**	%	TM245		103	104	104	104	101	102
GRO >C5-C12 (HS_1D_TOTAL)	<50 µg/l	TM245		<50 #	<50 #	<50 #	<50 #	<50 #	<50 #
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 (aq) (SPECD_AL1_W)	<10 µg/l	TM439		<10	<50	<100	<100	<100	<100
Aliphatics >C16-C21 (aq) (SPECD_AL2_W)	<10 µg/l	TM439		<10	<50	<100	<100	<100	<100
Aliphatics >C21-C35 (aq) (SPECD_AL3_W)	<10 µg/l	TM439		<10	<50	<100	<100	<100	<100
Total Aliphatics >C12-C35 (aq) (EPHAL12_35T_GC_W)	<10 µg/l	TM439		<10	<50	<100	<100	<100	<100
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 (aq) (SPECD_AROM1_W)	<10 µg/l	TM439		<10	<50	<100	<100	<100	<100
Aromatics >EC16-EC21 (aq) (SPECD_AROM2_W)	<10 µg/l	TM439		<10	<50	<100	<100	<100	<100
Aromatics >EC21-EC35 (aq) (SPECD_AROM3_W)	<10 µg/l	TM439		<10	<50	<100	<100	<100	<100
Total Aromatics >EC12-EC35 (aq) (EPHAR12_35T_GC_W)	<10 µg/l	TM439		<10	<50	<100	<100	<100	<100
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM439		<10	<10	<10	<10	<10	<10

CERTIFICATE OF ANALYSIS

SDG: 240430-69 **Report Number:** 728374 **Superseded Report:**
Client Ref.: 501.065477.0001 **Location:** Mounthall, Co. Laois

TPH CWG (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Customer Sample Ref.	2024BH06	2024BH08				
Depth (m)	0.00 - 0.00	0.00 - 0.00				
Sample Type	Ground Water (GW)	Ground Water (GW)				
Date Sampled	24/04/2024	24/04/2024				
Sample Time	.	.				
Date Received	30/04/2024	30/04/2024				
SDG Ref	240430-69	240430-69				
Lab Sample No.(s)	29727231	29727264				
AGS Reference						

Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM245	108	99				
GRO >C5-C12 (HS_1D_TOTAL)	<50 µg/l	TM245	<50 #	<50 #				
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/l	TM245	<10	<10				
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/l	TM245	<10	<10				
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/l	TM245	<10	<10				
Aliphatics >C10-C12 (HS_1D_AL)	<10 µg/l	TM245	<10	<10				
Aliphatics >C12-C16 (aq) (SPECD_AL1_W)	<10 µg/l	TM439	<10	<50				
Aliphatics >C16-C21 (aq) (SPECD_AL2_W)	<10 µg/l	TM439	<10	<50				
Aliphatics >C21-C35 (aq) (SPECD_AL3_W)	<10 µg/l	TM439	<10	424				
Total Aliphatics >C12-C35 (aq) (EPHAL12_35T_GC_W)	<10 µg/l	TM439	<10	424				
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/l	TM245	<10	<10				
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/l	TM245	<10	<10				
Aromatics >EC8-EC10	<10 µg/l	TM245	<10	<10				
Aromatics >EC10-EC12	<10 µg/l	TM245	<10	<10				
Aromatics >EC12-EC16 (aq) (SPECD_AROM1_W)	<10 µg/l	TM439	<10	<50				
Aromatics >EC16-EC21 (aq) (SPECD_AROM2_W)	<10 µg/l	TM439	<10	<50				
Aromatics >EC21-EC35 (aq) (SPECD_AROM3_W)	<10 µg/l	TM439	<10	2010				
Total Aromatics >EC12-EC35 (aq) (EPHAR12_35T_GC_W)	<10 µg/l	TM439	<10	2010				
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM439	<10	2430				

CERTIFICATE OF ANALYSIS

SDG: 240430-69 **Report Number:** 728374 **Superseded Report:**
Client Ref.: 501.065477.0001 **Location:** Mounthall, Co. Laois

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	2023BH01	2023BH02	2023BH03	2023BH04	2023BH05	2024BH03
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	24/04/2024	24/04/2024	25/04/2024	25/04/2024	25/04/2024	24/04/2024
			Sample Time	.	.	.	.	.	.
			Date Received	30/04/2024	30/04/2024	30/04/2024	30/04/2024	30/04/2024	30/04/2024
			SDG Ref	240430-69	240430-69	240430-69	240430-69	240430-69	240430-69
			Lab Sample No.(s)	29727199	29727213	29727223	29727239	29727247	29727255
			AGS Reference						
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Benzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Toluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
o-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Sum of detected Xylenes	<2 µg/l	TM208		<2	<2	<2	<2	<2	<2
Sum of BTEX	<5 µg/l	TM208		<5	<5	<5	<5	<5	<5

CERTIFICATE OF ANALYSIS

SDG: 240430-69 **Report Number:** 728374 **Superseded Report:**
Client Ref.: 501.065477.0001 **Location:** Mounthall, Co. Laois

VOC MS (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4♦§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	2024BH06	2024BH08				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Ground Water (GW)	Ground Water (GW)				
			Date Sampled	24/04/2024	24/04/2024				
			Sample Time	.	.				
			Date Received	30/04/2024	30/04/2024				
			SDG Ref	240430-69	240430-69				
			Lab Sample No.(s)	29727231	29727264				
			AGS Reference						
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #				
Benzene	<1 µg/l	TM208		<1 #	<1 #				
Toluene	<1 µg/l	TM208		<1 #	<1 #				
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #				
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #				
o-Xylene	<1 µg/l	TM208		<1 #	<1 #				
Sum of detected Xylenes	<2 µg/l	TM208		<2	<2				
Sum of BTEX	<5 µg/l	TM208		<5	<5				

Table of Results - Appendix

Method No	Description
TM104	Determination of Fluoride using the Kone Analyser
TM183	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM245	Determination of GRO by Headspace in waters
TM152	Analysis of Aqueous Samples by ICP-MS
TM208	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM256	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM178	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM439	Determination of Extractable Petroleum Hydrocarbons (EPH) CWG banding by GC-FID on liquids
TM099	Determination of Ammonium in Water Samples using the Kone Analyser

NA = not applicable.
Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).

CERTIFICATE OF ANALYSIS

SDG: 240430-69 **Report Number:** 728374 **Superseded Report:**
Client Ref.: 501.065477.0001 **Location:** Mounthall, Co. Laois

Test Completion Dates

Lab Sample No(s)	29727199	29727213	29727223	29727239	29727247	29727255	29727231	29727264
Customer Sample Ref.	2023BH01	2023BH02	2023BH03	2023BH04	2023BH05	2024BH03	2024BH06	2024BH08
AGS Ref.								
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Ammoniacal Nitrogen	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024
Anions by Kone (w)	07-May-2024	07-May-2024	07-May-2024	07-May-2024	07-May-2024	07-May-2024	07-May-2024	01-May-2024
Dissolved Metals by ICP-MS	08-May-2024	08-May-2024	08-May-2024	08-May-2024	08-May-2024	08-May-2024	08-May-2024	08-May-2024
EPH and CWG by FID	02-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	02-May-2024	02-May-2024
Fluoride	02-May-2024	02-May-2024	02-May-2024	02-May-2024	02-May-2024	02-May-2024	02-May-2024	02-May-2024
GRO by GC-FID (W)	01-May-2024	01-May-2024	01-May-2024	01-May-2024	01-May-2024	01-May-2024	01-May-2024	01-May-2024
Mercury Dissolved	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024
Nitrite by Kone (w)	07-May-2024	07-May-2024	07-May-2024	07-May-2024	07-May-2024	07-May-2024	01-May-2024	01-May-2024
PAH Spec MS - Aqueous (W)	03-May-2024	07-May-2024	12-May-2024	03-May-2024	07-May-2024	07-May-2024	03-May-2024	03-May-2024
pH Value	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024
Phosphate by Kone (w)	02-May-2024	02-May-2024	02-May-2024	02-May-2024	02-May-2024	02-May-2024	01-May-2024	01-May-2024
TPH CWG (W)	02-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	03-May-2024	02-May-2024	02-May-2024
VOC MS (W)	01-May-2024	01-May-2024	01-May-2024	01-May-2024	01-May-2024	01-May-2024	01-May-2024	01-May-2024

Appendix

General

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

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of 15 days after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury

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

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

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

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

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

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

19. **Sample Deviations**

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

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

20. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials andd soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

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

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

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SLR Consulting Ireland
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Attention: Mairead Brown

CERTIFICATE OF ANALYSIS

Date of report Generation:	08 May 2024
Customer:	SLR Consulting Ireland
Sample Delivery Group (SDG):	240430-71
Your Reference:	501.065477.00001
Location:	Mounthall, Co.Laois
Report No:	728103
Order Number:	1201

We received 3 samples on Tuesday April 30, 2024 and 3 of these samples were scheduled for analysis which was completed on Wednesday May 08, 2024. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan
Operations Manager

CERTIFICATE OF ANALYSIS

SDG: 240430-71 **Report Number:** 728103 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall, Co.Laois

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
29727318	SW1		0.00 - 0.00	25/04/2024
29727335	SW2		0.00 - 0.00	25/04/2024
29727348	SW3		0.00 - 0.00	24/04/2024

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

Validated

CERTIFICATE OF ANALYSIS

SDG: 240430-71 **Report Number:** 728103 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall, Co.Laois

RECEIVED: 19/09/2024

Results Legend

X Test

N No Determination Possible

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

			Lab Sample No(s)	29727318	29727335	29727348
			Customer Sample Reference	SW1	SW2	SW3
			AGS Reference			
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Container	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)
			Sample Type	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
Ammonium Low	All	NDPs: 0 Tests: 3					X							X							X	
Anions by Kone (w)	All	NDPs: 0 Tests: 3			X								X							X		
BOD True Total	All	NDPs: 0 Tests: 3		X							X							X				
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 3					X								X							X
EPH and CWG by FID	All	NDPs: 0 Tests: 3	X							X							X					
GRO by GC-FID (W)	All	NDPs: 0 Tests: 3							X							X						
Mercury Dissolved	All	NDPs: 0 Tests: 3					X								X							X
Nitrite by Kone (w)	All	NDPs: 0 Tests: 3						X								X						
pH Value	All	NDPs: 0 Tests: 3			X								X							X		
Phosphate by Kone (w)	All	NDPs: 0 Tests: 3			X								X							X		
Suspended Solids	All	NDPs: 0 Tests: 3			X								X							X		
TPH CWG (W)	All	NDPs: 0 Tests: 3	X							X							X					
VOC MS (W)	All	NDPs: 0 Tests: 3							X							X						

29727348	SW3		0.00 - 0.00	Vial (ALE297)	SW											X															X
				NaOH (ALE245)	SW															X											

Validated

CERTIFICATE OF ANALYSIS

SDG: 240430-71 **Report Number:** 728103 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall, Co.Laois

RECEIVED: 19/09/2024

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2	SW3			
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)			
			Date Sampled	25/04/2024	25/04/2024	24/04/2024			
			Sample Time	.	.	.			
			Date Received	30/04/2024	30/04/2024	30/04/2024			
			SDG Ref	240430-71	240430-71	240430-71			
			Lab Sample No.(s)	29727318	29727335	29727348			
			AGS Reference						
Suspended solids, Total	<2 mg/l	TM022		<2 #	<2 #	<2 #			
BOD, unfiltered	<1 mg/l	TM045		<1 @ #	<1 @ #	<1 @ #			
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		0.012 #	0.052 #	0.026 #			
Arsenic (diss.filt)	<0.5 µg/l	TM152		<0.5 #	<5 #	<0.5 #			
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.8 #	<0.08 #			
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<10 #	<1 #			
Copper (diss.filt)	<0.3 µg/l	TM152		<0.3 #	<3 #	<0.3 #			
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	<2 #	<0.2 #			
Nickel (diss.filt)	<0.4 µg/l	TM152		<0.4 #	<4 #	<0.4 #			
Selenium (diss.filt)	<1 µg/l	TM152		<1 #	<10 #	<1 #			
Zinc (diss.filt)	<1 µg/l	TM152		1.37 #	<10 #	1.86 #			
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01	<0.01	<0.01			
Nitrite as NO2	<0.05 mg/l	TM184		<0.05 #	<0.05 #	<0.05 #			
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184		<0.05 #	<0.05 #	<0.05 #			
Sulphate	<2 mg/l	TM184		<2 #	2 #	3.7 #			
Chloride	<2 mg/l	TM184		7.4 #	7.9 #	8.8 #			
Nitrate as NO3	<0.3 mg/l	TM184		1.95 #	2.51 #	6.33 #			
pH	<1 pH Units	TM256		7.75 #	7.9 #	8.21 #			
Conductivity @ 20 deg.C	<0.02 mS/cm	TM256		0.123 #	0.141 #	0.342 #			
Alkalinity, Total as CaCO3	<3 mg/l	TM256		48.5 #	57.9 #	170 #			

Validated

CERTIFICATE OF ANALYSIS

SDG: 240430-71 **Report Number:** 728103 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall, Co.Laois

TPH CWG (W)

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Customer Sample Ref.			SW1	SW2	SW3			
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
Sample Type			Surface Water (SW)	Surface Water (SW)	Surface Water (SW)			
Date Sampled			25/04/2024	25/04/2024	24/04/2024			
Sample Time			.	.	.			
Date Received			30/04/2024	30/04/2024	30/04/2024			
SDG Ref			240430-71	240430-71	240430-71			
Lab Sample No.(s)			29727318	29727335	29727348			
AGS Reference								
Component	**LOD/Units**	**Method**						
GRO Surrogate % recovery**	%	TM245	106	99	107			
GRO >C5-C12 (HS_1D_TOTAL)	<50 µg/l	TM245	<50 #	<50 #	<50 #			
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/l	TM245	<10	<10	<10			
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/l	TM245	<10	<10	<10			
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/l	TM245	<10	<10	<10			
Aliphatics >C10-C12 (HS_1D_AL)	<10 µg/l	TM245	<10	<10	<10			
Aliphatics >C12-C16 (aq) (SPECD_AL1_W)	<10 µg/l	TM439	<10	<10	<10			
Aliphatics >C16-C21 (aq) (SPECD_AL2_W)	<10 µg/l	TM439	<10	<10	<10			
Aliphatics >C21-C35 (aq) (SPECD_AL3_W)	<10 µg/l	TM439	<10	<10	<10			
Total Aliphatics >C12-C35 (aq) (EPHAL12_35T_GC_W)	<10 µg/l	TM439	<10	<10	<10			
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/l	TM245	<10	<10	<10			
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/l	TM245	<10	<10	<10			
Aromatics >EC8-EC10	<10 µg/l	TM245	<10	<10	<10			
Aromatics >EC10-EC12	<10 µg/l	TM245	<10	<10	<10			
Aromatics >EC12-EC16 (aq) (SPECD_AROM1_W)	<10 µg/l	TM439	<10	<10	<10			
Aromatics >EC16-EC21 (aq) (SPECD_AROM2_W)	<10 µg/l	TM439	<10	<10	<10			
Aromatics >EC21-EC35 (aq) (SPECD_AROM3_W)	<10 µg/l	TM439	<10	<10	<10			
Total Aromatics >EC12-EC35 (aq) (EPHAR12_35T_GC_W)	<10 µg/l	TM439	<10	<10	<10			
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM439	<10	<10	<10			

CERTIFICATE OF ANALYSIS

SDG: 240430-71 **Report Number:** 728103 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall, Co.Laois

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2	SW3
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)
			Date Sampled	25/04/2024	25/04/2024	24/04/2024
			Sample Time	.	.	.
			Date Received	30/04/2024	30/04/2024	30/04/2024
			SDG Ref	240430-71	240430-71	240430-71
			Lab Sample No.(s)	29727318	29727335	29727348
			AGS Reference			
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #	<1 #
Benzene	<1 µg/l	TM208		<1 #	<1 #	<1 #
Toluene	<1 µg/l	TM208		<1 #	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #
o-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #
Sum of detected Xylenes	<2 µg/l	TM208		<2	<2	<2
Sum of BTEX	<5 µg/l	TM208		<5	<5	<5

Table of Results - Appendix

Method No	Description
TM439	Determination of Extractable Petroleum Hydrocarbons (EPH) CWG banding by GC-FID on liquids
TM152	Analysis of Aqueous Samples by ICP-MS
TM208	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM256	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM183	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM245	Determination of GRO by Headspace in waters
TM022	Determination of total suspended solids in waters
TM045	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids
TM099	Determination of Ammonium in Water Samples using the Kone Analyser

NA = not applicable.
Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).

CERTIFICATE OF ANALYSIS

SDG: 240430-71 **Report Number:** 728103 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall, Co.Laois

Test Completion Dates

Lab Sample No(s)	29727318	29727335	29727348
Customer Sample Ref.	SW1	SW2	SW3
AGS Ref.			
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Surface Water	Surface Water	Surface Water
Ammonium Low	02-May-2024	02-May-2024	02-May-2024
Anions by Kone (w)	07-May-2024	01-May-2024	01-May-2024
BOD True Total	05-May-2024	05-May-2024	05-May-2024
Dissolved Metals by ICP-MS	08-May-2024	08-May-2024	08-May-2024
EPH and CWG by FID	02-May-2024	03-May-2024	02-May-2024
GRO by GC-FID (W)	01-May-2024	01-May-2024	01-May-2024
Mercury Dissolved	03-May-2024	03-May-2024	03-May-2024
Nitrite by Kone (w)	07-May-2024	01-May-2024	01-May-2024
pH Value	02-May-2024	02-May-2024	02-May-2024
Phosphate by Kone (w)	01-May-2024	01-May-2024	01-May-2024
Suspended Solids	04-May-2024	03-May-2024	04-May-2024
TPH CWG (W)	02-May-2024	03-May-2024	02-May-2024
VOC MS (W)	01-May-2024	01-May-2024	01-May-2024

Appendix

General

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

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of 15 days after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury

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

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

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

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

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

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

19. **Sample Deviations**

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

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

20. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials andd soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

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

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

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SLR Consulting Ireland
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Unit 7
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Windy Harbour
Dublin
Dublin14

Attention: Mairead Brown

CERTIFICATE OF ANALYSIS

Date of report Generation:	03 July 2024
Customer:	SLR Consulting Ireland
Sample Delivery Group (SDG):	240624-47
Your Reference:	501.065477.00001
Location:	Mounthall Co. Laois
Report No:	733574
Order Number:	1279

We received 8 samples on Monday June 24, 2024 and 8 of these samples were scheduled for analysis which was completed on Wednesday July 03, 2024. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan
Operations Manager

Validated

CERTIFICATE OF ANALYSIS

SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
29972305	BH01		0.00 - 0.00	18/06/2024
29972314	BH02		0.00 - 0.00	18/06/2024
29972322	BH03		0.00 - 0.00	18/06/2024
29972330	BH04		0.00 - 0.00	18/06/2024
29972339	BH05		0.00 - 0.00	19/06/2024
29972349	BH06		0.00 - 0.00	19/06/2024
29972358	BH07		0.00 - 0.00	18/06/2024
29972367	BH08		0.00 - 0.00	18/06/2024

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

Validated

CERTIFICATE OF ANALYSIS

SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

RECEIVED: 19/09/2024

Results Legend

X Test

N No Determination Possible

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

			Lab Sample No(s)	29972305	29972314	29972322	29972330
			Customer Sample Reference	BH01	BH02	BH03	BH04
			AGS Reference				
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Container	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)
			Sample Type	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 8			X				X				X				X			X	
Anions by Kone (w)	All	NDPs: 0 Tests: 8		X				X				X					X			X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 8				X					X					X					X
EPH and CWG by FID	All	NDPs: 0 Tests: 8		X				X				X					X			X	
Fluoride	All	NDPs: 0 Tests: 8		X				X				X					X			X	
GRO by GC-FID (W)	All	NDPs: 0 Tests: 8					X				X				X						
Mercury Dissolved	All	NDPs: 0 Tests: 8				X					X					X					X
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 8	X					X					X					X				
pH Value	All	NDPs: 0 Tests: 8		X				X				X					X			X	
Phosphate by Kone (w)	All	NDPs: 0 Tests: 8		X				X				X					X			X	
TPH CWG (W)	All	NDPs: 0 Tests: 8	X					X					X					X				
VOC MS (W)	All	NDPs: 0 Tests: 8					X				X					X						

29972367	BH08		0.00 - 0.00	Vial (ALE297)	GW						X						X
				HNO3 Filtered (ALE204)	GW			X				X					
				H2SO4 (ALE244)	GW	X											
				500ml Plastic (ALE208)	GW		X		X	X				X	X		
				0.5l glass bottle (ALE227)	GW								X			X	
29972358	BH07		0.00 - 0.00	Vial (ALE297)	GW						X						X
				HNO3 Filtered (ALE204)	GW			X				X					
				H2SO4 (ALE244)	GW	X											
				500ml Plastic (ALE208)	GW		X			X				X	X		
				0.5l glass bottle (ALE227)	GW				X				X			X	
29972349	BH06		0.00 - 0.00	Vial (ALE297)	GW						X						X
				HNO3 Filtered (ALE204)	GW			X									
				H2SO4 (ALE244)	GW	X											
				500ml Plastic (ALE208)	GW		X		X	X		X		X	X		
				0.5l glass bottle (ALE227)	GW								X			X	
29972339	BH05		0.00 - 0.00	Vial (ALE297)	GW						X						X
				HNO3 Filtered (ALE204)	GW			X				X					
				H2SO4 (ALE244)	GW	X											
				500ml Plastic (ALE208)	GW		X		X	X				X	X		
				0.5l glass bottle (ALE227)	GW								X			X	
29972330	BH04		0.00 - 0.00	Vial (ALE297)	GW						X						X

Validated

CERTIFICATE OF ANALYSIS

SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH01	BH02	BH03	BH04	BH05	BH06
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	18/06/2024	18/06/2024	18/06/2024	18/06/2024	19/06/2024	19/06/2024
			Sample Time	.	.	.	.	.	.
			Date Received	24/06/2024	24/06/2024	24/06/2024	24/06/2024	24/06/2024	24/06/2024
			SDG Ref	240624-47	240624-47	240624-47	240624-47	240624-47	240624-47
			Lab Sample No.(s)	29972305	29972314	29972322	29972330	29972339	29972349
			AGS Reference						
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #
Ammoniacal Nitrogen as NH3	<0.2 mg/l	TM099		<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #
Fluoride	<0.5 mg/l	TM104		<0.5 #	<0.5 #	<0.5 #	<0.5 #	<0.5 #	<0.5 #
Aluminium (diss.filt)	<10 µg/l	TM152		<10 #	<10 #	<10 #	<10 #	<10 #	48 #
Arsenic (diss.filt)	<0.5 µg/l	TM152		<0.5 #	<0.5 #	<0.5 #	<0.5 #	<0.5 #	1.06 #
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #	<0.08 #	<0.08 #	<0.08 #	<0.08 #
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #	<1 #	<1 #	<1 #	2.12 #
Copper (diss.filt)	<0.3 µg/l	TM152		3.23 #	0.55 #	0.566 #	2.25 #	3.15 #	3.2 #
Lead (diss.filt)	<0.2 µg/l	TM152		0.518 #	<0.2 #	<0.2 #	0.372 #	0.538 #	0.351 #
Nickel (diss.filt)	<0.4 µg/l	TM152		0.646 #	0.48 #	0.639 #	0.646 #	1.34 #	1.52 #
Zinc (diss.filt)	<1 µg/l	TM152		37.4 #	9.14 #	11.2 #	20.3 #	38.6 #	10 #
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		1.27 #	2.96 #	2.48 #	3.41 #	1.94 #	2.9 #
Iron (Dis.Filt)	<0.019 mg/l	TM152		<0.019 #	<0.019 #	<0.019 #	<0.019 #	<0.019 #	0.0945 #
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 2 #
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184		<0.05 #	<0.05 #	<0.05 #	<0.05 #	0.053 #	<0.05 #
Sulphate	<2 mg/l	TM184		<2 #	3.1 #	<2 #	4 #	3.4 #	6.7 #
Chloride	<2 mg/l	TM184		3.4 #	8.5 #	4.2 #	12.4 #	9.3 #	10.1 #
Nitrate as NO3	<0.3 mg/l	TM184		2.63 #	4.41 #	5.53 #	10.9 #	2.64 #	5.07 #
pH	<1 pH Units	TM256		6.51 #	7.59 #	7.43 #	7.27 #	7.41 #	8 #
Conductivity @ 20 deg.C	<0.02 mS/cm	TM256		0.166 #	0.426 #	0.502 #	0.479 #	0.332 #	0.568 #

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SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4♦§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH07	BH08				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Ground Water (GW)	Ground Water (GW)				
			Date Sampled	18/06/2024	18/06/2024				
			Sample Time	-	-				
			Date Received	24/06/2024	24/06/2024				
			SDG Ref	240624-47	240624-47				
			Lab Sample No.(s)	29972358	29972367				
			AGS Reference						
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		<0.2 #	<0.2 #				
Ammoniacal Nitrogen as NH3	<0.2 mg/l	TM099		<0.2 #	<0.2 #				
Fluoride	<0.5 mg/l	TM104		<0.5 #	<0.5 #				
Aluminium (diss.filt)	<10 µg/l	TM152		<10 #	10.1 #				
Arsenic (diss.filt)	<0.5 µg/l	TM152		<0.5 #	<0.5 #				
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #				
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	1.09 #				
Copper (diss.filt)	<0.3 µg/l	TM152		1.95 #	0.378 #				
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	<0.2 #				
Nickel (diss.filt)	<0.4 µg/l	TM152		1.61 #	0.498 #				
Zinc (diss.filt)	<1 µg/l	TM152		7.83 #	3 #				
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		8.99 #	2.86 #				
Iron (Dis.Filt)	<0.019 mg/l	TM152		<0.019 #	<0.019 #				
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #	<0.01 #				
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184		<0.05 #	<0.05 #				
Sulphate	<2 mg/l	TM184		5.3 #	3.7 #				
Chloride	<2 mg/l	TM184		5.3 #	6.8 #				
Nitrate as NO3	<0.3 mg/l	TM184		1.37 #	7.68 #				
pH	<1 pH Units	TM256		7.08 #	7.65 #				
Conductivity @ 20 deg.C	<0.02 mS/cm	TM256		0.573 #	0.445 #				

CERTIFICATE OF ANALYSIS

SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

PAH Spec MS - Aqueous (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH01	BH02	BH03	BH04	BH05	BH06
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	18/06/2024	18/06/2024	18/06/2024	18/06/2024	19/06/2024	19/06/2024
			Sample Time	.	.	.	.	.	.
			Date Received	24/06/2024	24/06/2024	24/06/2024	24/06/2024	24/06/2024	24/06/2024
			SDG Ref	240624-47	240624-47	240624-47	240624-47	240624-47	240624-47
			Lab Sample No.(s)	29972305	29972314	29972322	29972330	29972339	29972349
			AGS Reference						
Naphthalene (aq)	<0.01 µg/l	TM178		<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.05 #	<0.05 #
Acenaphthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Acenaphthylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Phenanthrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Fluorene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Chrysene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Pyrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178		<0.002 #	<0.002 #	<0.002 #	<0.002 #	<0.01 #	<0.01 #
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #	<0.005 #	<0.005 #	<0.025 #	<0.025 #
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178		<0.082 #	<0.082 #	<0.082 #	<0.082 #	<0.41 #	<0.41 #

CERTIFICATE OF ANALYSIS

SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

PAH Spec MS - Aqueous (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4♦§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH07	BH08				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Ground Water (GW)	Ground Water (GW)				
			Date Sampled	18/06/2024	18/06/2024				
			Sample Time	.	.				
			Date Received	24/06/2024	24/06/2024				
			SDG Ref	240624-47	240624-47				
			Lab Sample No.(s)	29972358	29972367				
			AGS Reference						
Naphthalene (aq)	<0.01 µg/l	TM178		<0.01 #	<0.01 #				
Acenaphthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Acenaphthylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Phenanthrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Fluorene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Chrysene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Pyrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178		<0.002 #	<0.002 #				
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 #				
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178		<0.082 #	<0.082 #				

CERTIFICATE OF ANALYSIS

SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

TPH CWG (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH01	BH02	BH03	BH04	BH05	BH06
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	18/06/2024	18/06/2024	18/06/2024	18/06/2024	19/06/2024	19/06/2024
			Sample Time	.	.	.	.	.	.
			Date Received	24/06/2024	24/06/2024	24/06/2024	24/06/2024	24/06/2024	24/06/2024
			SDG Ref	240624-47	240624-47	240624-47	240624-47	240624-47	240624-47
			Lab Sample No.(s)	29972305	29972314	29972322	29972330	29972339	29972349
			AGS Reference						
GRO Surrogate % recovery**	%	TM245		94	93	88	76	87	92
GRO >C5-C12 (HS_1D_TOTAL)	<50 µg/l	TM245		<50 #	<50 #	<50 #	<50 #	<50 #	<50 #
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 (aq) (SPECD_AL1_W)	<10 µg/l	TM439		<10	<10	<10	<10	<50	<50
Aliphatics >C16-C21 (aq) (SPECD_AL2_W)	<10 µg/l	TM439		<10	<10	<10	<10	<50	<50
Aliphatics >C21-C35 (aq) (SPECD_AL3_W)	<10 µg/l	TM439		<10	<10	<10	<10	<50	<50
Total Aliphatics >C12-C35 (aq) (EPHAL12_35T_GC_W)	<10 µg/l	TM439		<10	<10	<10	<10	<50	<50
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 (aq) (SPECD_AROM1_W)	<10 µg/l	TM439		<10	<10	<10	<10	<50	<50
Aromatics >EC16-EC21 (aq) (SPECD_AROM2_W)	<10 µg/l	TM439		<10	<10	<10	<10	<50	<50
Aromatics >EC21-EC35 (aq) (SPECD_AROM3_W)	<10 µg/l	TM439		<10	<10	<10	<10	<50	<50
Total Aromatics >EC12-EC35 (aq) (EPHAR12_35T_GC_W)	<10 µg/l	TM439		<10	<10	<10	<10	<50	<50
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM439		<10	<10	<10	<10	<50	<50

Validated

CERTIFICATE OF ANALYSIS

SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

TPH CWG (W)

Results Legend
ISO17025 accredited.
M mCERTS accredited.
aq Aqueous / settled sample.
diss.filt Dissolved / filtered sample.
tot.unfilt Total / unfiltered sample.
* Subcontracted - refer to subcontractor report for accreditation status.
** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F) Trigger breach confirmed
1-4+$@ Sample deviation (see appendix)

Customer Sample Ref.	BH07	BH08
Depth (m)	0.00 - 0.00	0.00 - 0.00
Sample Type	Ground Water (GW)	Ground Water (GW)
Date Sampled	18/06/2024	18/06/2024
Sample Time	.	.
Date Received	24/06/2024	24/06/2024
SDG Ref	240624-47	240624-47
Lab Sample No.(s)	29972358	29972367
AGS Reference		

Component	LOD/Units	Method		
GRO Surrogate % recovery**	%	TM245	86	88
GRO >C5-C12 (HS_1D_TOTAL)	<50 µg/l	TM245	<50 #	<50 #
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/l	TM245	<10	<10
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/l	TM245	<10	<10
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/l	TM245	<10	<10
Aliphatics >C10-C12 (HS_1D_AL)	<10 µg/l	TM245	<10	<10
Aliphatics >C12-C16 (aq) (SPECD_AL1_W)	<10 µg/l	TM439	<10	<10
Aliphatics >C16-C21 (aq) (SPECD_AL2_W)	<10 µg/l	TM439	<10	<10
Aliphatics >C21-C35 (aq) (SPECD_AL3_W)	<10 µg/l	TM439	<10	<10
Total Aliphatics >C12-C35 (aq) (EPHAL12_35T_GC_W)	<10 µg/l	TM439	<10	<10
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/l	TM245	<10	<10
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/l	TM245	<10	<10
Aromatics >EC8-EC10	<10 µg/l	TM245	<10	<10
Aromatics >EC10-EC12	<10 µg/l	TM245	<10	<10
Aromatics >EC12-EC16 (aq) (SPECD_AROM1_W)	<10 µg/l	TM439	<10	<10
Aromatics >EC16-EC21 (aq) (SPECD_AROM2_W)	<10 µg/l	TM439	<10	<10
Aromatics >EC21-EC35 (aq) (SPECD_AROM3_W)	<10 µg/l	TM439	<10	<10
Total Aromatics >EC12-EC35 (aq) (EPHAR12_35T_GC_W)	<10 µg/l	TM439	<10	<10
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM439	<10	<10

Validated

CERTIFICATE OF ANALYSIS

SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	BH01	BH02	BH03	BH04	BH05	BH06
Customer Sample Ref.								
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
Date Sampled			18/06/2024	18/06/2024	18/06/2024	18/06/2024	19/06/2024	19/06/2024
Sample Time			.	.	.	.	.	.
Date Received			24/06/2024	24/06/2024	24/06/2024	24/06/2024	24/06/2024	24/06/2024
SDG Ref			240624-47	240624-47	240624-47	240624-47	240624-47	240624-47
Lab Sample No.(s)			29972305	29972314	29972322	29972330	29972339	29972349
AGS Reference								
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Benzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Toluene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
o-Xylene	<1 µg/l	TM208	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Sum of detected Xylenes	<2 µg/l	TM208	<2	<2	<2	<2	<2	<2
Sum of BTEX	<5 µg/l	TM208	<5	<5	<5	<5	<5	<5

CERTIFICATE OF ANALYSIS

SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

VOC MS (W)

Results Legend
ISO17025 accredited.
M mCERTS accredited.
aq Aqueous / settled sample.
diss.filt Dissolved / filtered sample.
tot.unfilt Total / unfiltered sample.
* Subcontracted - refer to subcontractor report for accreditation status.
** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F) Trigger breach confirmed
1-4♦§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH07	BH08				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Ground Water (GW)	Ground Water (GW)				
			Date Sampled	18/06/2024	18/06/2024				
			Sample Time	.	.				
			Date Received	24/06/2024	24/06/2024				
			SDG Ref	240624-47	240624-47				
			Lab Sample No.(s)	29972358	29972367				
			AGS Reference						
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #				
Benzene	<1 µg/l	TM208		<1 #	<1 #				
Toluene	<1 µg/l	TM208		<1 #	<1 #				
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #				
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #				
o-Xylene	<1 µg/l	TM208		<1 #	<1 #				
Sum of detected Xylenes	<2 µg/l	TM208		<2	<2				
Sum of BTEX	<5 µg/l	TM208		<5	<5				

CERTIFICATE OF ANALYSIS

SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

Table of Results - Appendix

Method No	Description
TM099	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Determination of Fluoride using the Kone Analyser
TM183	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM245	Determination of GRO by Headspace in waters
TM178	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM439	Determination of Extractable Petroleum Hydrocarbons (EPH) CWG banding by GC-FID on liquids
TM152	Analysis of Aqueous Samples by ICP-MS
TM208	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM256	Determination of pH, EC, TDS and Alkalinity in Aqueous samples

NA = not applicable.
Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).

CERTIFICATE OF ANALYSIS

SDG: 240624-47 **Report Number:** 733574 **Superseded Report:**
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

Test Completion Dates

Lab Sample No(s)	29972305	29972314	29972322	29972330	29972339	29972349	29972358	29972367
Customer Sample Ref.	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08
AGS Ref.								
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
Ammoniacal Nitrogen	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024	28-Jun-2024	28-Jun-2024	27-Jun-2024
Anions by Kone (w)	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024
Dissolved Metals by ICP-MS	01-Jul-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	01-Jul-2024	28-Jun-2024	28-Jun-2024
EPH and CWG by FID	03-Jul-2024	03-Jul-2024	03-Jul-2024	03-Jul-2024	03-Jul-2024	03-Jul-2024	01-Jul-2024	03-Jul-2024
Fluoride	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024
GRO by GC-FID (W)	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024
Mercury Dissolved	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	01-Jul-2024	28-Jun-2024	28-Jun-2024
Nitrite by Kone (w)	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024
PAH Spec MS - Aqueous (W)	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	01-Jul-2024	28-Jun-2024	28-Jun-2024
pH Value	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024	28-Jun-2024
Phosphate by Kone (w)	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024	27-Jun-2024
TPH CWG (W)	03-Jul-2024	03-Jul-2024	03-Jul-2024	03-Jul-2024	03-Jul-2024	03-Jul-2024	01-Jul-2024	03-Jul-2024
VOC MS (W)	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024

Appendix

General

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

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of 15 days after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury

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

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

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

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

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

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

19. **Sample Deviations**

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

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

20. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials andd soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

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

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

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SLR Consulting Ireland
CSA House
Unit 7
Dundrum Business Park
Windy Harbour
Dublin
Dublin14

Attention: Mairead Brown

CERTIFICATE OF ANALYSIS

Date of report Generation:	11 July 2024
Customer:	SLR Consulting Ireland
Sample Delivery Group (SDG):	240624-48
Your Reference:	501.065477.00001
Location:	Mounthall, Co. Laois
Report No:	734331
Order Number:	1278

This report has been revised and directly supersedes 733568 in its entirety.

We received 3 samples on Monday June 24, 2024 and 3 of these samples were scheduled for analysis which was completed on Thursday July 11, 2024. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan
Operations Manager

CERTIFICATE OF ANALYSIS

SDG: 240624-48 **Report Number:** 734331 **Superseded Report:** 733568
Client Ref.: 501.065477.00001 **Location:** Mounthall, Co. Laois

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
29972386	SW1		0.00 - 0.00	19/06/2024
29972395	SW2		0.00 - 0.00	19/06/2024
29972405	SW3		0.00 - 0.00	19/06/2024

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

Validated

CERTIFICATE OF ANALYSIS

SDG: 240624-48 **Report Number:** 734331 **Superseded Report:** 733568
Client Ref.: 501.065477.00001 **Location:** Mounthall, Co. Laois

RECEIVED: 19/09/2024

Results Legend

X Test

N No Determination Possible

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

			Lab Sample No(s)	29972386	29972395	29972405
			Customer Sample Reference	SW1	SW2	SW3
			AGS Reference			
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Container	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)
			Sample Type	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 3					X							X							X	
Anions by Kone (w)	All	NDPs: 0 Tests: 3			X							X								X		
BOD True Total	All	NDPs: 0 Tests: 3		X							X								X			
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 3					X								X							X
EPH and CWG by FID	All	NDPs: 0 Tests: 3	X							X								X				
GRO by GC-FID (W)	All	NDPs: 0 Tests: 3							X								X					
Mercury Dissolved	All	NDPs: 0 Tests: 3					X								X							X
Nitrite by Kone (w)	All	NDPs: 0 Tests: 3						X								X						
pH Value	All	NDPs: 0 Tests: 3			X							X								X		
Phosphate by Kone (w)	All	NDPs: 0 Tests: 3			X							X								X		
Suspended Solids	All	NDPs: 0 Tests: 3			X							X								X		
TPH CWG (W)	All	NDPs: 0 Tests: 3	X							X								X				
VOC MS (W)	All	NDPs: 0 Tests: 3							X								X					

29972405	SW3		0.00 - 0.00	Vial (ALE297)	SW											X															X
				NaOH (ALE245)	SW															X											

Validated

CERTIFICATE OF ANALYSIS

SDG: 240624-48 **Report Number:** 734331 **Superseded Report:** 733568

Client Ref.: 501.065477.00001 **Location:** Mounthall, Co. Laois

RECEIVED: 19/09/2024

Results Legend

- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2	SW3			
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)			
			Date Sampled	19/06/2024	19/06/2024	19/06/2024			
			Sample Time	.	.	.			
			Date Received	24/06/2024	24/06/2024	24/06/2024			
			SDG Ref	240624-48	240624-48	240624-48			
			Lab Sample No.(s)	29972386	29972395	29972405			
			AGS Reference						
Suspended solids, Total	<2 mg/l	TM022		<2 #	<2 #	<2 #			
BOD, unfiltered	<1 mg/l	TM045		<1 @ #	<1 @ #	<1 @ #			
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		<0.2 #	<0.2 #	<0.2 #			
Arsenic (diss.filt)	<0.5 µg/l	TM152		<0.5 #	<0.5 #	<0.5 #			
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #	<0.08 #			
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #	<1 #			
Copper (diss.filt)	<0.3 µg/l	TM152		<0.3 #	<0.3 #	<0.3 #			
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	<0.2 #	<0.2 #			
Nickel (diss.filt)	<0.4 µg/l	TM152		<0.4 #	<0.4 #	<0.4 #			
Selenium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #	<1 #			
Zinc (diss.filt)	<1 µg/l	TM152		1.28 #	<1 #	1.6 #			
Mercury (diss.filt)	<0.01 µg/l	TM183		0.0248	<0.01	<0.01			
Nitrite as NO2	<0.05 mg/l	TM184		<0.05 #	<0.05 #	<0.05 #			
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184		<0.05 #	<0.05 #	<0.05 #			
Sulphate	<2 mg/l	TM184		<2 #	<2 #	4.6 #			
Chloride	<2 mg/l	TM184		7.2 #	7.6 #	8.7 #			
Nitrate as NO3	<0.3 mg/l	TM184		1.64 #	1.44 #	6.81 #			
pH	<1 pH Units	TM256		7.78 #	7.91 #	8.31 #			
Conductivity @ 20 deg.C	<0.02 mS/cm	TM256		0.136 #	0.151 #	0.336 #			
Alkalinity, Total as CaCO3	<3 mg/l	TM256		59.8 #	67.3 #	172 #			

Validated

CERTIFICATE OF ANALYSIS

SDG: 240624-48 **Report Number:** 734331 **Superseded Report:** 733568

Client Ref.: 501.065477.00001 **Location:** Mounthall, Co. Laois

TPH CWG (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2	SW3
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)
			Date Sampled	19/06/2024	19/06/2024	19/06/2024
			Sample Time	.	.	.
			Date Received	24/06/2024	24/06/2024	24/06/2024
			SDG Ref	240624-48	240624-48	240624-48
			Lab Sample No.(s)	29972386	29972395	29972405
			AGS Reference			
GRO Surrogate % recovery**	%	TM245		106	104	101
GRO >C5-C12 (HS_1D_TOTAL)	<50 µg/l	TM245		<50 #	<50 #	<50 #
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10
Aliphatics >C10-C12 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10
Aliphatics >C12-C16 (aq) (SPECD_AL1_W)	<10 µg/l	TM439		<10	<10	<10
Aliphatics >C16-C21 (aq) (SPECD_AL2_W)	<10 µg/l	TM439		<10	<10	<10
Aliphatics >C21-C35 (aq) (SPECD_AL3_W)	<10 µg/l	TM439		<10	<10	<10
Total Aliphatics >C12-C35 (aq) (EPHAL12_35T_GC_W)	<10 µg/l	TM439		<10	<10	<10
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/l	TM245		<10	<10	<10
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/l	TM245		<10	<10	<10
Aromatics >EC8-EC10	<10 µg/l	TM245		<10	<10	<10
Aromatics >EC10-EC12	<10 µg/l	TM245		<10	<10	<10
Aromatics >EC12-EC16 (aq) (SPECD_AROM1_W)	<10 µg/l	TM439		<10	<10	<10
Aromatics >EC16-EC21 (aq) (SPECD_AROM2_W)	<10 µg/l	TM439		<10	<10	<10
Aromatics >EC21-EC35 (aq) (SPECD_AROM3_W)	<10 µg/l	TM439		<10	<10	<10
Total Aromatics >EC12-EC35 (aq) (EPHAR12_35T_GC_W)	<10 µg/l	TM439		<10	<10	<10
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM439		<10	<10	<10

CERTIFICATE OF ANALYSIS

SDG: 240624-48 **Report Number:** 734331 **Superseded Report:** 733568
Client Ref.: 501.065477.00001 **Location:** Mounthall, Co. Laois

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2	SW3
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)
			Date Sampled	19/06/2024	19/06/2024	19/06/2024
			Sample Time	.	.	.
			Date Received	24/06/2024	24/06/2024	24/06/2024
			SDG Ref	240624-48	240624-48	240624-48
			Lab Sample No.(s)	29972386	29972395	29972405
			AGS Reference			
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #	<1 #
Benzene	<1 µg/l	TM208		<1 #	<1 #	<1 #
Toluene	<1 µg/l	TM208		<1 #	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #
o-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #
Sum of detected Xylenes	<2 µg/l	TM208		<2	<2	<2
Sum of BTEX	<5 µg/l	TM208		<5	<5	<5

Table of Results - Appendix

Method No	Description
TM152	Analysis of Aqueous Samples by ICP-MS
TM208	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM256	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM439	Determination of Extractable Petroleum Hydrocarbons (EPH) CWG banding by GC-FID on liquids
TM183	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM245	Determination of GRO by Headspace in waters
TM022	Determination of total suspended solids in waters
TM045	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids
TM099	Determination of Ammonium in Water Samples using the Kone Analyser

NA = not applicable.
Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).

CERTIFICATE OF ANALYSIS

SDG: 240624-48 **Report Number:** 734331 **Superseded Report:** 733568
Client Ref.: 501.065477.00001 **Location:** Mounthall, Co. Laois

Test Completion Dates

Lab Sample No(s)	29972386	29972395	29972405
Customer Sample Ref.	SW1	SW2	SW3
AGS Ref.			
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Surface Water	Surface Water	Surface Water
Ammoniacal Nitrogen	28-Jun-2024	28-Jun-2024	28-Jun-2024
Anions by Kone (w)	27-Jun-2024	27-Jun-2024	27-Jun-2024
BOD True Total	29-Jun-2024	29-Jun-2024	29-Jun-2024
Dissolved Metals by ICP-MS	11-Jul-2024	11-Jul-2024	11-Jul-2024
EPH and CWG by FID	03-Jul-2024	03-Jul-2024	03-Jul-2024
GRO by GC-FID (W)	26-Jun-2024	26-Jun-2024	26-Jun-2024
Mercury Dissolved	09-Jul-2024	09-Jul-2024	09-Jul-2024
Nitrite by Kone (w)	27-Jun-2024	27-Jun-2024	27-Jun-2024
pH Value	28-Jun-2024	28-Jun-2024	28-Jun-2024
Phosphate by Kone (w)	27-Jun-2024	27-Jun-2024	27-Jun-2024
Suspended Solids	29-Jun-2024	29-Jun-2024	29-Jun-2024
TPH CWG (W)	03-Jul-2024	03-Jul-2024	03-Jul-2024
VOC MS (W)	26-Jun-2024	26-Jun-2024	26-Jun-2024

Appendix

General

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

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of 15 days after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury

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

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

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

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

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

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

19. **Sample Deviations**

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

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

20. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials andd soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

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

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

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Deeside
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SLR Consulting Ireland
CSA House
Unit 7
Dundrum Business Park
Windy Harbour
Dublin
Dublin14

Attention: Mairead Brown

CERTIFICATE OF ANALYSIS

Date of report Generation:	26 July 2024
Customer:	SLR Consulting Ireland
Sample Delivery Group (SDG):	240717-88
Your Reference:	501.065477.00001
Location:	Mounthall Co. Laois
Report No:	735910
Order Number:	1279

This report has been revised and directly supersedes 735908 in its entirety.

We received 11 samples on Monday July 15, 2024 and 11 of these samples were scheduled for analysis which was completed on Friday July 26, 2024. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.

Approved By:

Lauren Ellis
General Manager Western Europe Environmental

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
30091025	BH01		0.00 - 0.00	09/07/2024
30091053	BH02		0.00 - 0.00	09/07/2024
30091061	BH03		0.00 - 0.00	09/07/2024
30091069	BH04		0.00 - 0.00	09/07/2024
30091078	BH05		0.00 - 0.00	09/07/2024
30091086	BH06		0.00 - 0.00	09/07/2024
30091094	BH07		0.00 - 0.00	09/07/2024
30091102	BH08		0.00 - 0.00	09/07/2024
30121807	SW1		0.00 - 0.00	10/07/2024
30091110	SW2		0.00 - 0.00	10/07/2024
30091044	SW3		0.00 - 0.00	10/07/2024

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

Validated

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

Results Legend

X Test

N No Determination Possible

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

Lab Sample No(s)			30091025					30091053					30091061					30091069			
Customer Sample Reference			BH01					BH02					BH03					BH04			
AGS Reference																					
Depth (m)			0.00 - 0.00					0.00 - 0.00					0.00 - 0.00					0.00 - 0.00			
Container			0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 7			X					X					X					X		
Ammonium Low	All	NDPs: 0 Tests: 3																				
Anions by Kone (w)	All	NDPs: 0 Tests: 10		X					X					X					X			
BOD True Total	All	NDPs: 0 Tests: 3																				
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 11				X					X					X						X
EPH and CWG by FID	All	NDPs: 0 Tests: 10					X					X					X					
Fluoride	All	NDPs: 0 Tests: 7		X					X					X					X			
GRO by GC-FID (W)	All	NDPs: 0 Tests: 10					X					X					X					
Mercury Dissolved	All	NDPs: 0 Tests: 11				X					X					X						X
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 7	X					X					X					X				
pH Value	All	NDPs: 0 Tests: 10		X					X					X					X			
Phosphate by Kone (w)	All	NDPs: 0 Tests: 10		X					X					X					X			
Suspended Solids	All	NDPs: 0 Tests: 3																				
TPH CWG (W)	All	NDPs: 0 Tests: 10	X					X					X					X				
VOC MS (W)	All	NDPs: 0 Tests: 10					X					X					X					

30121807	SW1		0.00 - 0.00	HNO3 Filtered (ALE204)	SW					X				X								
				H2SO4 (ALE244)	SW		X															
				500ml Plastic (ALE208)	SW			X										X	X	X		
				250ml BOD (ALE212)	SW				X													
				0.5l glass bottle (ALE227)	SW																X	
30091094	BH07		0.00 - 0.00	Vial (ALE297)	GW						X		X									X
				HNO3 Filtered (ALE204)	GW					X				X								
				H2SO4 (ALE244)	GW	X																
				500ml Plastic (ALE208)	GW			X		X		X		X			X	X				
				0.5l glass bottle (ALE227)	GW											X					X	
30091086	BH06		0.00 - 0.00	Vial (ALE297)	GW								X									X
				HNO3 Filtered (ALE204)	GW					X												
				H2SO4 (ALE244)	GW	X																
				500ml Plastic (ALE208)	GW			X			X	X		X			X	X				
				0.5l glass bottle (ALE227)	GW											X					X	
30091078	BH05		0.00 - 0.00	Vial (ALE297)	GW								X									X
				HNO3 Filtered (ALE204)	GW					X				X								
				H2SO4 (ALE244)	GW	X																
				500ml Plastic (ALE208)	GW			X			X	X					X	X				
				0.5l glass bottle (ALE227)	GW											X					X	
30091069	BH04		0.00 - 0.00	Vial (ALE297)	GW						X		X									X

Validated

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908

Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

Results Legend

X Test

N No Determination Possible

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

Lab Sample No(s)			30121807							30091110								30091044		
Customer Sample Reference			SW1							SW2								SW3		
AGS Reference																				
Depth (m)			0.00 - 0.00							0.00 - 0.00								0.00 - 0.00		
Container			NaOH (ALE245)	Vial (ALE297)	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)		
Sample Type			SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW		
Ammonium Low	All	NDPs: 0 Tests: 3						X							X					
Anions by Kone (w)	All	NDPs: 0 Tests: 10					X							X						
BOD True Total	All	NDPs: 0 Tests: 3				X							X							
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 11							X							X				
EPH and CWG by FID	All	NDPs: 0 Tests: 10		X	X													X		
GRO by GC-FID (W)	All	NDPs: 0 Tests: 10		X							X							X		
Mercury Dissolved	All	NDPs: 0 Tests: 11							X							X				
Nitrite by Kone (w)	All	NDPs: 0 Tests: 3	X							X							X			
pH Value	All	NDPs: 0 Tests: 10					X							X						
Phosphate by Kone (w)	All	NDPs: 0 Tests: 10					X							X						
Suspended Solids	All	NDPs: 0 Tests: 3					X							X						
TPH CWG (W)	All	NDPs: 0 Tests: 10			X							X								
VOC MS (W)	All	NDPs: 0 Tests: 10		X							X							X		

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	BH01	BH02	BH03	BH04	BH05	BH06
Customer Sample Ref.								
Depth (m)			0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
Date Sampled			09/07/2024	09/07/2024	09/07/2024	09/07/2024	09/07/2024	09/07/2024
Sample Time			.	.	.	.	.	.
Date Received			15/07/2024	15/07/2024	15/07/2024	15/07/2024	15/07/2024	15/07/2024
SDG Ref			240717-88	240717-88	240717-88	240717-88	240717-88	240717-88
Lab Sample No.(s)			30091025	30091053	30091061	30091069	30091078	30091086
AGS Reference								
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #
Ammoniacal Nitrogen as NH3	<0.2 mg/l	TM099	<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #	<0.2 #
Fluoride	<0.5 mg/l	TM104	<0.5 #	<0.5 #	<0.5 #	<0.5 #	<0.5 #	<0.5 #
Aluminium (diss.filt)	<10 µg/l	TM152	<10 #	18.3 #	<10 #	11.1 #	<10 #	287 #
Arsenic (diss.filt)	<0.5 µg/l	TM152	<0.5 #	<0.5 #	<0.5 #	<0.5 #	<0.5 #	0.789 #
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08 #	<0.08 #	<0.08 #	<0.08 #	<0.08 #	<0.08 #
Chromium (diss.filt)	<1 µg/l	TM152	<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Copper (diss.filt)	<0.3 µg/l	TM152	2.77 #	0.455 #	2.18 #	1.28 #	4.25 #	16.5 #
Lead (diss.filt)	<0.2 µg/l	TM152	0.549 #	<0.2 #	0.452 #	<0.2 #	0.911 #	5.39 #
Nickel (diss.filt)	<0.4 µg/l	TM152	0.952 #	<0.4 #	0.566 #	<0.4 #	0.768 #	3.33 #
Zinc (diss.filt)	<1 µg/l	TM152	20.4 #	10.1 #	7.93 #	25.1 #	17.3 #	142 #
Magnesium (Dis.Filt)	<0.036 mg/l	TM152	1.32 #	2.62 #	2.44 #	3.14 #	1.83 #	4 #
Iron (Dis.Filt)	<0.019 mg/l	TM152	0.033 #	<0.019 #	<0.019 #	<0.019 #	<0.019 #	0.191 #
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 2 #
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184	<0.05 #	<0.05 #	<0.05 #	<0.05 #	0.051 #	<0.05 #
Sulphate	<2 mg/l	TM184	<2 #	<2 #	<2 #	3.1 #	2.2 #	3.7 #
Chloride	<2 mg/l	TM184	3.7 #	7.8 #	4.3 #	12.5 #	9.5 #	9.5 #
Nitrate as NO3	<0.3 mg/l	TM184	2.88 #	4.62 #	6.43 #	10.8 #	2.78 #	5.11 #
pH	<1 pH Units	TM256	6.5 @ #	7.65 @ #	7.37 @ #	7.25 @ #	7.42 @ #	7.57 @ #
Conductivity @ 20 deg.C	<0.02 mS/cm	TM256	0.162 #	0.415 #	0.535 #	0.495 #	0.312 #	0.473 #

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH07	SW1	SW2	SW3		
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00		
			Sample Type	Ground Water (GW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)		
			Date Sampled	09/07/2024	10/07/2024	10/07/2024	10/07/2024		
			Sample Time	.	.	.	.		
			Date Received	15/07/2024	15/07/2024	15/07/2024	15/07/2024		
			SDG Ref	240717-88	240717-88	240717-88	240717-88		
			Lab Sample No.(s)	30091094	30121807	30091110	30091044		
			AGS Reference						
Suspended solids, Total	<2 mg/l	TM022			8.2 @ #	10.6 @ #	<2 @ #		
BOD, unfiltered	<1 mg/l	TM045			<1 @ #	<1 @ #	<1 @ #		
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		<0.2 #					
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099			0.02 #	0.017 #	0.013 #		
Ammoniacal Nitrogen as NH3	<0.2 mg/l	TM099		<0.2 #					
Fluoride	<0.5 mg/l	TM104		<0.5 #					
Aluminium (diss.filt)	<10 µg/l	TM152		<10 #					
Arsenic (diss.filt)	<0.5 µg/l	TM152		0.546 #	0.527 #	<0.5 #	<0.5 #		
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #	<0.08 #	<0.08 #		
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #	<1 #	<1 #		
Copper (diss.filt)	<0.3 µg/l	TM152		13.4 #	0.753 #	0.628 #	0.474 #		
Lead (diss.filt)	<0.2 µg/l	TM152		2.98 #	0.428 #	0.36 #	<0.2 #		
Nickel (diss.filt)	<0.4 µg/l	TM152		3.79 #	0.623 #	0.634 #	0.467 #		
Selenium (diss.filt)	<1 µg/l	TM152			<1 #	<1 #	<1 #		
Zinc (diss.filt)	<1 µg/l	TM152		32.5 #	5.04 #	3.42 #	2.27 #		
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		8.7 #					
Iron (Dis.Filt)	<0.019 mg/l	TM152		<0.019 #					
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 2 #	<0.01	<0.01	<0.01		
Nitrite as NO2	<0.05 mg/l	TM184			<0.25 #	<0.25 #	<0.05 #		
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184		<0.05 #	<0.1 #	<0.1 #	<0.05 #		
Sulphate	<2 mg/l	TM184		6.4 #	<10 #	<10 #	3.7 #		
Chloride	<2 mg/l	TM184		6 #	<10 #	<10 #	8.7 #		
Nitrate as NO3	<0.3 mg/l	TM184		0.38 #	<1.5 #	<1.5 #	6.46 #		
pH	<1 pH Units	TM256		7.1 @ #	6.71 @ #	6.88 @ #	8.23 @ #		
Conductivity @ 20 deg.C	<0.02 mS/cm	TM256		0.607 #	0.0458 #	0.05 #	0.331 #		
Alkalinity, Total as CaCO3	<3 mg/l	TM256			12.4 #	14.3 #	172 #		

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

PAH Spec MS - Aqueous (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH01	BH02	BH03	BH04	BH05	BH06
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	09/07/2024	09/07/2024	09/07/2024	09/07/2024	09/07/2024	09/07/2024
			Sample Time	.	.	.	.	.	.
			Date Received	15/07/2024	15/07/2024	15/07/2024	15/07/2024	15/07/2024	15/07/2024
			SDG Ref	240717-88	240717-88	240717-88	240717-88	240717-88	240717-88
			Lab Sample No.(s)	30091025	30091053	30091061	30091069	30091078	30091086
			AGS Reference						
Naphthalene (aq)	<0.01 µg/l	TM178		<0.01 #	<0.01 @ #	<0.01 #	<0.02 @ #	<0.02 @ #	<0.01 @ #
Acenaphthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	0.0159 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Acenaphthylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Phenanthrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Fluorene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Chrysene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	0.0101 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Pyrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178		<0.002 #	<0.002 @ #	<0.002 #	<0.004 @ #	<0.004 @ #	<0.002 @ #
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.005 @ #	<0.005 #	<0.01 @ #	<0.01 @ #	<0.005 @ #
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178		<0.082 #	<0.082 @ #	<0.082 #	<0.164 @ #	<0.164 @ #	<0.082 @ #

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

PAH Spec MS - Aqueous (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4♦§@ Sample deviation (see appendix)

		Customer Sample Ref.	BH07
		Depth (m)	0.00 - 0.00
		Sample Type	Ground Water (GW)
		Date Sampled	09/07/2024
		Sample Time	.
		Date Received	15/07/2024
		SDG Ref	240717-88
		Lab Sample No.(s)	30091094
		AGS Reference	
Component	**LOD/Units**	**Method**	
Naphthalene (aq)	<0.01 µg/l	TM178	0.105 @ #
Acenaphthene (aq)	<0.005 µg/l	TM178	0.0786 @ #
Acenaphthylene (aq)	<0.005 µg/l	TM178	<0.025 @ #
Fluoranthene (aq)	<0.005 µg/l	TM178	<0.025 @ #
Anthracene (aq)	<0.005 µg/l	TM178	<0.025 @ #
Phenanthrene (aq)	<0.005 µg/l	TM178	<0.025 @ #
Fluorene (aq)	<0.005 µg/l	TM178	<0.025 @ #
Chrysene (aq)	<0.005 µg/l	TM178	0.0717 @ #
Pyrene (aq)	<0.005 µg/l	TM178	<0.025 @ #
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	<0.025 @ #
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	<0.025 @ #
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	<0.025 @ #
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	<0.01 @ #
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	<0.025 @ #
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	<0.025 @ #
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	<0.025 @ #
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	<0.41 @ #

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

TPH CWG (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+$@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH01	BH02	BH03	BH04	BH05	BH06
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	09/07/2024	09/07/2024	09/07/2024	09/07/2024	09/07/2024	09/07/2024
			Sample Time	.	.	.	.	.	.
			Date Received	15/07/2024	15/07/2024	15/07/2024	15/07/2024	15/07/2024	15/07/2024
			SDG Ref	240717-88	240717-88	240717-88	240717-88	240717-88	240717-88
			Lab Sample No.(s)	30091025	30091053	30091061	30091069	30091078	30091086
			AGS Reference						
GRO Surrogate % recovery**	%	TM245		95	106	100	98	105	102
GRO >C5-C12 (HS_1D_TOTAL)	<50 µg/l	TM245		<50 #	<50 #	<50 #	<50 #	<50 #	<50 #
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16 (aq) (SPECD_AL1_W)	<10 µg/l	TM439		<100	<100	<50	<100	<10	<50
Aliphatics >C16-C21 (aq) (SPECD_AL2_W)	<10 µg/l	TM439		<100	<100	<50	<100	<10	<50
Aliphatics >C21-C35 (aq) (SPECD_AL3_W)	<10 µg/l	TM439		<100	<100	<50	<100	<10	<50
Total Aliphatics >C12-C35 (aq) (EPHAL12_35T_GC_W)	<10 µg/l	TM439		<100	<100	<50	<100	<10	<50
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	<10 µg/l	TM245		<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16 (aq) (SPECD_AROM1_W)	<10 µg/l	TM439		<100	<100	<50	<100	<10	<50
Aromatics >EC16-EC21 (aq) (SPECD_AROM2_W)	<10 µg/l	TM439		<100	<100	<50	<100	<10	<50
Aromatics >EC21-EC35 (aq) (SPECD_AROM3_W)	<10 µg/l	TM439		<100	<100	<50	<100	<10	<50
Total Aromatics >EC12-EC35 (aq) (EPHAR12_35T_GC_W)	<10 µg/l	TM439		<100	<100	<50	<100	<10	<50
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM439		<10	<10	<50	<100	<10	<50

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

TPH CWG (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4♦§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH07	SW1	SW2	SW3		
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00		
			Sample Type	Ground Water (GW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)		
			Date Sampled	09/07/2024	10/07/2024	10/07/2024	10/07/2024		
			Sample Time	.	.	.	.		
			Date Received	15/07/2024	15/07/2024	15/07/2024	15/07/2024		
			SDG Ref	240717-88	240717-88	240717-88	240717-88		
			Lab Sample No.(s)	30091094	30121807	30091110	30091044		
			AGS Reference						
GRO Surrogate % recovery**	%	TM245		109	102	105	108		
GRO >C5-C12 (HS_1D_TOTAL)	<50 µg/l	TM245		<50 #	<50 #	<50 #	<50 #		
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10		
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10		
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10		
Aliphatics >C10-C12 (HS_1D_AL)	<10 µg/l	TM245		<10	<10	<10	<10		
Aliphatics >C12-C16 (aq) (SPECD_AL1_W)	<10 µg/l	TM439		<50	<100	<20	<100		
Aliphatics >C16-C21 (aq) (SPECD_AL2_W)	<10 µg/l	TM439		<50	<100	<20	<100		
Aliphatics >C21-C35 (aq) (SPECD_AL3_W)	<10 µg/l	TM439		2120	<100	<20	<100		
Total Aliphatics >C12-C35 (aq) (EPHAL12_35T_GC_W)	<10 µg/l	TM439		2120	<100	<20	<100		
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/l	TM245		<10	<10	<10	<10		
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/l	TM245		<10	<10	<10	<10		
Aromatics >EC8-EC10	<10 µg/l	TM245		<10	<10	<10	<10		
Aromatics >EC10-EC12	<10 µg/l	TM245		<10	<10	<10	<10		
Aromatics >EC12-EC16 (aq) (SPECD_AROM1_W)	<10 µg/l	TM439		<50	<100	<20	<100		
Aromatics >EC16-EC21 (aq) (SPECD_AROM2_W)	<10 µg/l	TM439		<50	<100	<20	<100		
Aromatics >EC21-EC35 (aq) (SPECD_AROM3_W)	<10 µg/l	TM439		109	<100	<20	<100		
Total Aromatics >EC12-EC35 (aq) (EPHAR12_35T_GC_W)	<10 µg/l	TM439		109	<100	<20	<100		
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM439		2230	<10	<10	<10		

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH01	BH02	BH03	BH04	BH05	BH06
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
			Date Sampled	09/07/2024	09/07/2024	09/07/2024	09/07/2024	09/07/2024	09/07/2024
			Sample Time	.	.	.	.	.	.
			Date Received	15/07/2024	15/07/2024	15/07/2024	15/07/2024	15/07/2024	15/07/2024
			SDG Ref	240717-88	240717-88	240717-88	240717-88	240717-88	240717-88
			Lab Sample No.(s)	30091025	30091053	30091061	30091069	30091078	30091086
			AGS Reference						
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Benzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Toluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
o-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Sum of detected Xylenes	<2 µg/l	TM208		<2	<2	<2	<2	<2	<2
Sum of BTEX	<5 µg/l	TM208		<5	<5	<5	<5	<5	<5

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

VOC MS (W)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.filt Dissolved / filtered sample.
- tot.unfilt Total / unfiltered sample.
- * Subcontracted - refer to subcontractor report for accreditation status.
- ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
- (F) Trigger breach confirmed
- 1-4+§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH07	SW1	SW2	SW3		
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00		
			Sample Type	Ground Water (GW)	Surface Water (SW)	Surface Water (SW)	Surface Water (SW)		
			Date Sampled	09/07/2024	10/07/2024	10/07/2024	10/07/2024		
			Sample Time	.	.	.	.		
			Date Received	15/07/2024	15/07/2024	15/07/2024	15/07/2024		
			SDG Ref	240717-88	240717-88	240717-88	240717-88		
			Lab Sample No.(s)	30091094	30121807	30091110	30091044		
			AGS Reference						
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #		
Benzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #		
Toluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #		
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #		
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #		
o-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #		
Sum of detected Xylenes	<2 µg/l	TM208		<2	<2	<2	<2		
Sum of BTEX	<5 µg/l	TM208		<5	<5	<5	<5		

Table of Results - Appendix

Method No	Description
TM022	Determination of total suspended solids in waters
TM045	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids
TM099	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Determination of Fluoride using the Kone Analyser
TM183	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM245	Determination of GRO by Headspace in waters
TM152	Analysis of Aqueous Samples by ICP-MS
TM208	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM256	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM178	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM439	Determination of Extractable Petroleum Hydrocarbons (EPH) CWG banding by GC-FID on liquids

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).

CERTIFICATE OF ANALYSIS

SDG: 240717-88 **Report Number:** 735910 **Superseded Report:** 735908
Client Ref.: 501.065477.00001 **Location:** Mounthall Co. Laois

Test Completion Dates

Lab Sample No(s)	30091025	30091053	30091061	30091069	30091078	30091086	30091094	30121807	30091110	30091044
Customer Sample Ref.	BH01	BH02	BH03	BH04	BH05	BH06	BH07	SW1	SW2	SW3
AGS Ref.										
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water	Surface Water
Ammoniacal Nitrogen	25-Jul-2024	25-Jul-2024	25-Jul-2024	25-Jul-2024	25-Jul-2024	25-Jul-2024	25-Jul-2024			
Ammonium Low								25-Jul-2024	25-Jul-2024	25-Jul-2024
Anions by Kone (w)	24-Jul-2024	24-Jul-2024	24-Jul-2024	24-Jul-2024	24-Jul-2024	24-Jul-2024	24-Jul-2024	24-Jul-2024	24-Jul-2024	24-Jul-2024
BOD True Total								24-Jul-2024	24-Jul-2024	24-Jul-2024
Dissolved Metals by ICP-MS	23-Jul-2024	25-Jul-2024	22-Jul-2024	22-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024	22-Jul-2024	22-Jul-2024	23-Jul-2024
EPH and CWG by FID	26-Jul-2024	26-Jul-2024	25-Jul-2024	25-Jul-2024	25-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	25-Jul-2024	26-Jul-2024
Fluoride	19-Jul-2024	18-Jul-2024	19-Jul-2024	19-Jul-2024	19-Jul-2024	19-Jul-2024	19-Jul-2024			
GRO by GC-FID (W)	19-Jul-2024	19-Jul-2024	19-Jul-2024	19-Jul-2024	19-Jul-2024	19-Jul-2024	19-Jul-2024	22-Jul-2024	22-Jul-2024	22-Jul-2024
Mercury Dissolved	23-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024
Nitrite by Kone (w)	18-Jul-2024	18-Jul-2024	18-Jul-2024	18-Jul-2024	18-Jul-2024	18-Jul-2024	18-Jul-2024	18-Jul-2024	18-Jul-2024	18-Jul-2024
PAH Spec MS - Aqueous (W)	23-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024	23-Jul-2024			
pH Value	24-Jul-2024	24-Jul-2024	24-Jul-2024	24-Jul-2024	24-Jul-2024	24-Jul-2024	24-Jul-2024	25-Jul-2024	25-Jul-2024	25-Jul-2024
Phosphate by Kone (w)	18-Jul-2024	18-Jul-2024	18-Jul-2024	18-Jul-2024	18-Jul-2024	18-Jul-2024	23-Jul-2024	18-Jul-2024	18-Jul-2024	18-Jul-2024
Suspended Solids								24-Jul-2024	24-Jul-2024	24-Jul-2024
TPH CWG (W)	26-Jul-2024	26-Jul-2024	25-Jul-2024	25-Jul-2024	25-Jul-2024	26-Jul-2024	26-Jul-2024	26-Jul-2024	25-Jul-2024	26-Jul-2024
VOC MS (W)	19-Jul-2024	19-Jul-2024	19-Jul-2024	19-Jul-2024	19-Jul-2024	19-Jul-2024	19-Jul-2024	22-Jul-2024	23-Jul-2024	23-Jul-2024

Appendix

General

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

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of 15 days after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury

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

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

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

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

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

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

19. **Sample Deviations**

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

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

20. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials andd soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

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

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

Appendix 7-G
Rating of Existing Environment Significance / Sensitivity

Rating of Existing Environment Significance / Sensitivity (IGI, 2013 Guidelines)

Importance	Criteria	Typical Example
High	Attribute has a high quality or value on an international scale	Groundwater/ Surface Water supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status
	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – e.g. NHA status. Regionally important potable water source supplying >2,500 homes Inner source protection area for regionally important water source. Drinking water supply from river. Amenity use of waterbody
	Attribute has a high quality or value on a local scale	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer Potable water source supplying >50 homes. Outer source protection area for locally important water source. No specific recreational use of waterbody
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer. Potable water source supplying <50 homes. No water supply from surface water, no abstraction designation for watercourse No amenity value of waterbody
Negligible	Attribute has negligible quality or	No groundwater supply from a bedrock aquifer inn vicinity of site.

	value on a local site scale	Surface water not used for any specific purpose.

Appendix 7-H
Descriptions of Effects (EPA, 2022)

Descriptions of Effects (EPA, 2022)

Impact Characteristic	Term	Description
Quality of Effects	Positive Effects	A change which improves the quality of the environment
	Neutral Effects	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative / Adverse Effects	A change which reduces the quality of the environment
Describing the Significance of Effects	Imperceptible	An effect capable of measurement but without significant consequences
	Not significant	An effect which causes noticeable2 changes in the character of the environment but without significant consequences.
	Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound Effects	An effect which obliterates sensitive characteristics
Describing the Extent and Context of Effects	Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect
	Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Probability of Effects	Likely Effects	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.

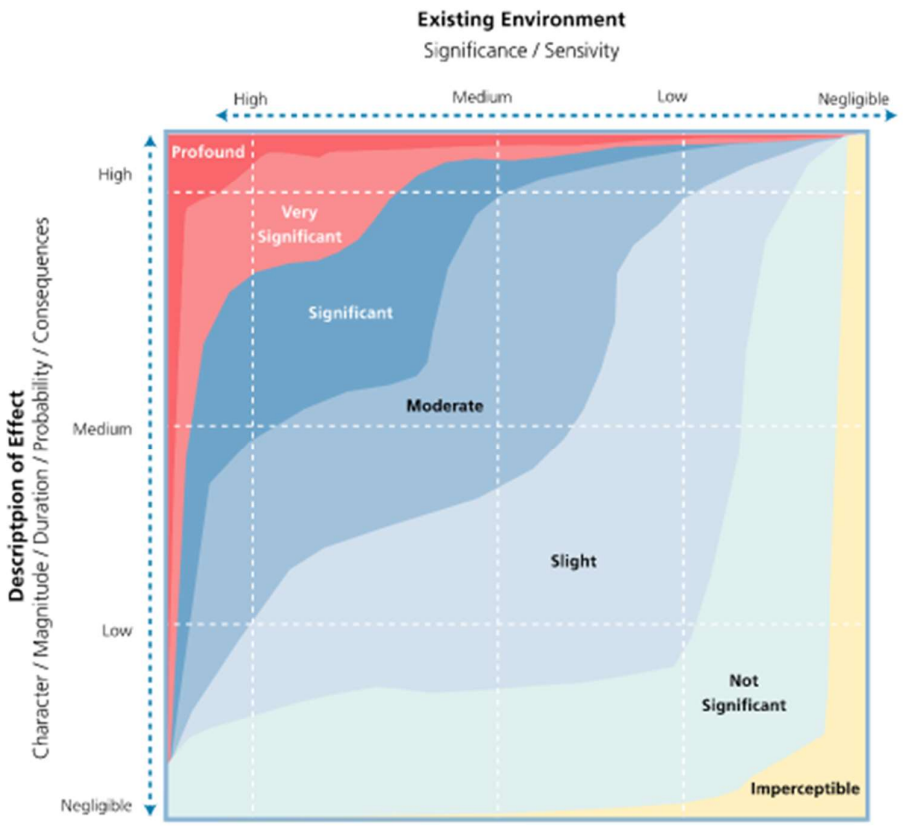
	Unlikely Effects	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Duration and Frequency of Effects	Momentary Effects	Effects lasting from seconds to minutes
	Brief Effects	Effects lasting less than a day
	Temporary Effects	Effects lasting less than a year
	Short-term Effects	Effects lasting one to seven years
	Medium-term Effects	Effects lasting seven to fifteen years
	Long-term Effects	Effects lasting fifteen to sixty years
	Permanent Effects	Effects lasting over sixty years
	Reversible Effects	Effects that can be undone, for example through remediation or restoration
	Frequency of Effects	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually.
Describing the Types of Effects	Indirect / Secondary Effects	Likely, significant effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative Effects	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	Do-Nothing Effects	The environment as it would be in the future should the subject project not be carried out.
	Worst Case Effects	The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
	Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.

	Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

Appendix 7-I
Classification of the Significance of Impacts

Determining Significance

Figure 3.4 shows how comparing the character of the predicted effect to the sensitivity of the receiving environment can determine the significance of the effect.



There are seven generalised degrees of effect significance that are commonly used in EIA. Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant and Profound. Generalised definitions of each of these are provided in Table 3.4. When more specific definitions exist within a specialised factor or topic, e.g. biodiversity, these should be used in preference to these generalised definitions. (ref. Advice Notes[68].)

(Source: Figure 3.4 Environmental Protection Agency (May 2022), *'Guidelines on the Information to be contained in Environmental Impact Assessment Reports'*).