Chapter 8:

WATER

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8.1 Introduction

This Chapter of the remedial Environmental Impact assessment Report (rEIAR) assesses the impact which the extraction and processing of stone and aggregate has had on the hydrological and hydrogeological environment surrounding the development. The subject site lies within the catchment of the Eany Water River which discharges into Inver Bay approximately 3 km southwest of the subject site.

8.1.1 Objectives

The objectives of the assessment are to:

- Identify likely significant effects of historical development at the site on surface water and groundwater.
- Produce a baseline study of the existing water environment (surface water and groundwater) in the area of the site.
- identify likely significant effects of the development on surface water and groundwater during the construction phase, operational phase and decommissioning phase of each aspect of the development.
- identify mitigation measures to avoid, remediate or reduce significant negative effects.

8.2 Methodology

The overall study components comprised of a desk study reviewing all the available relevant information on the site followed by site assessments involving inspection of site features and chemical analysis of waters. Assessment of potential impacts on sensitive receptors by the proposed development was carried out. The methodology employed was 3-stage:

- Desk study
- Site assessment and analysis
- Impact assessment

8.2.1 Desk Study

A desk study of the development site and surrounding area was completed prior to the undertaking of site walkover assessments. The desk study involved collecting all relevant geological, hydrological, hydrogeological and meteorological data for the study area. This included consultation with the following:

- Environmental Protection Agency database (www.epa.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Met Eireann Meteorological Databases (www.met.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive Map Viewer (www.catchments.ie);
- Geological Survey of Ireland - Groundwater Body Characterisation Reports;
- OPW Indicative Flood Maps (www.floodmaps.ie);
- Environmental Protection Agency – “Hydrotool” Map Viewer (www.epa.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie); and,
- Department of Environment, Community and Local Government on-line mapping viewer (www.myplan.ie).
- Donegal County Council Discharge Licence Analytical Results (Personal Communication)

8.2.2 Site Investigations

A hydrological walkover survey, including detailed mapping and baseline monitoring/sampling, was undertaken by Colin Farrell of Greentrack on various dates between April 2023 and July 2024. The field assessments included a detailed site walkover survey, water features survey, and an inspection of all relevant hydrological features, such as existing drainage ditches, groundwater contributions and inflows/outflows from the site. In summary, assessments to address the water, hydrology, and hydrogeology Chapter of the rEIAR included the following:

- Walkover surveys and hydrological mapping of the existing quarry site and the surrounding area were undertaken whereby water flow directions and drainage patterns were recorded
- Sampling and analysis of waters was carried out in 2023 and 2024 to monitor the quality of surface water and groundwater in and around the site.
- Monitoring boreholes were installed on the site and groundwater levels were monitored. Groundwater quality was assessed.

8.2.3 Impact Assessment Methodology

Section 8.2 of this rEIAR refers to the impact assessment methodology employed. In addition, the sensitivity of the water environment receptors was assessed on completion of the desk study and baseline study. Levels of sensitivity which are defined in Table 8.1 are then used to assess the potential effects that the proposal may have on the local baseline water environment (i.e. water receptors).

Table 8.1: Receptor Sensitivity Criteria (Adapted from www.sepa.org.uk)

Sensitivity of Receptor	Description
Not Sensitive	Receptor is of low environmental importance (e.g. surface water quality classified by EPA as A3 waters or seriously polluted), fish sporadically present or restricted). Heavily engineered or artificially modified and may dry up during summer months. Environmental equilibrium is stable and is resilient to changes which are considerably greater than natural fluctuations, without detriment to its present character. No abstractions for public or private water supplies. GSI groundwater vulnerability "Low" – "Medium" classification and "Poor" aquifer importance.
Sensitive	Sensitive Receptor is of medium environmental importance or of regional value. Surface water quality classified by EPA as A2. Salmonid species may be present and may be locally important for fisheries. Abstractions for private water supplies. Environmental equilibrium copes well with all natural fluctuations but cannot absorb some changes greater than this without altering part of its present character. GSI groundwater vulnerability "High" classification and "Locally" important aquifer.
Very Sensitive	Very sensitive Receptor is of high environmental importance or of national or international value i.e. NHA or SAC. Surface water quality classified by EPA as A1 and salmonid spawning grounds present. Abstractions for public drinking water supply. GSI groundwater vulnerability "Extreme" classification and "Regionally" important.

8.2.4 Relevant Guidance

The hydrological and hydrogeological descriptions and assessments in this rEIAR are carried out in line with guidance contained in the following:

- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU);
- Environmental Protection Agency (May 2022) - Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (September 2015): Draft - Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- National Roads Authority (2009): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters;
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);
- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006);
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006;

8.3 Development

Quarrying has been undertaken at the site in various regards for at least one hundred years, and probably considerably longer. There are numerous small local sandstone quarries in the area all using the Mullaghmore Sandstone Formation resource.

The current applicant has been involved in the quarry all his working life having acquired the site from his parents. Extraction continued until the current footprint of the application site was reached. This rEIAR is to accompany a substitute consent application for the extraction and processing activities that have been carried out to date.

The extraction area is c. 2.49 hectares in size and has been developed as a stone quarry. Extraction has taken place over most of the footprint of the site. The highest point of the site is along the eastern boundary where the vegetated berms are at 73 mOD. The lowest point of the site is the quarry deck at approximately 54 mOD. The applicant has been extracting and processing rock by mechanical means and the use of guillotines and cutting saws. Blasting has been discontinued since 2007 as an extraction method as it was seen to induce unwanted fracture patterns into the stone reducing its value as a product. Historically blasting was yearly from 2004-2007 and approximately every 5 years previous to 2004. No washing or crushing/screening of product takes place on site.

A number of measures have been put in place for the protection of surface and groundwater on the site. Protection from accidental pollution has been achieved by adhering to best practice in relation to mobile re-fueling of plant and vehicles and by robust fuel and lubricant storage measures off site.

Protection of the wider surface water environment has been achieved by the use of settlement ponds to ensure discharge to natural waters has acceptable levels of suspended sediment. The majority of surface waters draining the extraction area flow to a central settlement pond for

settlement treatment before flow by gravity through a vegetated channel before discharge off site. A smaller second settlement pond is functional along the northwest boundary of the site for runoff in this area.

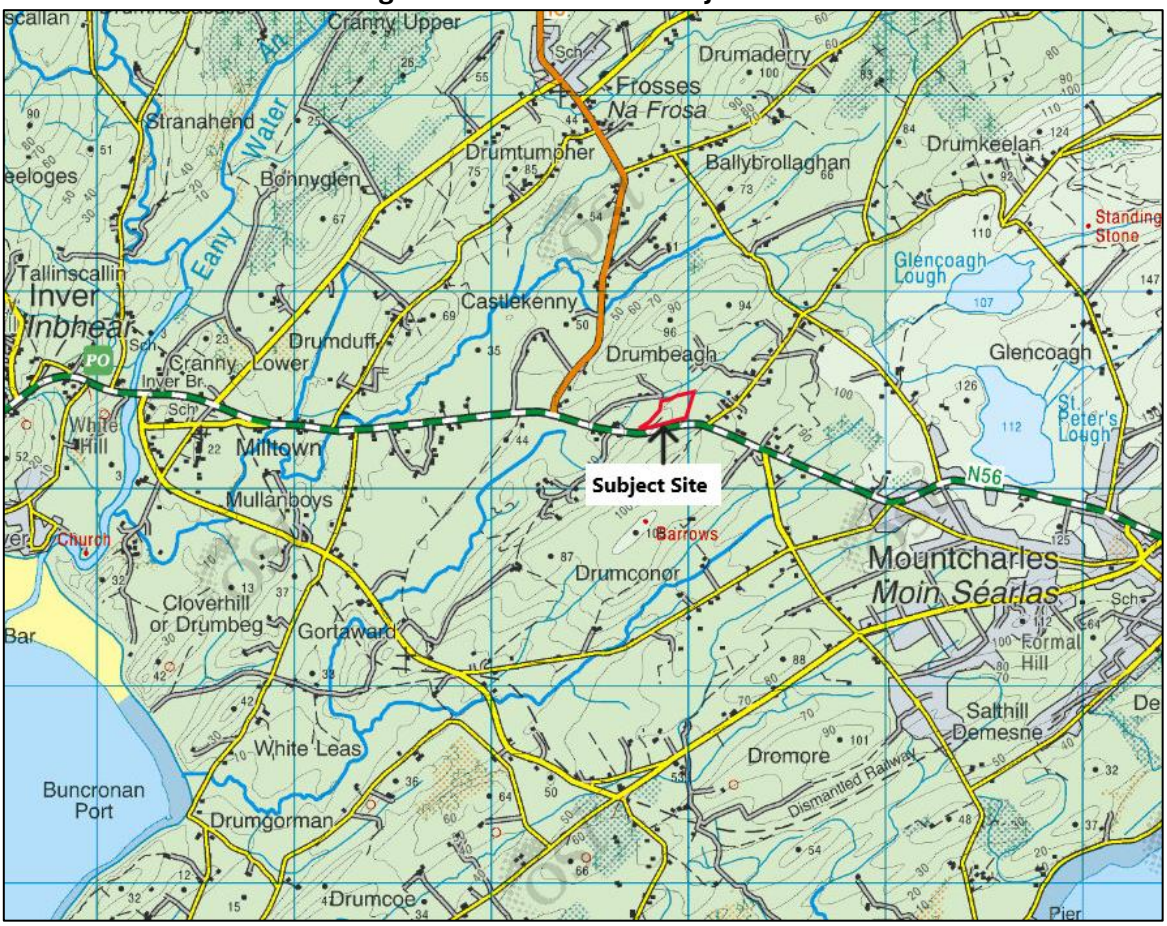
The extraction and processing of rock at the site is a dry operation. There is no washing of the product before it leaves site for market. The only requirement for water usage during the extraction and processing activities has been for dust suppression in periods of dry weather.

8.4 Site Description

8.4.1 Site Location

The development consists of a quarry located on a 3.45-hectare site in the rural townland of Drumbeagh. The site is located immediately north of the N56 between the villages of Mountcharles and Inver. The site is approximately 2.5 km west of Mountcharles, 3 km east of Inver and 1.7 km south of the villages of Frosses. The site is accessed off a local slip road immediately off the N56. The access road also serves the quarry owner and one other local resident. The site is surrounded by a mixture of poor-quality agricultural land, improved agricultural grassland and one-off rural houses and farmsteads. There are also peatlands and isolated forestry blocks in the surrounding area. The subject site location is outlined in Figure 8.1 below.

Figure 8.1: Location of Subject site



CYAL50381113 © Ordnance Survey Ireland/Government of Ireland

8.4.2 Site Services in Water & Wastewater

There are no welfare facilities provided on site. Toilet and canteen provision for the family business is made at the applicants dwelling approximately 130 m west of the quarry entrance.

8.4.3 Current Land Use

The site is surrounded by a mixture of poor-quality agricultural land, improved agricultural grassland and one-off rural houses and farmsteads. There are also peatlands and isolated forestry blocks in the surrounding area. The current land use for the application site is as a working quarry. Extraction takes place in the central part of the site on the quarry deck with some minor processing of extracted material occurring in the western portion of the site.

8.4.4 Historical Land Use

The Ordnance Survey of Ireland historical map series was examined for land use on the application site. In the 25'' series mapped between 1863 and 1924 the site is seen as partially excavated ground. The current applicant started excavation and processing on the site in 2004 while the site was in the ownership of his family.

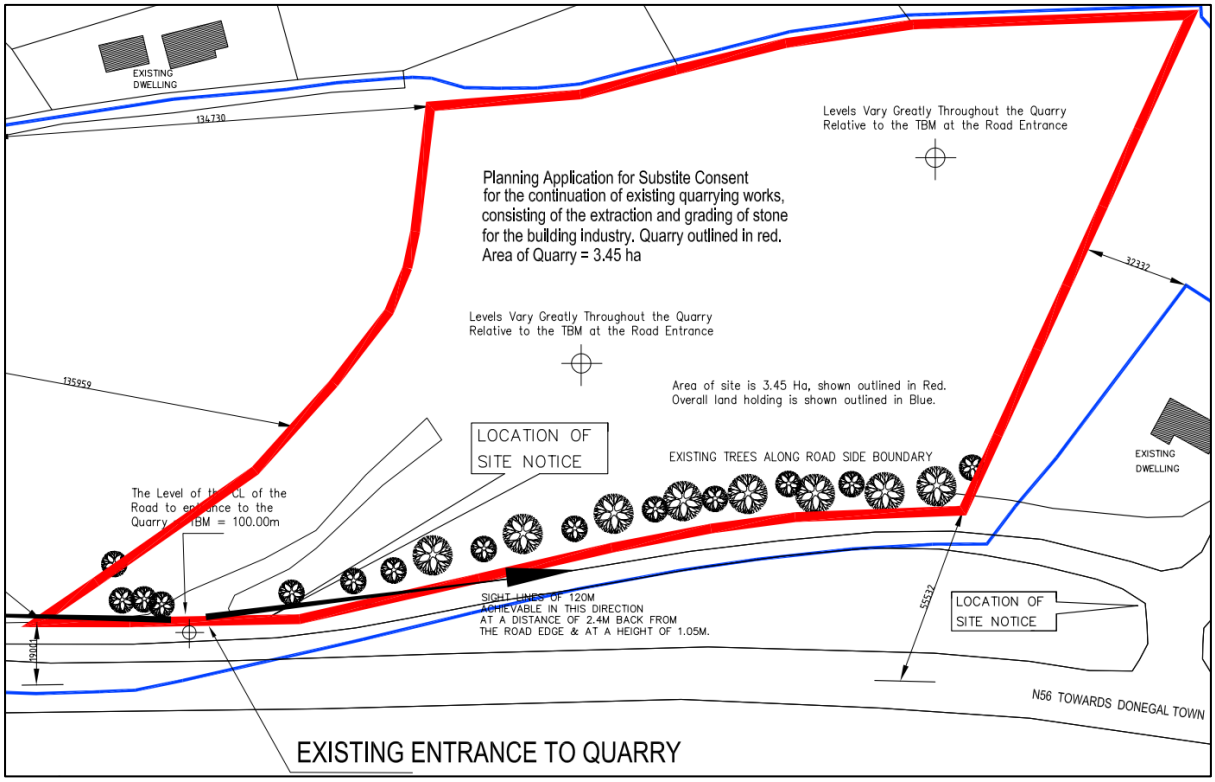
8.4.5 Topography

The site is c. 3.45 hectares in size and has been developed as a stone quarry. Extraction has taken place over most of the footprint of the site (2.49 ha). The topography of the study area is undulating and the topography within the quarry site varies from c.73 mOD on top of the screening berms in the east to c.54 mOD in the central deck of the site.

8.4.6 Site Layout

The historical development of quarrying at the site has resulted in a quarry void. There is a one distinct entrance into the quarry from the western side. The quarry faces can be accessed from the central levelled area of the site. The main items of site infrastructure on the site are the settlement ponds and the small processing area where guillotining and cutting take place. Ther are temporary structures erected around the fixed cutting equipment to keep them dry. A drainage sump serves the processing area. Previous temporary structures including a caravan used as an office building have been removed from the site. The location of this site infrastructure is shown on the main site layout drawing in Figure 8.2 below.

Figure 8.2: Site Layout Drawing



(Map supplied by McMullin Architects – not to scale)

8.4.7 Extraction

Extraction at the site was well advanced prior to the applicant taking control of the site. Extraction was then continued chasing the rock of easiest access and highest value. Bothe a buff/brown and blue sandstone are found on site.

8.4.8 Water Requirements

There are currently no requirements for welfare water on site. Welfare facilities are provided offsite. There is no washing of quarry product. Water is required for dust suppression in periods of prolonged dry weather and water is recycled for use in cooling cutting saws down. This is done in a closed loop system whereby runoff from the processing area drains to the sump where sediment settles out of solution. Small amounts of clean water are then utilised for cooling saw blades. Dust suppression water is supplied from the settlement ponds within the site.

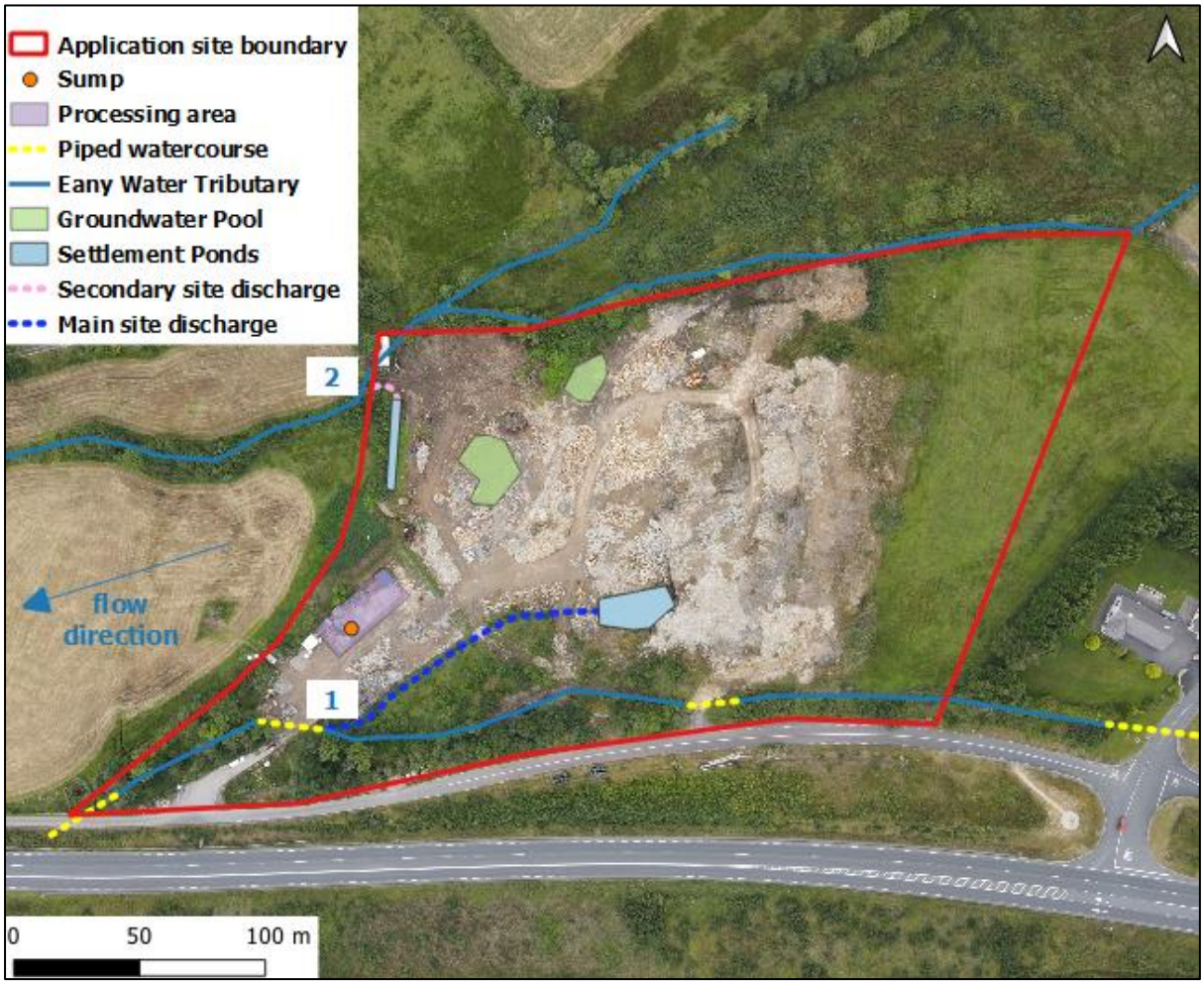
8.4.9 Site Drainage & Surface Water Runoff on Site

The current drainage flow directions for the site and surrounding areas were examined and identified within the site. The main surface water features are shown in Figure 8.3 below.

The general slope of ground is from northeast to southwest, and the main central settlement pond captures the vast majority of runoff from the site. A small area in the northwest of the site drains through a screening berm to a linear settlement pond in the northwest. Stream tributaries of the Eany Water River system flow along the northern boundary of the site and through the southern edge of the site. The southern tributary is piped in several places through the site and the main effluent discharge from the central settlement pond discharges to this southern tributary (point 1, Figure 8.3). Discharge is via a 60m heavily vegetated open channel which provides a high degree of impediment and hence treatment of the effluent. Photograph 8.1 shows this impeded pathway. Discharge from the linear settlement pond in the northwest is to the northern tributary of Eany Water (Point 2, Figure 8.3).

The product at the site is cut stone and dimension stone so minimal processing is required. There is no crushing, screening or washing of product. Processing activities include guillotining and cutting with a saw. These activities are carried out in a dedicated area in the west of the site which is underlain by a concrete base draining to a sump. There is no outflow to this sump, and the applicant states that he has never known it to overflow. Small amounts of water are recycled for use with the cutting saws. The sludge at the base of the sump is periodically cleaned out and used to supplement screening berms.

Figure 8.3: Water movement within the application site



(Created with QGIS and Greentrack aerial imagery)

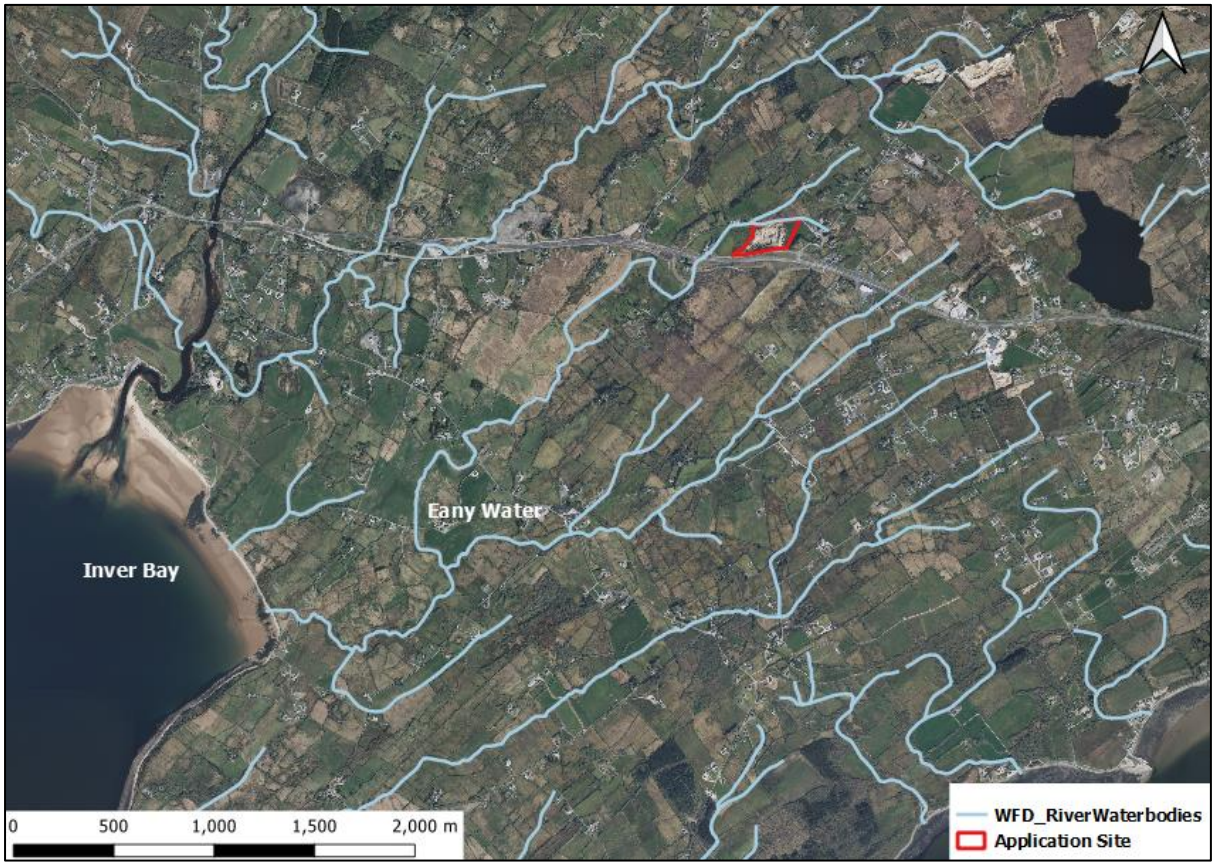
Photograph 8.1: Impeded pathway for site discharge to tributary of Eany Water

8.4.10 Existing Surface Water Quality

The subject site is located within the Water Framework Directive (WFD) Catchment 37 Donegal Bay North (GBNIIENW) and the WFD sub catchment Eany (Water)_SC_010. A tributary of the Eany Water River flows (EPA code: IE_NW_37E030350) flows along the northern boundary of the site, and through the southern boundary of the site. The site is located in the Eany Water sub basin catchment. The Eany Water River flows into the sea at Inver Bay approximately 3 km southwest of the subject site. The hydrological distance from the site to Inver Bay is approximately 4.67 km. Hydrological connections are shown in Figure 8.4 below.

The site is outside any Margaritifera catchment and does not influence any waters designated under the Salmonid Regulations (SI 293/1988). There are no EPA monitoring stations on the tributary of the Eany water system leading from the site. There are a number of EPA monitoring stations in other unconnected tributaries of the Eany water to the north of the application site. The latest Q values (2022) from these stations indicate both good and high ecological status.

Figure 8.4: Hydrological Connections



(Created using QGIS software and NPWS datasets)

Water flow in and around the quarry is shown in Figure 8.3 above. There are effectively two outflows from the site. A small proportion of the runoff from the site flows north through a settlement pond, which has been unmanaged, and onwards into a tributary of the Eany Water River. The majority of the runoff from the footprint of the site flows into a settlement pond located in the central southern part of the site. The outflow from this settlement pond flows into a vegetated drainage ditch and into an open drain at the entrance of the site. This drain is then culverted and flows southwest into a tributary of the Eany Water.

The processing area where stone is cut and guillotined is surfaced with concrete. The concrete is graded towards a sump covered by slatted concrete. All runoff from this area is directed to the sump. Water is recycled for use within the circular saws from the sump and there is no other outflow from this sump.

To assess the effectiveness of the treatment of surface water runoff within the site by settlement samples were taken in 2023 and 2024. The sample points are labelled, and the location of each sample point is shown in Figure 8.5 below. The two outflows from the site were analysed (samples 2 & 5) and the receiving watercourses were sampled upstream and downstream of site influence.

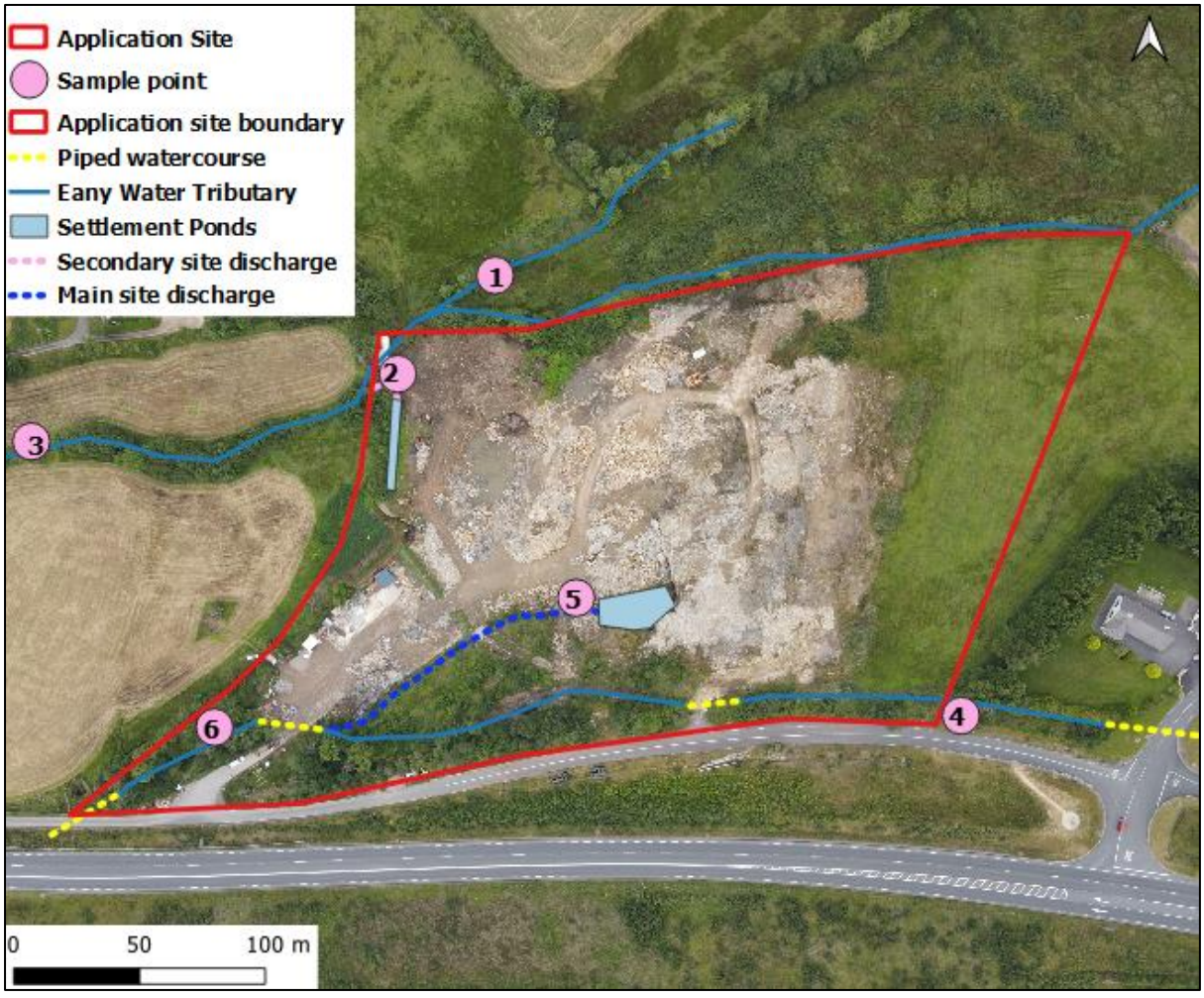
A summary of the analysis results is given in Table 4.6 below. The certificates of analysis are presented in Appendix 8.1. The analytical results were assessed with regard to the EU Environmental Objectives (Surface Water) Regulations (as amended), 2019 (SI 77/2019).

- Biochemical Oxygen Demand (BOD): good status is <1.5 mg/l, and high status <1.3 mg/l
- pH: between 6 and 9
- Total Ammonia: good status is <0.065 mg/l, and high status <0.04 mg/l
- Dissolved Inorganic Nitrogen: good status is <0.25 mg/l, and high status <0.17 mg/l

- Orthophosphate: good status is <0.035 mg/l, and high status <0.025 mg/l
- Total Phosphorus: good status is <0.025 mg/l, and high status <0.01 mg/l

Both receiving watercourses downstream of the site outflows achieve 'high' status in relation to levels of Ammonia, Orthophosphate and Total Phosphorus.
BOD was in the 'good' range for the southern receiving watercourse in August 2023 and in the 'high' range in July 2024. BOD was in the 'good' range for the northern receiving watercourse in July 2024. Some results for BOD for the northern tributary of Eany Water and results for Dissolved Inorganic Nitrogen for both receiving watercourses were outside the acceptable range. In these cases, the upstream values for these parameters were also outside the acceptable range. It is concluded that site influence cannot be responsible for the measured levels of these parameters downstream of the site.
pH and suspended solids are all seen to be within accepted limits of 6-9 and < 20 mg/l respectively. (20 mg/l is taken as a guideline limit that is commonly applied to water discharge licence conditions.)

Figure 8.5: Surface water sampling points



(Created using QGIS and Greentrack aerial imagery)

Table 8.2: Water Quality Analysis of Site Discharge

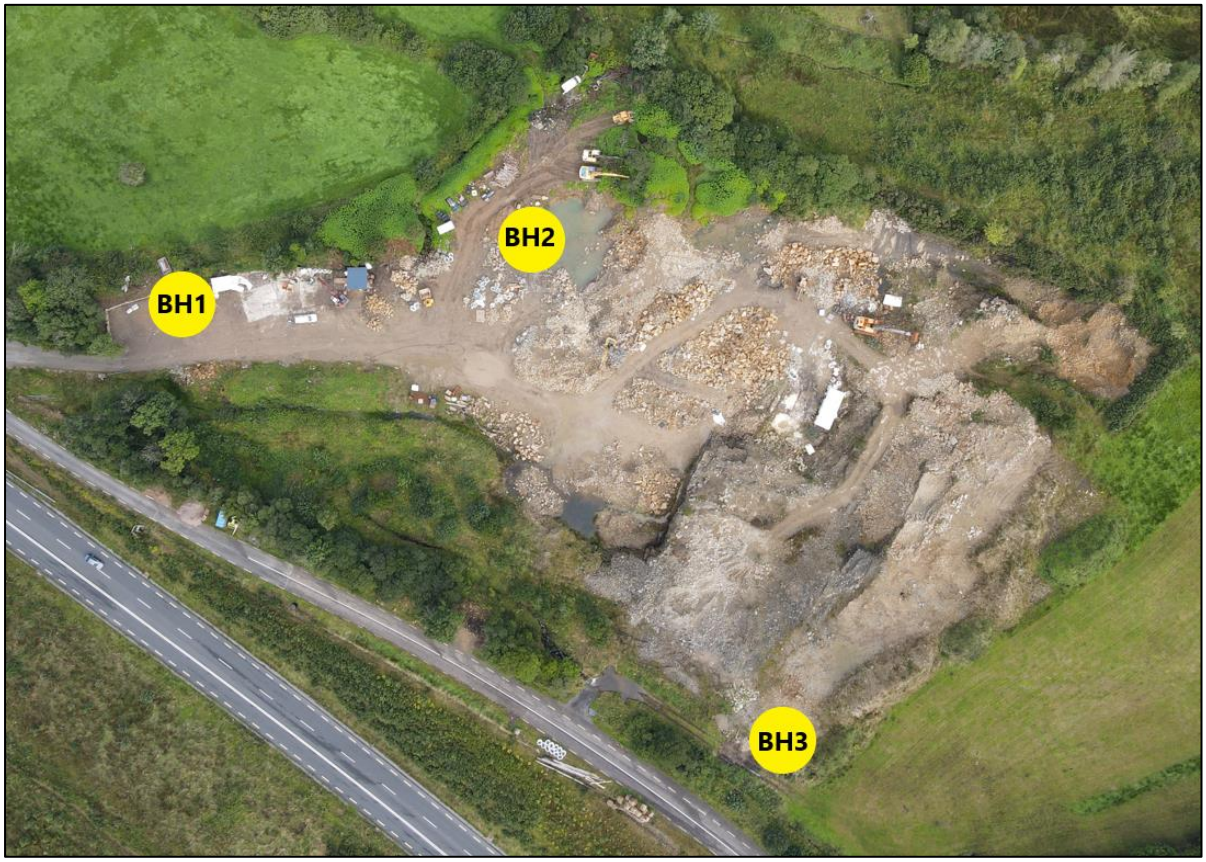
Sample	Description	Sample & Date	pH	Ammonia mg/l	Dissolved Inorg N mg/l	Dissolved TON mg/l	Dissolved Ammonia mg/l	Orthophosphate mg/l	Total Phosphorus mg/l	Conductivity µS/cm	Suspended Solids mg/l	BOD mg/l
1	***Northern tributary of Eany Water upstream of site influence.***	**August 2023**	7.19	<0.01	0.54	0.51	<0.01	0.02	<0.05	178	<5	2
		July 2024	7.64	0.4	0.74	0.57	0.17	0.01	<0.05	275	<5	1.53
2	***Outflow from North.***	**August 2023**	7.06	0.26	1.31	1.19	0.12	<0.01	<0.05	496	12	2
		July 2024	7.80	0.28	0.86	0.59	0.27	0.01	<0.05	280	11	1.75
3	***Northern tributary of Eany Water downstream of site outflow.***	**August 2023**	7.28	0.04	0.6	0.6	<0.01	<0.01	<0.05	187	<5	2.7
		July 2024	7.70	0.06	0.42	0.39	0.03	0.02	<0.05	293	<5	1.42
4	***Southern tributary of Eany water upstream of site influence.***	**August 2023**	7.52	<0.01	0.49	0.49	<0.01	<0.01	<0.05	256	<5	1.58
		July 2024	8.15	0.06	0.42	0.39	0.03	<0.01	<0.05	412	<5	<1
5	***Outflow from South.***	**August 2023**	7.99	<0.01	0.51	0.51	<0.01	<0.01	<0.05	254	<5	1.55
		July 2024	8.04	0.02	0.27	0.25	0.02	<0.01	<0.05	401	<5	1.89
6	***Southern tributary of Eany Water downstream of site outflow.***	**August 2023**	7.76	<0.01	0.53	0.53	<0.01	<0.01	<0.05	260	<5	1.49
		July 2024	7.91	0.08	0.24	0.16	0.08	0.04	<0.05	407	<5	<1

8.4.11 Hydrogeology, Groundwater Levels and Gradient

To assess the current hydrogeological regime on site, three monitoring boreholes were drilled and installed in August 2023. The position of the three wells (BH1, BH2 &BH3) is shown in Figure 8.6 below.
The boreholes were 100 mm in diameter drilled to approximately 10 meters below ground level (bgl), 50 mm diameter standpipe installed, slotted at the bottom, gravel packed, and bentonite sealed. Boreholes were capped with a vandal proof cap.

These were drilled on 17th august 2023 and the borehole logs are presented in Appendix 8.2. The approximate position of the boreholes is shown in Figure 8.6 below. A brief water level monitoring program was commenced when the boreholes had been established to assess the water table levels and assess any likely impact. Two of the boreholes (BH1 & BH2) were located within the current extraction footprint and the third borehole (BH3) was located outside the quarry void. BH1 and BH2 were drilled to 13m and 12m depth respectively and BH3 was drilled to 31m depth.

Figure 8.6: Position of monitoring boreholes, BH1, BH2 & BH3



8.4.11.1 Groundwater Levels

The standing groundwater levels were dipped with an electronic groundwater dip meter on three occasions as part of this study. The recorded groundwater levels are given in Table 8.3 below.

Table 8.3: Groundwater levels

Borehole	Ground Level mOD	Groundwater Level mOD							
		31.08.23	07.09.23	14.09.23	01.03.24	10.05.24	28.06.24	12.07.24	24.07.24
BH1	55.5	54.04	54.03	54.04	53.85	53.50	53.00	52.60	52.66
BH2	57.0	56.33	54.30	56.30	56.32	56.30	56.29	56.28	56.27
BH3	69.4	64.81	64.41	63.95	64.29	64.00	62.90	62.15	62.38

The groundwater levels at BH01 varied between c.52.5 mOD and c.54 mOD over the study period.

The groundwater levels at BH02 varied between c. 54 mOD and c.56.5 mOD over the study period.
The groundwater levels at BH03 varied between c. 62 mOD and c.65 mOD over the study period.
Most of the boreholes showed a seasonal variation in level of up to 2.5 m.

8.4.11.2 Groundwater Gradient

As expected in most of the general area, standing groundwater levels are found to be within the top 10m of the ground. Groundwater levels in BH1 and BH2 are encountered within 2.5m of the surface due to previous extraction activities. There is a slight gradient in a south-westerly direction between the groundwater levels in BH2 and BH1. The GSI have characterised the groundwater body underlying the site as the Frosses Groundwater body comprising of the Mullaghmore Sandstone Formation. The groundwater gradient on site is consistent with the expected groundwater gradient in the Frosses groundwater body which flows to the southwest and the coast.

The groundwater gradient has been affected by excavation at the site. The excavated area has had the effect of a large diameter borehole creating a cone of depression in the water table on the site. It appears the groundwater level is currently slightly below the existing quarry deck level at approximately 54mOD. Groundwater levels are observed to average around 64-65 mOD at BH3 which is between 8 and 10 m horizontally from the top of the southeast quarry face. Although the groundwater table has been lowered by excavation, the zone of influence of the quarry depression is not expected to extend for any significant distance beyond the site boundaries.

The EPA have water level monitoring boreholes (DON 039) in the underlying Frosses groundwater body and measurements from 1995 to 2001 show a consistent groundwater level of between 3 and 4 m below ground level. Measurements at BH3 may show a slightly depressed groundwater level due to the proximity of the excavation nearby but are broadly consistent with this.

8.4.11.3 Aquifer properties

The GSI have characterised the underlying groundwater body (GWB) as the Frosses groundwater body and produced a conceptual model of the Frosses GWB. These are the main characteristics of the Frosses GWB:

- The GWB is mainly bounded by differing types of aquifers. A small portion of the SW boundary is coastline. The topography ranges from gently sloping to hilly, with a small area of drumlins in the north/northwest. Elevations range from sea level to 150 mAOD.
- The sole rock group in this body is Dinantian Sandstone, which is considered to have the potential for relatively high fissure permeability. Most of the unconfined groundwater flux is expected to be in the uppermost part of the aquifer comprising a broken and weathered zone typically less than 3m thick, a zone of interconnected fissuring typically less than 40m, and a zone of isolated fissuring typically less than 150m.
- Transmissivity values are expected to be 10-50 m2 /d although may be as high as 100-150 m2 /d, especially in the vicinity of faults. Storativity is likely to be relatively good.
- High fissure permeability aquifers can generally support regional scale flow systems. Long flow paths (e.g. 2000 m) can be expected although are likely to be shorter (100-300 m) as this GWB mainly constitutes a discharge area.
- Recharge will occur diffusely through the thinner and/or more permeable subsoil and rock outcrops, although is limited by any thicker low permeability subsoil and bedrock.
- The main discharges are to the streams, rivers and springs within the GWB, and seeps along the coastline. Overall, the flow direction is to the southwest, as determined by the topography.

A well bedded blue and brown/buff sandstone, part of the Mullaghmore Sandstone Formation, is present on site. The aquifer underlying the application site is described by the GSI as a Locally Important Aquifer (Lm) – Bedrock which is Generally Moderately Productive. Locally important

aquifers are capable of 'good' well yields 100-400 m3/day. Information reported in the County Donegal Groundwater Protection Scheme, Volume I July 2004, produced by Donegal County Council and the GSI highlight that groundwater will circulate primarily through fissures and cracks as these rock units do not show significant intergranular permeability. Fissure permeability is generally more developed in the top 20-30 m of the aquifer and the Mullaghmore Sandstone Formation tends to have calcareous cement that is prone to dissolution leading to increasing permeability. The underlying aquifer is expected to be moderately productive but also variable dependent on the fracture pattern and extent. The Dinantian Sandstones, of which the Mullaghmore Formation is a member, make up approximately 3% of the aquifers in County Donegal.

8.4.11.4 Groundwater Vulnerability

The term 'Vulnerability' is used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities (County Donegal Groundwater Protection Scheme, DELG, DCC, GSI, 2004). The vulnerability of groundwater depends on:

- the time of travel of infiltrating water (and contaminants).
- the relative quantity of contaminants that can reach the groundwater.
- the contaminant attenuation capacity of the geological materials through which the water and contaminants infiltrate.

The GSI have assessed most of the application site as 'X' which is indicative of rock at or near the surface. A portion of the site to the east is classified as 'Extreme' due to the thin nature of the soils on site. Due to the vulnerable nature of the aquifer of Local Importance mitigation measures are in place to ensure that the aquifer is protected. Further mitigation measures are proposed for activities into the future.

8.4.11.5 Quarry History

Documentation made available to Greentrack from the quarry operator included an Unauthorised Development Report sent out by Donegal County Council Planning Department (Ref: UD 2027). There were several visits to the site documented and an oil spill noted on one Donegal County Council staff visit on 12/02/202. The quarry operator states that this spillage was cleaned up using an oil spill kit and the contaminated soil/stone was removed to an authorised facility.

As part of the rEIAR study Greentrack undertook analysis of the soil/stone in the general area of the oil spill to assess the extent of any potential residual contamination. Greentrack also undertook chemical analysis of the groundwater underneath the site to assess any potential migration of contamination into the groundwater body.

One composite soil/stone sample was taken from the general area of the oil spillage and a sample was taken from each of the groundwater monitoring boreholes using disposable manual bailers. All the samples were tested for any traces of petroleum hydrocarbons and derivatives and the results are presented in Table 8.4. below. The certificates of analysis are presented in Appendix 8.1.

Table 8.4: Chemical Analysis of soil/stone and groundwater following oil spill.

Sample	Total Aliphatics (C10 -C44) µg/kg or µg/l	Total Aromatics (EC10 -EC44) µg/kg or µg/l	Total PAH µg/kg or µg/l	Toal PCB µg/kg or µg/l	Total BTEX µg/kg or µg/l
Soil/stone form quarry floor	25,800	20,000	<118	<21	<7
BH1	<10	<10	<0.082	-	<5
BH2	<10	<10	0.146	-	<5
BH3	59	<10	0.143	-	<5
Limit of Detection µg/kg	<10,000* <10	<5,000* <10	<118* <0.082**	<21	<7* <5**

*LOD for solid samples. ** LOD for liquid samples

8.4.11.5.1 Assessment of Chemical Analysis Results for Soil/Stone

The soil/stone sample from the quarry floor shows some trace amounts of mineral oil in the heavier fraction (>C21 & >EC21) amounting to 45800 µg/kg. This is the equivalent of 45.8 mg/kg. The result is compared with the maximum concentrations allowed for soil/stone to be accepted at soil recovery facilities published by the EPA (Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities, EPA 2020). The upper threshold for Mineral Oil is 50 mg/kg in the guidelines. It is noted that the Mineral Oil value recorded on site is below this trigger value, so the site is considered remediated.

8.4.11.5.2 Assessment of Chemical Analysis Results for Groundwater

There were almost no traces of petroleum hydrocarbons in the groundwater samples. The sample from BH3 showed a slight trace of aliphatics in the C16-C35 fraction. It is unlikely that activities within the quarry have influenced these results as BH3 is hydrologically upgradient from the quarry floor. The groundwater analysis was compared against the parameters set out in S.I No. 9/2010 – European Communities Environmental Objectives (Groundwater) regulations 2010. PAH levels were seen to be slightly elevated when compared with the Guideline Limit Values of 0.075 µg/l. BH3 and BH2 show the slightly elevated levels of PAH whereas BH1 is below the limits of detection. This may suggest that the source of PAH may be outside the site.

8.4.11.5.3 Overall Conclusion

There does not appear to be any significant residual hydrocarbon contamination either in the soil/stone of the site or the groundwater following the reported oil spill.

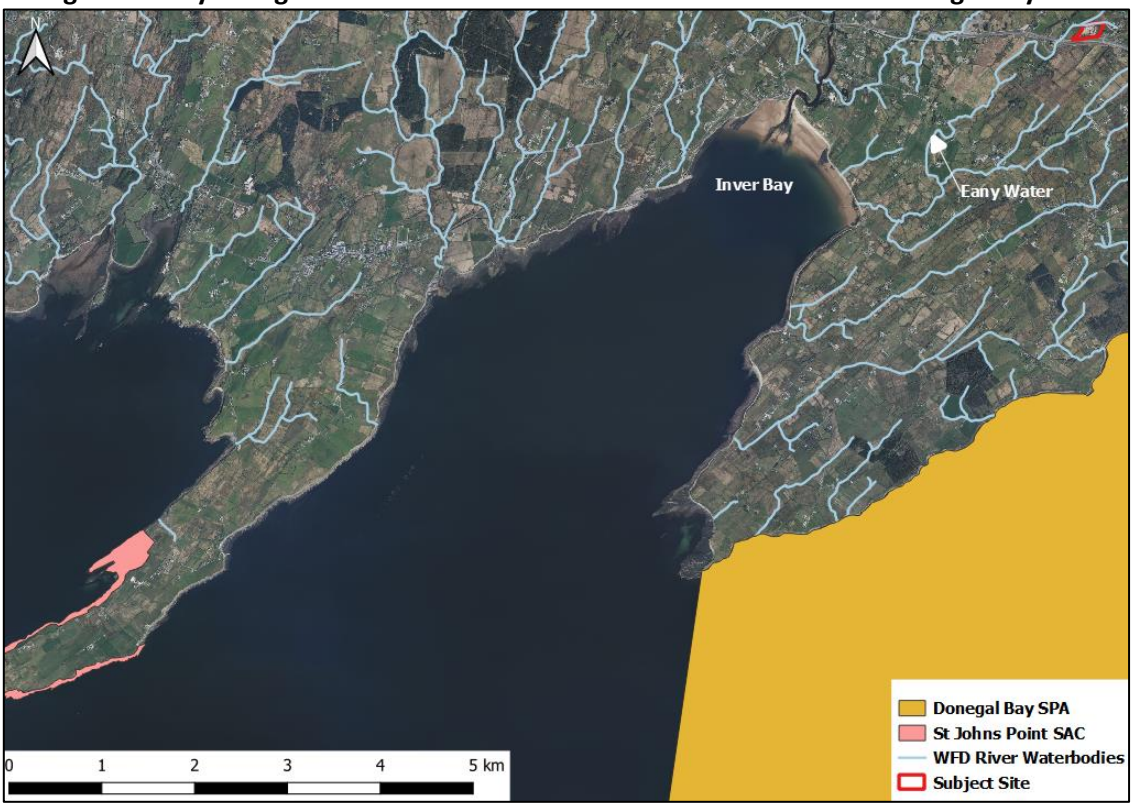
8.5 Receiving Environment

8.5.1 Designated Areas

The nearest hydrologically connected Natura sites are St Johns Point SAC (Site Code: 000191) at 13.67 km hydrological distance and Donegal Bay SPA (Site Code: 004151) at 9.17 km hydrological distance. The hydrological connection is demonstrated in Figure 8.7 below.

The hydrological connection is made through runoff/ effluent from the site discharging to tributaries of the Eany Water River which flows into Inver Bay and towards the SAC and SPA. There is also a potential hydrological link from groundwater at the site discharging to tributaries of the Eany Water River.

Figure 8.7: Hydrological connection from site to St Johns Point SAC & Donegal Bay SPA



(Created using QGIS software and datasets from NPWS)

The qualifying interest of St John's Point SAC are:

- Large shallow inlets and bays [1160]
- Reefs [1170]
- Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]
- Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]
- Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410]
- Alkaline fens [7230]
- Limestone pavements [8240]
- Submerged or partially submerged sea caves [8330]
- Euphydryas aurinia (Marsh Fritillary) [1065]
- Tursiops truncatus (Common Bottlenose Dolphin) [1349]

The qualifying interest of Donegal Bay SPA are:

- Great Northern Diver (Gavia immer) [A003]
- Light-bellied Brent Goose (Branta bernicla hrota) [A046]
- Common Scoter (Melanitta nigra) [A065]
- Sanderling (Calidris alba) [A144]
- Wetland and Waterbirds [A999]

Any historical or potential impact on hydrology due to activities connected (directly or indirectly) with the subject site may have potential impact on these habitats/conservation interests. This issue is dealt with in detail in the Ecological Report which contains a Screening Report for Appropriate Assessment which will also accompany the substitute consent application.

8.5.2 Soil

There are no undisturbed soils left on site. Almost all ground has been stripped of soil for excavation or for the creation of turning areas or other site infrastructure. Pre-development the site is most likely to have been covered by the same soil type as that remaining in the east of the site – a poorly drained mineral oil (mainly acidic). The GSI describe the soil as a surface water Gley and the subsoil as a till derived from lower Carboniferous sandstones and shales.
Many of the soils stripped from the site to facilitate extraction were used to create the screening berms on the eastern boundary of the site and along the northwestern boundary of the site. Most of these berms are now vegetated and providing excellent screening cover for the quarry.

8.5.3 Bedrock Geology

The area is underlain by sedimentary rocks belonging to the Mullaghmore Sandstone Formation which is part of the Dinantian Sandstone Group. The colour of the sandstone on site varies from a buff light brown to a grey/blue depending on the strata. Beds are seen to dip gently to the southeast. The rock cleaves very well and is suited to high end uses as facing stone, dimension stone and for ornamental uses. A full description of the geology of the site is given in Chapter 7, *Land, Soils and Geology*, of this rEIAR.

8.5.4 Aquifer Classification and Potential Recharge

The Mullaghmore Sandstone Formation is listed as the bedrock underlying the site. These rocks are classified by the Geological Survey of Ireland (GSI) as being Lm - a locally important Aquifer which is moderately productive. Aquifer recharge occurs diffusely through the subsoil and outcrops and is estimated at 85% recharge co-efficient by the GSI. Average annual recharge is estimated at 909 mm.

8.5.5 Source Protection Areas and Groundwater Wells

A search for the nearest EPA source protection area to the site found that the nearest Source Protection Area is 13.9 km southwest in a separate hydrological catchment area in Ballyshannon. There are approximately 8 recorded groundwater wells within 1 km of the application site. There are no wells within the zone of influence of the site. A brief description of the nearest wells is given in Table 8.5 below.

Table 8.5: Wells in the vicinity of the site

Townland of well	Distance from site boundary	Type of well	Depth	Yield
Mountcharles	320 m southeast	Borehole	76 m	55 m^3 per day
Mountcharles	350 m southeast	Borehole	76 m	327 m^3 per day
Drumbeagh	530 m northeast	Borehole	91.4 m	44 m^3 per day
Drumbeagh	90 m northwest	Borehole	61m	55 m^3 per day
Drumconor	260 m west	Borehole	68.6 m	218 m^3 per day
Drumconor	680 m south	Borehole	20.1 m	87.2 m^3 per day
Drumconor	700 m south	Borehole	14.3 m	unknown

(after GSI)

8.5.6 Regional Hydrology

8.5.6.1 Surface Water

The subject site is located within the Water Framework Directive (WFD) Catchment 37 Donegal Bay North (GBNIIENW) and the WFD sub catchment Eany (Water)_SC_010. A tributary of the Eany Water River flows (EPA code: IE_NW_37E030350) flows along the northern boundary of the site and an un-named tributary of the Eany water flows through the southern edge of the site. The site is located in the Eany Water sub basin catchment. The Eany Water River flows into the sea at Inver Bay approximately 3 km southwest of the subject site. The hydrological distance from the site to Inver Bay is approximately 4.67 km. Hydrological connections are shown in Figure 8.4 . The

site is outside any Margaritifera catchment and does not influence any waters designated under the Salmonid Regulations (SI 293/1988).

8.5.6.2 Surface Water Quality

There are no EPA monitoring stations on the tributary of the Eany water system leading from the site. There are a number of EPA monitoring stations in other unconnected tributaries of the Eany water to the north of the application site. The latest Q values (2022) from these stations indicate good and high ecological status.

An assessment of the water chemistry of the receiving waters was made in section 8.4.10 with the sampling points shown in Figure 8.5 and the results of analysis tabulated in Table 8.2. The samples upstream of the site from both tributaries of Eany Water were examined.

pH and both orthophosphate and total Phosphorus levels were seen to be of an acceptable standard. Only one of the samples for ammonia was seen to be of 'good' standard with regard to the EU Environmental Objectives (Surface Water) Regulations (as amended), 2019 (SI 77/2019) and all the samples for BOD wee outside the 'high' and 'good' range. All suspended sediment samples, both upstream and downstream of the site, show low values.

8.5.7 Regional Hydrogeology

The regional groundwater body is the Frosses groundwater body, EPA code IE_NW_G_067. For the purposes of WFD water management, groundwater in Ireland is assigned, assessed, and managed within 514 local groundwater bodies, which range in size from < 1km^2 to 1,887km^2. The application site lies within the Donegal Bay North Groundwater Basin and the Frosses Groundwater Body which is described as productive fissured bedrock.

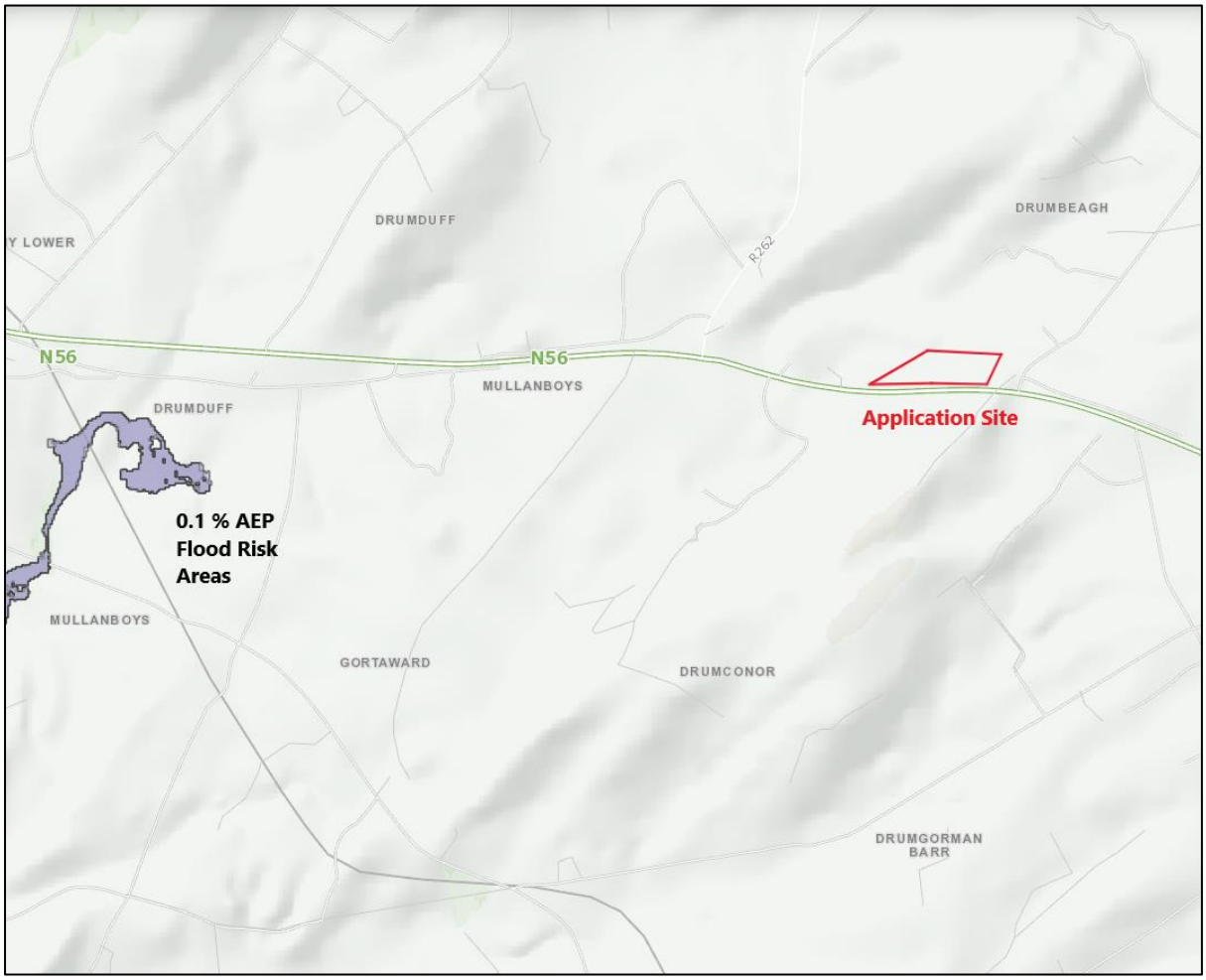
8.5.7.1 Groundwater WFD Status

Article 8 of the Water Framework Directive requires the establishment of programmes of monitoring for groundwater. The groundwater monitoring programmes by the EPA primarily focus on providing information that can be used to assess the environmental status of groundwater bodies. Groundwater in the region for the monitoring period 2016-2021 achieved 'good' quality status. The Frosses Groundwater Body is considered 'not at risk' by the EPA.

8.5.8 Flood Risk

An appraisal of the available flood maps was made to determine if there was any flood risk at the site or if any of the extraction and processing activities had been likely to increase the risk of flooding either at the site or elsewhere. An examination of the flood maps (floodinfo.ie) for the area show the application site and surrounding area to be at low risk of river flooding events. The flood risk map in relation to the application site is shown below in Figure 8.8. The layers active are the low probability of flooding, 0.1% AEP (1 in a 1000 chance of occurring) and the high-end future scenario is also modelled. This takes in the potential effects of climate change modelling an increase in rainfall of 30% and sea level rise of 1,000mm.

Figure 8.8: Flood Risk in the area around the application site



(Image from floodmaps.ie)

There is only one recorded flood events within 2.5 km of the application site. The closest recorded flood event is a recurring flood event in the village of Frosses approximately 2 km to the northwest of the site. There are no details to the source of the flooding. There is no hydrological connection between this flood event and the application site.

The site will have had the topsoil stripped and used to create screening berms leaving an exposed rock surface at various depths over the course of extraction. The rock surface may have had potential to create a flashier response to rainfall events than the undeveloped ground. However, any increase in rainfall response times is likely to have been attenuated by the creation of voids and ponds within the quarried area.

There is currently an extracted area with various hollows and small voids some of which are filled with water. The main settlement pond in the central southern area of the site has a footprint of approximately 700m2 and an average depth of 0.5 m so has a capacity of c. 350 m3. Other voids and pools within the site would bring the total storage volume to at least 500 m3. This conservatively estimated 500 m3 attenuation capacity more than offsets any slight increase in rainfall response times. Over the course of extraction, the quarry void would not have been as large as its current size, but significant ponds and voids would have evolved with extraction to more than compensate for slight increases in rainfall response times.

8.6 Water Management

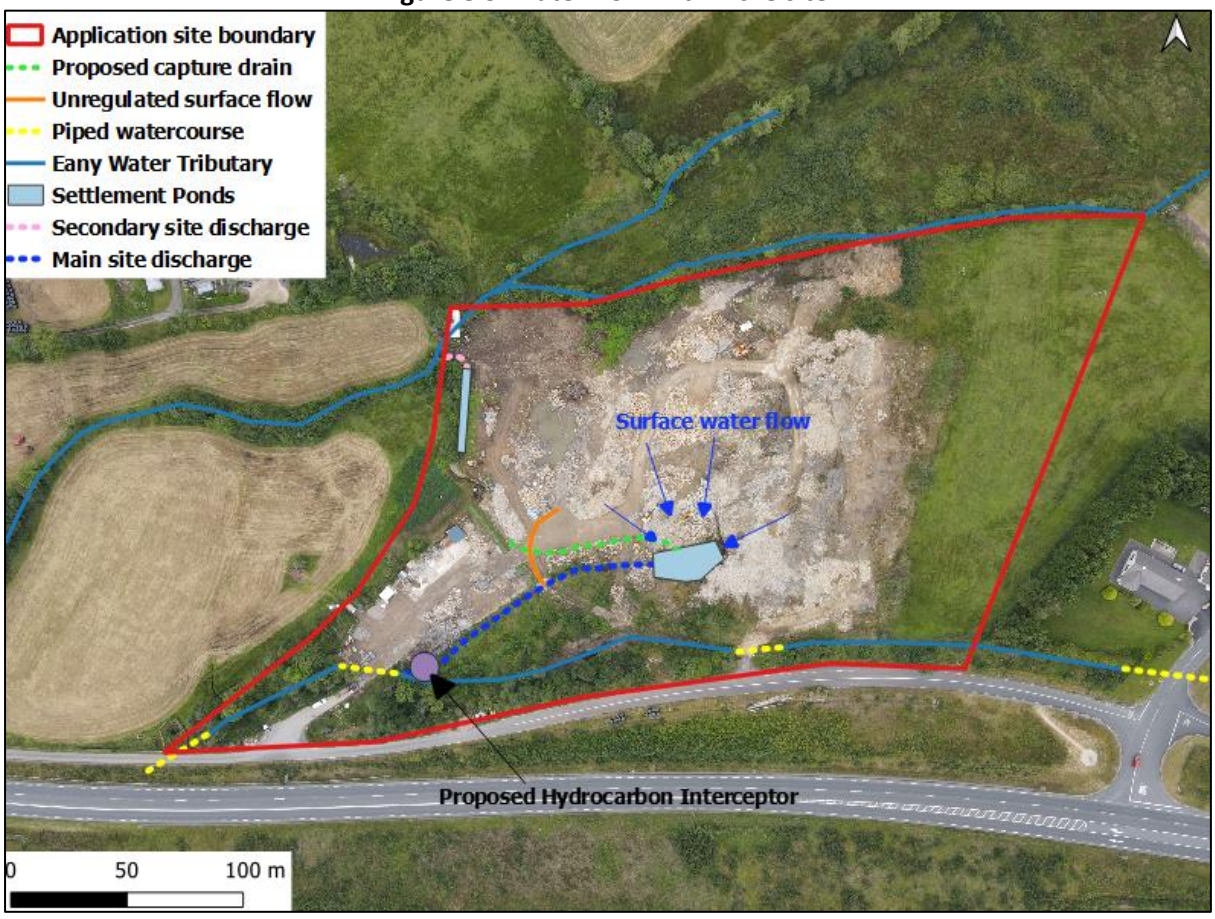
Mechanisms and infrastructure have been in place to ensure that effluent leaving the site is treated and will not negatively affect surface or groundwaters. The greatest threat to water quality leaving the site is from untreated or poorly treated effluent. The main source of effluent will be incident rainfall on extraction and working areas of the proposal leading to contaminated runoff.

The existing site drainage is described in section 8.4.9 and shown in Figure 8.3.

Historically over the recent extraction period, water movement through the site has remained broadly similar. Within the quarry void, over time, the point of extraction has changed and with it the point to which surface waters naturally flow within the void. However, the current main settlement pond in the central southern portion of the site captures almost all the drainage from the extraction areas to the east and northeast. A minor unregularized flow was noted coming from the central northern part of the site directly into the channel leading from the main settlement pond to the entrance of the site. Surface water flow to the main settlement pond and the unregulated flow is shown in Figure 8.9 below.

The unregulated flow is relatively minor in nature and is seen to bypass the settlement pond and enter the channel of the main site discharge. The flow in this discharge channel is slow and impeded by vegetation of grasses, rushes and reeds (Photograph 8.1) which will attenuate flow and provide effluent treatment in the biogeochemical root zone.

Figure 8.9: water flow within the site



(Created using QGIS, NPWS datasets and Greentrack aerial imagery)

8.6.1 Proposed Drainage and water management measures

Although effectively treated with the main discharge channel, it is a more a robust approach to have all effluent from the extraction area discharging to the main settlement pond for treatment before discharge off site. It is proposed to regularise the drainage by construction of a capture drain catching any unregulated flow and directing this flow to the main settlement pond. This proposed capture drain is shown in green in Figure 8.9 above.

It is proposed to install a hydrocarbon interceptor as best practice before discharge of waters off site. The interceptor should be located immediately prior to the discharge of treated effluent off site. The proposed location of the interceptor is indicated on Figure 8.9 above. Also

recommended is a dedicated monitoring point where grab samples for chemical analysis and flow rate measurements can be taken. It is recommended that the sample point be installed at the outflow of the interceptor.
It is also recommended to apply to Donegal County Council for a trade discharge licence for the discharge of treated effluent to the receiving waters of the Eany water River system.

8.6.2 Effluent Treatment

It is likely that the main contaminant arising from activities on site would have been suspended sediment contained within runoff. Effluent from the extraction and processing areas has been treated by settlement.
Over the course of recent extraction history when the applicant had a direct involvement with the site (2007 – 2024), most areas of the site have been worked out to varying degrees. Information from the applicant states that runoff from extraction and processing areas was always directed towards the nearest available pond/sump for settlement treatment before any potential discharge from site. There are no records available of sizes/depths of settlement ponds used over the course of extraction history.
The current treatment system has been examined for effectiveness. All relatively recent extraction and processing activities have taken place within the main quarry void. Any surface water runoff within the main extraction area flows towards the main settlement pond or is temporarily captured buy another pond/void before flowing towards the main settlement pond.
The main settlement pond in the central southern part of the site is seen to vary in size seasonally and holds a significant volume of water. The footprint of the main settlement pond varies between 400 m^2 – 800 m^2 and is taken to average at 600 m^2 over the course of recent extraction. Average depth of the pond is estimated at 0.5 m, so the average capacity of the pond has been estimated at c. 300 m^3.
There are other ponds and voids within the existing extraction footprint that have potential to hold water and act as temporary settlement ponds before releasing effluent to flow towards the main settlement pond. These are variable in size and depth but in combination are estimated to make a significant contribution to effluent treatment. These temporary ponds/voids are estimated conservatively to make up at least 250 m^3 capacity now and historically. Overall, the settlement capacity is estimated to conservatively be c. 550 m^3.

8.6.2.1 Area generating effluent

With regard to effluent treatment, the calculations below relate to the extraction and working area of the current site. There is also discussion below as to the likely areas generating effluent in a historical context. The total catchment of exposed rock draining to the main settlement pond at its maximum is estimated at 20,800 m^2. The area estimation was made with the aid of online mapping tools, topographical maps for the site and on the ground verification of flow directions and catchment areas.
The total extraction area requiring effluent treatment is taken as 20,800 m^2.

8.6.2.2 Effluent Volumes

To calculate sufficient settlement capacity the average runoff rates for the site are used with the settlement capacity to estimate residence time in the treatment system. To calculate average runoff rates the annual effective rainfall is assessed against the amount of rainfall that will percolate into the groundwater system. Effective rainfall (ER) is the average amount of incident rainfall minus the amount of Actual Evapotranspiration (AE). AE is usually calculated as 82% of Potential Evapotranspiration (PE). (The 82% figure has been used in recent studies and will calculate a higher ER rate than the customary 95% calculation rate which has been traditionally used). PE figures are available from Met Eireann for Malin Head. Malin Head is the nearest Met Eireann synoptic recording station located approximately 50 km to the north of the application site. Annual mean PE is 527.3mm.

AE = PE * 82 % ***AE = 432.4 mm***

However, the AE figure for the application site will be considerably less due to the lack of vegetation. A conservative figure of 50 mm AE is estimated for the site.

Average annual rainfall (AAR) can be taken from long term data sets produced by Met Eireann (1991-2020). The figure from Malin Head is 1,138mm.

The effective rainfall represents the water available for runoff and groundwater recharge. The effective rainfall for the site is calculated as follows:

- **Effective rainfall = AAR – AE**
- **ER = 1,138 mm – 50 mm**
- **ER = 1,088 mm**

A proportion of runoff will percolate into the ground and become groundwater. The calculations for this site are based on most of the site being stripped of topsoil and effectively bare rock. The GSI have produced maps with the groundwater recharge coefficients listed for each area. The site has a recharge coefficient of 85% meaning that approximately 85% of the incident rainfall will end up recharging the groundwater system and the remainder will end up as surface water runoff. This means that of the 1,088mm effective rainfall approximately 163.8 mm will generate runoff. This figure equates to an annual runoff figure for the site of 3,395 m^3 for the drainage area. This approximates to a daily runoff figure of 9.3 m^3 from incident rainfall requiring effective treatment before discharge off site.

8.6.2.3 Treatment Capacity and Residence Time

Settlement ponds and tanks are designed so that under ideal conditions all particles having an equivalent spherical diameter of d (typically 0.006mm) or greater are removed. Ideally a settlement tank will have parallel sides and a smooth floor to induce horizontal linear flow. To prevent re-suspension of sediment in a settlement pond a depth of at least 1m should be maintained. The minimum residence time for settlement of sediment varies from quarry to quarry dependent on a number of variables. In ideal conditions a settlement tank should have a retention time of greater than 11 hours to settle out particles with a diameter greater than 0.006mm. (A retention time of 24 hours is recommended for particles with a diameter greater than 0.004mm (fine silt)). This allows most of the suspended sediment to settle out of solution.
The total available settlement capacity is provided by the main settlement pond and other ponds/voids and is estimated at 550 m^3.
The residence time for the average daily runoff amount of 9.3 m^3 will be approximately 59 days. This is more than adequate time to settle sediment out of solution.

8.6.2.4 Treatment Capacity for Extreme Weather Events

Calculations shown in Section 8.6.2.3 have shown the settlement capacity to be more than adequate under average conditions. However, in reality, incident rainfall will not be consistent throughout the year. To ensure the settlement capacity on site is robust under all conditions, calculations are made of the expected residence time of effluent on site in response to an extreme weather event. The one in a 100-year 6-hour storm event is widely used as suitably extreme weather event. Rainfall returns from Met Eireann indicate that 60.4 mm of rainfall would be associated with the 1 in 100-year 6-hour storm event at the application site.
The maximum area serviced by the main settlement system is approximately 20,800 m^2. Assuming a worst-case scenario whereby only approximately 10% of the incident rainfall percolated to ground, the incident rainfall on the site would generate 1,130 m3 runoff requiring treatment before discharge. The available settlement capacity is approximately 550 m^3.
For a 1 in 100-year 6-hour storm event the expected residence time for effluent for treatment is calculated at 11.7 hours. This is adequate time to settle out most particles from the effluent

before discharge off site. The current effluent treatment system is shown to be robust under extreme conditions.
The current settlement pond arrangement is less than ideal in design regards as neither pond has smooth sides and floors. This is more than compensated for with the capacity provided by the combination of small pond/voids throughout the extraction area.

8.6.2.5 Historical Treatment Capacity

A crude means of attempting to assess what levels of effluent treatment were in place during the extraction period of the site was made examining the available aerial photographs. Historical aerial imagery for the site from 2007 is haphazard and appears to show a series of small depressions rather than any significant settlement pond/void. The applicant states that these small ponds connected in series by gravity flow to treat effluent and discharge was through a vegetated buffer to the tributary of the Eany water River.

8.6.3 Monitoring Point

A water quality and flow rate monitoring point is proposed to be installed immediately before treated effluent is discharged off site, downstream of the proposed hydrocarbon interceptor (Figure 8.9).

8.7 Groundwater Impact

Rock extraction has the potential to affect the water table by creating a cone of depression within the extraction void and can affect water supplies dependant on the groundwater resource in certain situations.
Within the application site the water table in the bedrock has been shown to be at relatively shallow levels (<2 mbgl), and outside the quarry void the observed groundwater levels are similar to what would be expected (<7 mbgl). Some seepage and groundwater movement along bedding planes and fissures within the quarry faces of the extracted area was noted and consistent with the GSI categorisation of the aquifer and expected groundwater movement.
Previous extraction activity has caused a cone of depression in the groundwater table on the site. The cone of depression is not symmetrical or evenly distributed throughout the site as it will vary with depth of extraction. While difficult to define the actual extent of the impact of quarry activity within the site, it is not expected to have any significant negative impact outside the extraction areas as groundwater levels are shown to be at similar to expected levels within relatively short distances from the edge of extraction areas. There is not expected to be any significant change in groundwater levels outside the site boundaries as a result of activities on site. No groundwater supplies will be impacted by the activity.

8.8 Impact Assessment

Soil/overburden removal, rock extraction, rock cutting, and stockpiling of product all have the potential to generate suspended sediment within the surface water runoff leaving the site. The use of hydrocarbon fuels and lubricants on site in vehicles and plant carries the potential for contamination of surface waters and groundwaters through leaks and accidental spillage. The quarrying of rock beneath the water table and the removal or alterations of catchments can have potential impacts on the surface and groundwater regimes. The potential impacts to surface waters and groundwaters are assessed, and existing and proposed mitigation measures are outlined.

8.8.1 Surface Water Quality Impacts from Suspended Sediment Load during construction phase involving earth movement and berm construction

The construction of berms and earth movement to facilitate construction activity may have led to discharge of suspended sediment load in runoff which may be directed to surface watercourses leading to the Eany Water River system and subsequently Inver Bay.

- **Receptor(s):** Eany Water River system, Inver Bay
- **Pathway(s):** Surface discharge to river system
- **Pre-mitigation Impact:** Moderate short-term negative effect on a sensitive receptor

The mitigation measures that are in place and proposed are listed below:

- Robust settlement pond system to treat effluent before discharge
- Discharge from main settlement pond through wide vegetated impeded pathway
- Single discharge point from entire site
- Trade discharge licence proposed

Residual Effect: Short-term imperceptible negative effect on surface water quality
Significance of Effects: No significant effects on surface water quality are expected

8.8.2 Surface Water Quality Impacts from Suspended Sediment Load during extraction & processing phase

The development discharges effluent off site directly to a surface watercourse leading to the Eany Water River system and subsequently Inver Bay.

- **Receptor(s):** Eany Water River system, Inver Bay
- **Pathway(s):** Surface discharge to river system
- **Pre-mitigation Impact:** Moderate short-term negative effect on a sensitive receptor

The mitigation measures that are in place and proposed are listed below;

- Adequate settlement pond capacity to reduce sediment load in the effluent to acceptable levels before discharge offsite (Section 8.6.2).
- Suitable drainage system in place to direct effluent and runoff that may become contaminated with suspended sediment to the settlement pond and system.
- Regular maintenance of settlement ponds (and drainage system) to ensure efficiency and appropriate disposal of material removed.
- Suspension of extraction and activities for the duration of a red level rainfall warning issued by Met Eireann.
- Regular monitoring of the discharge point.
- Trade discharge licence proposed.
- Dedicated capture channel to catch any unregulated flow within site and direct it to the main settlement pond.

Residual Effect: Short-term imperceptible negative effect on surface water quality
Significance of Effects: No significant effects on surface water quality are expected

8.8.3 Surface Water and Groundwater Quality Impacts from Hydrocarbon Contamination

The development discharges effluent off site directly to a surface watercourse leading to the Eany Water River system and subsequently Inver Bay.

- **Receptor(s):** Eany Water River system, Inver Bay, Local Groundwater Body
- **Pathway(s):** Surface discharge to river, discharge directly to groundwaters
- **Pre-mitigation Impact:** Moderate short-term negative effect on a sensitive receptor

The mitigation measures that are in place and proposed are listed below:

- Lubricants stored in a bunded area in machinery shed off site.

- A hydrocarbon interceptor is proposed within the drainage system downstream of amin settlement pond.
- Refuelling of static plant on site carried out using a fully bunded bowser/mobile fuel truck.
- Drip trays used for all re-fuelling operations. Best practice for re-fuelling incorporated into the Environmental Management System for the site.
- Regular inspections and maintenance scheduling for all plant and vehicle to minimise the potential for malfunction or leak.
- Emergency spill kit with oil boom, absorbers etc. is proposed to be kept on site for use in the event of an accidental spillage/leak.
- Regular visual monitoring of all surface waters onsite for any surface sheen or sign of potential hydrocarbon pollution.

Residual Effect: Short-term imperceptible negative effect on surface water quality
Significance of Effects: No significant effects on surface water quality or groundwater quality are expected.

8.8.4 Groundwater impacts due to extraction below water table

The development extracts bedrock some of which may be at or close to the water table.

- **Receptor(s):** Local Groundwater Body
- **Pathway(s):** Direct due to removal of bedrock
- **Pre-mitigation Impact:** Imperceptible permanent negative effect on a low sensitivity receptor

There are no mitigation measures proposed. Amounts of water that would have percolated to groundwater will now flow directly to the surface water system. This surface water system is also supplemented by groundwater flow.
No negative impact expected outside of the site boundary.

Residual Effect: Imperceptible permanent negative effect on groundwater.
Significance of Effects: No significant effects on groundwater supply are expected

8.8.5 Surface Water ecology losses due to alteration of catchment flow regime

The development has altered the greenfield site conditions which have supplied surface and groundwater to the tributary of the Eany Water River system which may affect the ecology and base flow of the watercourse.

- **Receptor(s):** Tributaries of the Eany Water River
- **Pathway(s):** Direct due to alteration of water supply to stream
- **Pre-mitigation Impact:** Imperceptible permanent negative effect on a high sensitivity receptor

There are no mitigation measures proposed as volumes of surface water supplied to the stream pre-development is not expected to have changed from the current situation. Pre-development, some surface water flow may have reached the stream slightly further upstream than now and some of the groundwater baseflow supply may have been more gradual along the length of the stream channel rather than concentrated through the main site discharge point. Overall, the nature of the supply to the stream may have changed slightly but the volumetric contribution from the site area is expected to have remained constant.

Residual Effect: Imperceptible negative effect on tributaries of the Eany water River system.
Significance of Effects: Neutral effects on Eany Water River system.

8.8.6 Cumulative Impacts

The application site must also be considered in association with other developments located within or close to the application site.

8.8.6.1 Other Developments

A search of the planning portal of the Donegal County Council website revealed no planned development which may result in significant cumulative impact in the vicinity of the application site. The application site is situated in a rural environment where the two main land uses are low intensity livestock farming and private commercial forestry.
There were no other planned developments in the townland of Drumbeagh which were granted planning permission in the last 5 years and have the potential to have any significant negative adverse cumulative impacts on the local environment.

- Planning ref. 21/50516 (365m west of the site) was granted permission in November 2021 for the erection of an agricultural shed and increasing of ground levels around the proposed shed and all associated site development works.
- Planning ref. 22/51910 (470m Southwest of the site) was granted permission in February 2023 for the (1) demolition of existing single storey domestic garage (2) construction of a single storey extension to existing storey and half type dwelling house including changes to existing elevations and all ancillary site development works.

Neither of these projects will be adversely affected by quarry activity at the application site. There is no hydrological or other direct link between the application site and any of these developments. Due to the small scale and non-invasive nature of these developments, we would contend that none represent any “significant negative effect” on the environment, when considered in combination with this proposal.

8.8.7 Determination of Environmental Impact Significance Pre-mitigation

Impact	Receptor	Description of Impact (Character/Magnitude/Duration /Probability/Consequences) Negligible - High	Existing Environment (Significance/Sensitivity) Negligible -High	Significance Imperceptible - Profound
Surface Water Quality Impacts from Suspended Sediment Load during construction phase involving earth movement and berm construction	Eany water River system, Inver Bay	Medium	Medium	Moderate
Surface Water Quality Impacts from Suspended Sediment Load during extraction & processing	Eany water River system, Inver Bay	Medium	Medium	Moderate
Surface Water and Groundwater Quality Impacts from Hydrocarbon Contamination	Eany water River system, Inver Bay, Local Groundwater Body	Low-Medium	Medium	Slight
Groundwater Impacts due to extraction below water table	Frosses Groundwater Body	Low-Negligible	Low	Not significant
Surface Water ecology losses due to alteration in catchment flow regime	Eany Water River system	Negligible	Medium	Not significant

8.8.8 Summary of Mitigation Measures Proposed

Summary of Mitigation Measures Proposed
• Adequate settlement pond capacity to reduce sediment load in the effluent to acceptable levels before discharge off-site (Section 8.6.2).
• Construction of a suitable drainage system in place to direct effluent and runoff that may become contaminated with suspended sediment to the settlement pond and system.
• Regular maintenance of settlement ponds (and drainage system) to ensure efficiency and appropriate disposal of material removed.
• Suspension of extraction and material handling activities for the duration of a red level rainfall warning issued by Met Eireann.
• Construction of a monitoring point immediately prior to discharge of effluent off-site.
• Single discharge point subject to the conditions of a trade discharge licence from Donegal County Council.
• Lubricants stored in a bunded area in machinery shed off site.

• A hydrocarbon interceptor is proposed within the main discharge channel immediately before discharge off-site.
• Refuelling of static plant on site carried out using a fully bunded bowser/mobile fuel truck.
• Drip trays used for all re-fuelling operations. Best practice for re-fuelling incorporated into the Environmental Management System for the site.
• Regular inspections and maintenance scheduling for all plant and vehicle to minimise the potential for malfunction or leak.
• Emergency spill kit with oil boom, absorbers etc. is proposed to be kept on site for use in the event of an accidental spillage/leak.
• Regular visual monitoring of all surface waters onsite for any surface sheen or sign of potential hydrocarbon pollution.

8.8.9 Determination of Environmental Impact Significance Following Mitigation

Impact	**Receptor**	**Description of Impact (Character/Magnitude/Duration/ Probability/Consequences)** Negligible - High	**Existing Environment (Significance/Sensitivity)** Negligible -High	**Significance of Impact** Imperceptible - Profound
Surface Water Quality Impacts from Suspended Sediment Load during construction phase involving earth movement and berm construction	Eany water River system, Inver Bay	Medium	Medium	Imperceptible
Surface Water Quality Impacts from Suspended Sediment Load during extraction & processing	Eany water River system, Inver Bay	Medium	Medium	Imperceptible
Surface Water and Groundwater Quality Impacts from Hydrocarbon Contamination	Eany water River system, Inver Bay, Local Groundwater Body	Low-Medium	Medium	Imperceptible
Groundwater Impacts due to extraction below water table	Frosses Groundwater Body	Low-Negligible	Low	Not significant
Surface Water ecology losses due to alteration in catchment flow regime	Eany Water River system	Negligible	Medium	Not significant

8.8.10 Conclusion

With the implementation of the mitigation measures listed, the implementation of the project as outlined will not have caused a significant negative effect on the surface water or groundwater environments.

Appendix 8.1: Certificates of Analysis (surface water)

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CERTIFICATE OF ANALYSIS

Customer: **Greentrack**
4 Roe House,
Dry Arch Business Park ,
Dromore ,
Letterkenny ,

Report no.:	**23-04762**
No. of samples:	6
Acceptance date:	09/08/2023
Analysis date:	09/08/2023
Date of issue:	21/08/2023
Contact:	Denis Faulkner

Comments
6 x sample water
Ref.: Murray Stone

Sample ID	Sample type	Client reference	Test method	Test description	Result / Units
23-04762-(01)	Water	ne wc u/s - stream	E-101	BOD	2 mg/l
			E-105	pH	7.19 @20.4°C
			E-124	Ammonia (as NH3-N)	<0.01 mg/l
			E-138	Dissolved Inorganic Nitrogen	0.54 mg/l
			E-138	Dissolved TON	0.54 mg/l
			E-138	Dissolved Ammonia	<0.01 mg/l
			E-109	Orthophosphate (as P)	0.02 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	178 µS/cm@20.0°C
			E-103	Suspended Solids	<5 mg/l
23-04762-(02)	Water	n outflow effuent	E-101	BOD	2 mg/l
			E-105	pH	7.06 @20.2°C
			E-124	Ammonia (as NH3-N)	0.26 mg/l
			E-109	Orthophosphate (as P)	<0.01 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	496 µS/cm@20.0°C
			E-103	Suspended Solids	12 mg/l
			E-138	Dissolved Inorganic Nitrogen	1.31 mg/l
			E-138	Dissolved TON	1.19 mg/l
			E-138	Dissolved Ammonia	0.12 mg/l

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CERTIFICATE OF ANALYSIS

Customer: **Greentrack**
4 Roe House,
Dry Arch Business Park ,
Dromore ,
Letterkenny ,

Report no.:	**23-04762**
No. of samples:	6
Acceptance date:	09/08/2023
Analysis date:	09/08/2023
Date of issue:	21/08/2023
Contact:	Denis Faulkner

Comments
6 x sample water
Ref.: Murray Stone

Sample ID	Sample type	Client reference	Test method	Test description	Result / Units
23-04762-(03)	Water	ne wc d/s - stream	E-101	BOD	2.70 mg/l
			E-105	pH	7.28 @19.7°C
			E-124	Ammonia (as NH3-N)	0.04 mg/l
			E-138	Dissolved Inorganic Nitrogen	0.60 mg/l
			E-138	Dissolved TON	0.60 mg/l
			E-138	Dissolved Ammonia	<0.01 mg/l
			E-109	Orthophosphate (as P)	<0.01 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	187 µS/cm@20.0°C
			E-103	Suspended Solids	<5 mg/l
23-04762-(04)	Water	s wc u/s - stream	E-105	pH	7.52 @19.9°C
			E-124	Ammonia (as NH3-N)	<0.01 mg/l
			E-138	Dissolved Inorganic Nitrogen	0.49 mg/l
			E-138	Dissolved TON	0.49 mg/l
			E-138	Dissolved Ammonia	<0.01 mg/l
			E-109	Orthophosphate (as P)	<0.01 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	256 µS/cm@20.0°C
			E-103	Suspended Solids	<5 mg/l
			E-101	BOD	1.58 mg/l

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CERTIFICATE OF ANALYSIS

Customer: **Greentrack**
4 Roe House,
Dry Arch Business Park ,
Dromore ,
Letterkenny ,

Report no.:	**23-04762**
No. of samples:	6
Acceptance date:	09/08/2023
Analysis date:	09/08/2023
Date of issue:	21/08/2023
Contact:	Denis Faulkner

Comments
6 x sample water
Ref.: Murray Stone

Sample ID	Sample type	Client reference	Test method	Test description	Result / Units
23-04762-(05)	Water	s outlfow effluent	E-105	pH	7.99 @20.0°C
			E-124	Ammonia (as NH3-N)	<0.01 mg/l
			E-138	Dissolved Inorganic Nitrogen	0.51 mg/l
			E-138	Dissolved TON	0.51 mg/l
			E-138	Dissolved Ammonia	<0.01 mg/l
			E-109	Orthophosphate (as P)	<0.01 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	254 µS/cm@20.0°C
			E-103	Suspended Solids	<5 mg/l
			E-101	BOD	1.55 mg/l
23-04762-(06)	Water	s wc d/s - stream	E-101	BOD	1.49 mg/l
			E-105	pH	7.76 @20..0°C
			E-124	Ammonia (as NH3-N)	<0.01 mg/l
			E-138	Dissolved Inorganic Nitrogen	0.53 mg/l
			E-138	Dissolved TON	0.53 mg/l
			E-138	Dissolved Ammonia	<0.01 mg/l
			E-109	Orthophosphate (as P)	<0.01 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	260 µS/cm@20.0°C

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No. of samples:	6
Acceptance date:	09/08/2023
Analysis date:	09/08/2023
Date of issue:	21/08/2023
Contact:	Denis Faulkner

Comments
6 x sample water
Ref.: Murray Stone

Sample ID	Sample type	Client reference	Test method	Test description	Result / Units
23-04762-(06)	Water	s wc d/s - stream	E-103	Suspended Solids	<5 mg/l

The results in this electronically produced test report have been checked and approved. The test report meets the requirements of IS EN ISO/IEC 17025:2017 and is also valid without signature.

Report authorised by: J Cassidy
Julie Cassidy
Senior Technician

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CERTIFICATE OF ANALYSIS

Customer: **Greentrack**
4 Roe House,
Dry Arch Business Park ,
Dromore ,
Letterkenny ,

Report no.:	**24-04969**
No. of samples:	6
Acceptance date:	16/07/2024
Analysis date:	16/07/2024
Date of issue:	22/07/2024
Contact:	Denis Faulkner

Comments
6 x samples ex Murray Stone , 15/7/24

Sample ID	Sample type	Client reference	Test method	Test description	Result / Units
24-04969-(01)	Water	upstream north	E-105	pH	7.64@ 20.7°C
			E-103	Suspended Solids	<5 mg/l
			E-124	Ammonia (as NH3-N)	0.40 mg/l
			E-138	Dissolved Inorganic Nitrogen	0.74 mg/l
			E-138	Dissolved TON	0.57 mg/l
			E-138	Dissolved Ammonia	0.17 mg/l
			E-109	Orthophosphate (as P)	0.01 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	275 µS/cm@ 20°C
			E-101	BOD	1.53 mg/l
24-04969-(02)	Effluent	site discharge north	E-105	pH	7.80@ 21.4°C
			E-124	Ammonia (as NH3-N)	0.28 mg/l
			E-138	Dissolved Inorganic Nitrogen	0.86 mg/l
			E-138	Dissolved TON	0.59 mg/l
			E-138	Dissolved Ammonia	0.27 mg/l
			E-109	Orthophosphate (as P)	0.01 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	280 µS/cm @ 20°C
			E-101	BOD	1.75 mg/l
			E-103	Suspended Solids	11 mg/l

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Report no.:	**24-04969**
No. of samples:	6
Acceptance date:	16/07/2024
Analysis date:	16/07/2024
Date of issue:	22/07/2024
Contact:	Denis Faulkner

Comments
6 x samples ex Murray Stone , 15/7/24

Sample ID	Sample type	Client reference	Test method	Test description	Result / Units
24-04969-(03)	Water	downstream north	E-105	pH	7.70@ 20.8°C
			E-103	Suspended Solids	<5 mg/l
			E-124	Ammonia (as NH3-N)	0.30 mg/l
			E-138	Dissolved Inorganic Nitrogen	0.87 mg/l
			E-138	Dissolved TON	0.57 mg/l
			E-138	Dissolved Ammonia	0.30 mg/l
			E-109	Orthophosphate (as P)	0.02 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	293 µS/cm @ 20°C
			E-101	BOD	1.42 mg/l
24-04969-(04)	Water	upstream south	E-105	pH	8.15@ 21.7°C
			E-103	Suspended Solids	<5 mg/l
			E-124	Ammonia (as NH3-N)	0.06 mg/l
			E-138	Dissolved Inorganic Nitrogen	0.42 mg/l
			E-138	Dissolved TON	0.39 mg/l
			E-138	Dissolved Ammonia	0.03 mg/l
			E-109	Orthophosphate (as P)	<0.01 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	412 µS/cm @ 20°C
			E-101	BOD	<1 mg/l

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CERTIFICATE OF ANALYSIS

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4 Roe House,
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Letterkenny ,

Report no.:	**24-04969**
No. of samples:	6
Acceptance date:	16/07/2024
Analysis date:	16/07/2024
Date of issue:	22/07/2024
Contact:	Denis Faulkner

Comments
6 x samples ex Murray Stone , 15/7/24

Sample ID	Sample type	Client reference	Test method	Test description	Result / Units
24-04969-(05)	Effluent	site discharge south	E-105	pH	8.04@ 21.2°C
			E-103	Suspended Solids	<5 mg/l
			E-124	Ammonia (as NH3-N)	0.02 mg/l
			E-138	Dissolved Inorganic Nitrogen	0.27 mg/l
			E-138	Dissolved TON	0.25 mg/l
			E-138	Dissolved Ammonia	0.02 mg/l
			E-109	Orthophosphate (as P)	<0.01 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	401 µS/cm @ 20°C
			E-101	BOD	1.89 mg/l
24-04969-(06)	Water	downstream south	E-105	pH	7.91@ 21.3°C
			E-103	Suspended Solids	<5 mg/l
			E-124	Ammonia (as NH3-N)	0.08 mg/l
			E-138	Dissolved Inorganic Nitrogen	0.24 mg/l
			E-138	Dissolved TON	0.16 mg/l
			E-138	Dissolved Ammonia	0.08 mg/l
			E-109	Orthophosphate (as P)	0.04 mg/l
			E-110A	#Total Phosphorus (as P)	<0.05 mg/l
			E-113	#Conductivity	407 µS/cm @ 20°C

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CERTIFICATE OF ANALYSIS

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Letterkenny ,

Report no.:	**24-04969**
No. of samples:	6
Acceptance date:	16/07/2024
Analysis date:	16/07/2024
Date of issue:	22/07/2024
Contact:	Denis Faulkner

Comments
6 x samples ex Murray Stone , 15/7/24

Sample ID	Sample type	Client reference	Test method	Test description	Result / Units
24-04969-(06)	Water	downstream south	E-101	BOD	<1 mg/l

The results in this electronically produced test report have been checked and approved. The test report meets the requirements of IS EN ISO/IEC 17025:2017 and is also valid without signature.

Report authorised by: J Cassidy

Julie Cassidy
Senior Technician

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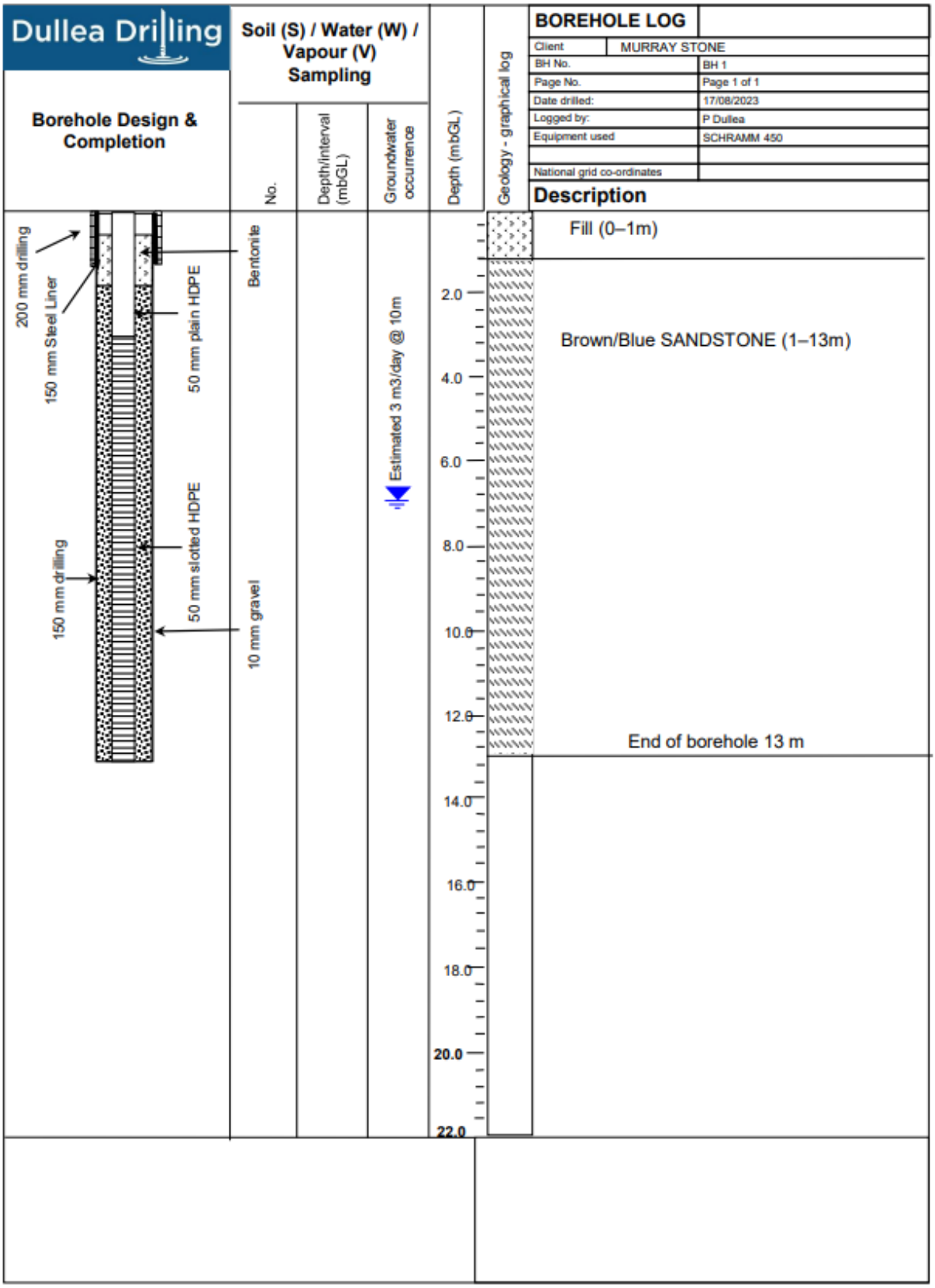
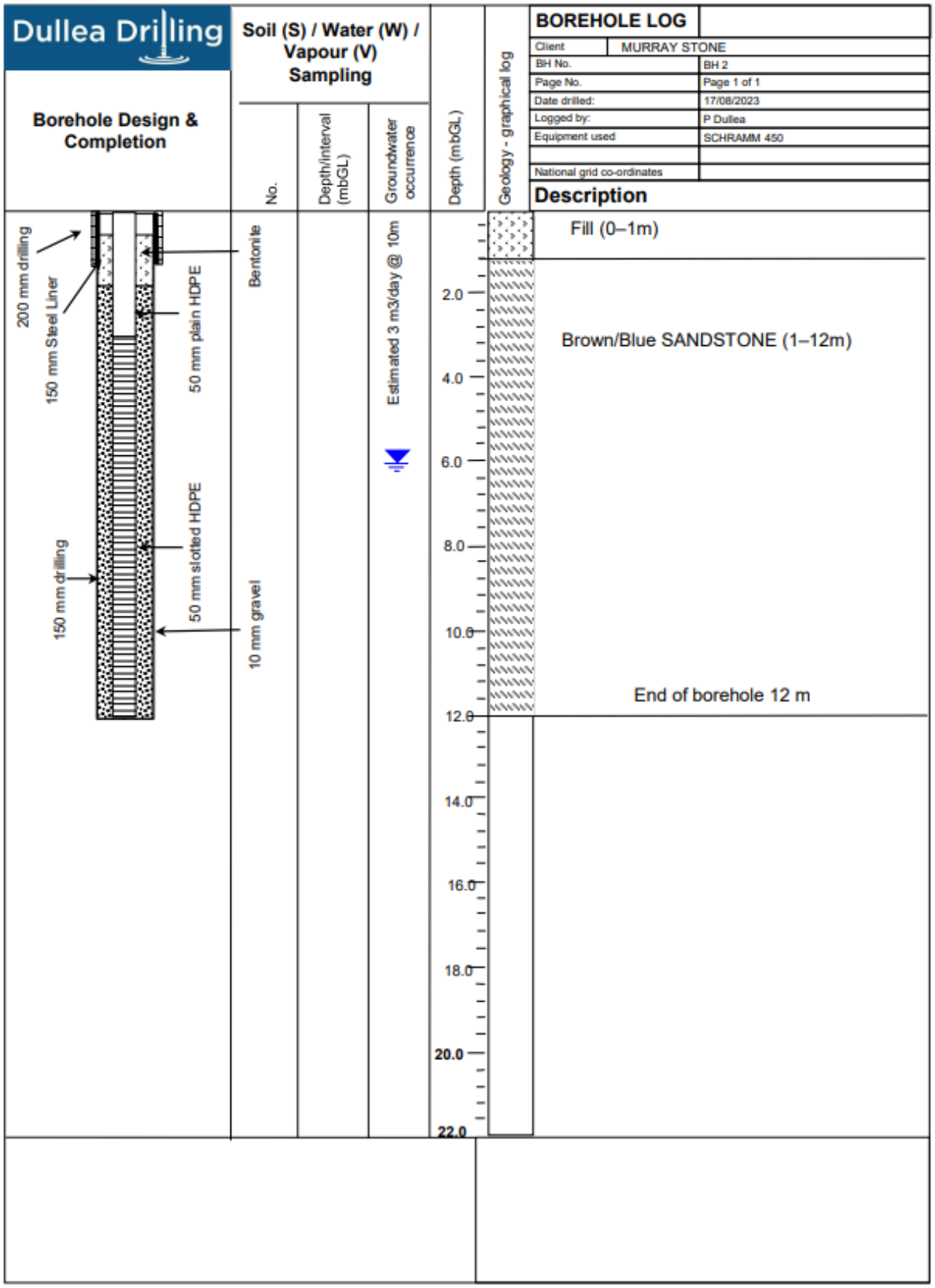
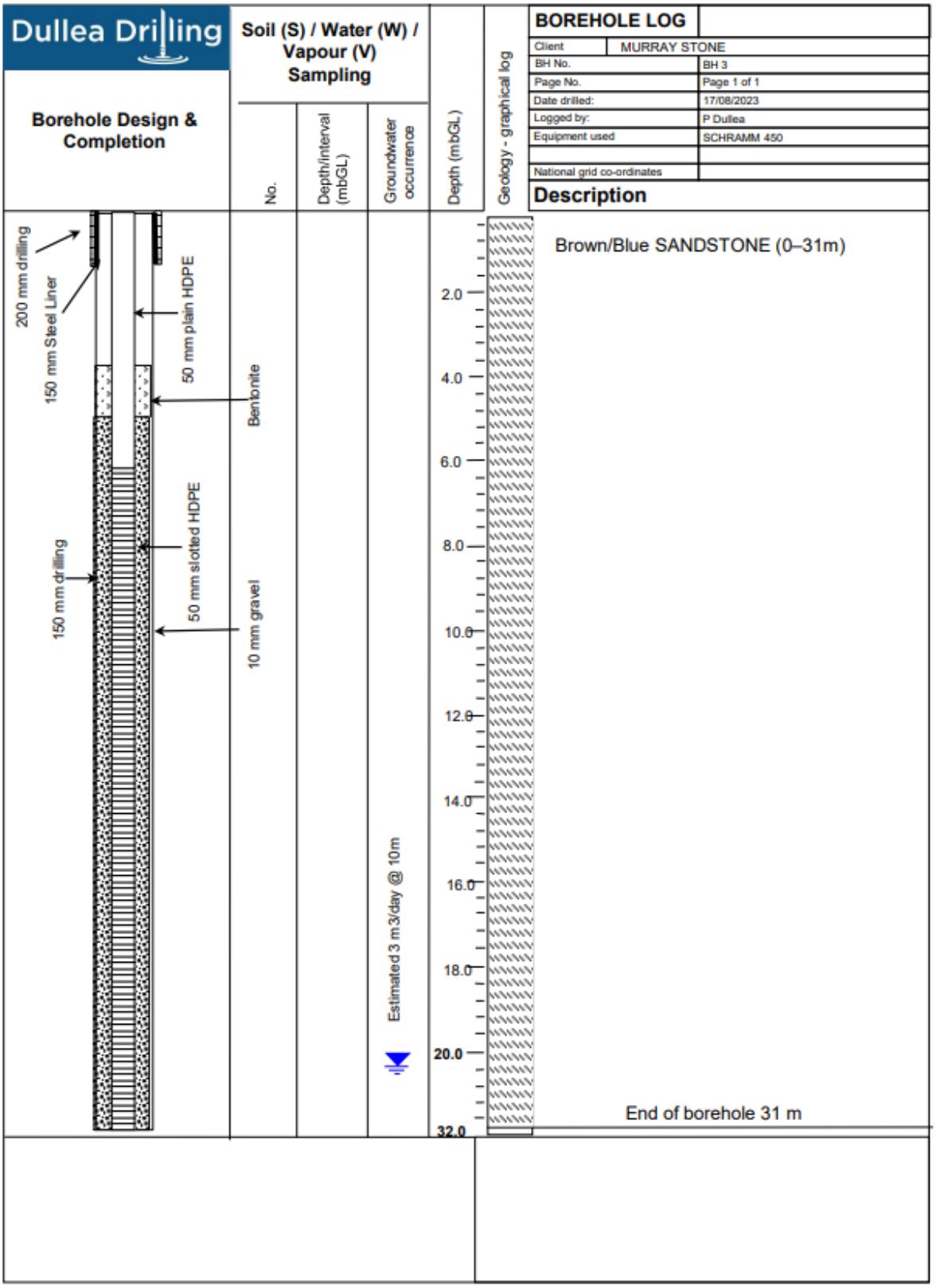
Appendix 8.2: Borehole Logs




Dullea Drilling
Borehole Design & Completion
Soil (S) / Water (W) / Vapour (V) Sampling
No.
Depth/interval (mbGL)
Groundwater occurrence
Depth (mbGL)
Geology - graphical log
BOREHOLE LOG
Client MURRAY STONE
BH No. BH 2
Page No. Page 1 of 1
Date drilled: 17/08/2023
Logged by: P Dullea
Equipment used SCHRAMM 450
National grid co-ordinates
Description
200 mm drilling
150 mm Steel Liner
50 mm plain HDPE
150 mm drilling
50 mm slotted HDPE
Bentonite
10 mm gravel
Estimated 3 m3/day @ 10m
Fill (0–1m)
Brown/Blue SANDSTONE (1–12m)
End of borehole 12 m
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0


Dullea Drilling
Borehole Design & Completion
Soil (S) / Water (W) / Vapour (V) Sampling
No.
Depth/Interval (mbGL)
Groundwater occurrence
Depth (mbGL)
Geology - graphical log
BOREHOLE LOG
Client MURRAY STONE
BH No. BH 3
Page No. Page 1 of 1
Date drilled: 17/08/2023
Logged by: P Dullea
Equipment used SCHRAMM 450
National grid co-ordinates
Description
200 mm drilling
150 mm Steel Liner
50 mm plain HDPE
Bentonite
50 mm slotted HDPE
150 mm drilling
10 mm gravel
Estimated 3 m3/day @ 10m
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
32.0
Brown/Blue SANDSTONE (0–31m)
End of borehole 31 m

Appendix 8.3: Certificates of Analysis

Validated

CERTIFICATE OF ANALYSIS

SDG: 230905-76 **Report Number:** 703981 **Superseded Report:**

Client Ref.: Murray Stone **Location:** Drumbeagh

Results Legend	Customer Sample Ref.	QUARRY FLOOR					
# ISO17025 accredited.	Depth (m)	0.30 - 0.30					
M mCERTS accredited.	Sample Type	Soil/Solid (S)					
aq Aqueous / settled sample.	Date Sampled	31/08/2023					
diss.filt Dissolved / filtered sample.	Sample Time	14:45:00					
tot.unfilt Total / unfiltered sample.	Date Received	05/09/2023					
* Subcontracted - refer to subcontractor report for accreditation status.	SDG Ref	230905-76					
** % 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.	Lab Sample No.(s)	28582276					
(F) Trigger breach confirmed	AGS Reference						
1+4+(S) Sample deviation (see appendix)							

Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	10					
PCB congener 28	<3 µg/kg	TM168	<3 M					
PCB congener 52	<3 µg/kg	TM168	<3 M					
PCB congener 101	<3 µg/kg	TM168	<3 M					
PCB congener 118	<3 µg/kg	TM168	<3 M					
PCB congener 138	<3 µg/kg	TM168	<3 M					
PCB congener 153	<3 µg/kg	TM168	<3 M					
PCB congener 180	<3 µg/kg	TM168	<3 M					
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21					

16:02:15 14/09/2023

Page 5 of 14

Validated

CERTIFICATE OF ANALYSIS

SDG: 230905-76 **Report Number:** 703981 **Superseded Report:**

Client Ref.: Murray Stone **Location:** Drumbeagh

PAH by GCMS

Results Legend	Customer Sample Ref.	QUARRY FLOOR
# 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.		
☑ Trigger breach confirmed		
1+4+[g] Sample deviation (see appendix)	Depth (m)	0.30 - 0.30
	Sample Type	Soil/Solid (S)
	Date Sampled	31/08/2023
	Sample Time	14:45:00
	Date Received	05/09/2023
	SDG Ref	230905-76
	Lab Sample No.(s)	28582276
	AGS Reference	

Component	LOD/Units	Method						
Naphthalene-d8 % recovery**	%	TM218	87.2					
Acenaphthene-d10 % recovery**	%	TM218	93					
Phenanthrene-d10 % recovery**	%	TM218	93.6					
Chrysene-d12 % recovery**	%	TM218	83.7					
Perylene-d12 % recovery**	%	TM218	78.8					
Naphthalene	<9 µg/kg	TM218	<9 M					
Acenaphthylene	<12 µg/kg	TM218	<12 M					
Acenaphthene	<8 µg/kg	TM218	<8 M					
Fluorene	<10 µg/kg	TM218	<10 M					
Phenanthrene	<15 µg/kg	TM218	<15 M					
Anthracene	<16 µg/kg	TM218	<16 M					
Fluoranthene	<17 µg/kg	TM218	<17 M					
Pyrene	<15 µg/kg	TM218	<15 M					
Benz(a)anthracene	<14 µg/kg	TM218	<14 M					
Chrysene	<10 µg/kg	TM218	<10 M					
Benzo(b)fluoranthene	<15 µg/kg	TM218	<15 M					
Benzo(k)fluoranthene	<14 µg/kg	TM218	<14 M					
Benzo(a)pyrene	<15 µg/kg	TM218	<15 M					
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	<18 M					
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	<23 M					
Benzo(g,h,i)perylene	<24 µg/kg	TM218	<24 M					
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	<118					

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CERTIFICATE OF ANALYSIS

SDG: 230905-76 **Report Number:** 703981 **Superseded Report:**

Client Ref.: Murray Stone **Location:** Drumbeagh

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.		
			BOREHOLE3	BOREHOLE2(N)	BOREHOLE1(W)
Depth (m)			5.00 - 5.00	1.00 - 1.00	2.00 - 2.00
Sample Type			Ground Water (GW)	Ground Water (GW)	Ground Water (GW)
Date Sampled			31/08/2023	31/08/2023	31/08/2023
Sample Time			14:30:00	14:15:00	14:00:00
Date Received			05/09/2023	05/09/2023	05/09/2023
SDG Ref			230905-76	230905-76	230905-76
Lab Sample No.(s) AGS Reference			28582274	28582273	28582272
Naphthalene (aq)	<0.01 µg/l	TM178	0.0453 #	<0.01 #	<0.01 #
Acenaphthene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #
Acenaphthylene (aq)	<0.005 µg/l	TM178	<0.005 #	0.123 #	0.0222 #
Fluoranthene (aq)	<0.005 µg/l	TM178	0.0264 #	<0.005 #	<0.005 #
Anthracene (aq)	<0.005 µg/l	TM178	0.02 #	0.0114 #	<0.005 #
Phenanthrene (aq)	<0.005 µg/l	TM178	0.0511 #	0.0115 #	<0.005 #
Fluorene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #
Chrysene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #
Pyrene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178	<0.002 #	<0.002 #	<0.002 #
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178	<0.005 #	<0.005 #	<0.005 #
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178	0.143 #	0.146 #	<0.082 #

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CERTIFICATE OF ANALYSIS

SDG: 230905-76 **Report Number:** 703981 **Superseded Report:**
Client Ref.: Murray Stone **Location:** Drumbeagh

TPH CWG (S)

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.					
			QUARRY FLOOR					
Depth (m)			0.30 - 0.30					
Sample Type			Soil/Solid (S)					
Date Sampled			31/08/2023					
Sample Time			14:45:00					
Date Received			05/09/2023					
SDG Ref			230905-76					
Lab Sample No.(s)			28582276					
AGS Reference								
GRO Surrogate % recovery**	%	TM089	99					
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/kg	TM089	<10					
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/kg	TM089	<10					
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/kg	TM089	<10					
Aliphatics >C10-C12 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000 #					
Aliphatics >C12-C16 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000 #					
Aliphatics >C16-C21 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000 #					
Aliphatics >C21-C35 (EH_2D_AL_#1)	<1000 µg/kg	TM414	19300 #					
Aliphatics >C35-C44 (EH_2D_AL_#1)	<1000 µg/kg	TM414	6560					
Total Aliphatics >C10-C44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	25800					
Total Aliphatics & Aromatics >C10-C44 (EH_2D_Total_#1)	<10000 µg/kg	TM414	45800					
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/kg	TM089	<10					
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/kg	TM089	<10					
Aromatics >EC8-EC10 (HS_1D_AR)	<10 µg/kg	TM089	<10					
Aromatics > EC10-EC12 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000 #					
Aromatics > EC12-EC16 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000 #					
Aromatics > EC16-EC21 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000 #					
Aromatics > EC21-EC35 (EH_2D_AR_#1)	<1000 µg/kg	TM414	18700 #					
Aromatics >EC35-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000					
Aromatics > EC40-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000					
Total Aromatics > EC10-EC44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	20000					
Total Aliphatics & Aromatics >C5-C44 (EH_2D_Total_#1+HS_1D_Total)	<10000 µg/kg	TM414	45800					
Total Aliphatics >C5-C10 (HS_1D_AL_TOTAL)	<50 µg/kg	TM089	<50					
Total Aromatics >EC5-EC10 (HS_1D_AR_TOTAL)	<50 µg/kg	TM089	<50					
GRO >C5-C10 (HS_1D_TOTAL)	<20 µg/kg	TM089	<20					

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CERTIFICATE OF ANALYSIS

SDG: 230905-76 **Report Number:** 703981 **Superseded Report:**

Client Ref.: Murray Stone **Location:** Drumbeagh

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 [a] Sample deviation (see appendix)

Customer Sample Ref.	BOREHOLE3	BOREHOLE2(N)	BOREHOLE1(W)			
Depth (m)	5.00 - 5.00	1.00 - 1.00	2.00 - 2.00			
Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
Date Sampled	31/08/2023	31/08/2023	31/08/2023			
Sample Time	14:30:00	14:15:00	14:00:00			
Date Received	05/09/2023	05/09/2023	05/09/2023			
SDG Ref	230905-76	230905-76	230905-76			
Lab Sample No.(s)	28582274	28582273	28582272			
AGS Reference						

Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM245	85	81	77			
GRO >C5-C12	<50 µg/l	TM245	<50 #	<50 #	<50 #			
Aliphatics >C5-C6	<10 µg/l	TM245	<10	<10	<10			
Aliphatics >C6-C8	<10 µg/l	TM245	<10	<10	<10			
Aliphatics >C8-C10	<10 µg/l	TM245	<10	<10	<10			
Aliphatics >C10-C12	<10 µg/l	TM245	<10	<10	<10			
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	<10	<10	<10			
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	17	<10	<10			
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	42	<10	<10			
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	59	<10	<10			
Aromatics >EC5-EC7	<10 µg/l	TM245	<10	<10	<10			
Aromatics >EC7-EC8	<10 µg/l	TM245	<10	<10	<10			
Aromatics >EC8-EC10	<10 µg/l	TM245	<10	<10	<10			
Aromatics >EC10-EC12	<10 µg/l	TM245	<10	<10	<10			
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	<10	<10	<10			
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	<10	<10	<10			
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	<10	<10	<10			
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	<10	<10	<10			
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	59	<10	<10			
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174	59	<10	<10			

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CERTIFICATE OF ANALYSIS

SDG: 230905-76 **Report Number:** 703981 **Superseded Report:**
Client Ref.: Murray Stone **Location:** Drumbeagh

VOC MS (S)

Results Legend	Customer Sample Ref.	QUARRY FLOOR					
# ISO17025 accredited.	Depth (m)	0.30 - 0.30					
M mCERTS accredited.	Sample Type	Soil/Solid (S)					
aq Aqueous / settled sample.	Date Sampled	31/08/2023					
diss.filt Dissolved / filtered sample.	Sample Time	14:45:00					
tot.unfilt Total / unfiltered sample.	Date Received	05/09/2023					
* Subcontracted - refer to subcontractor report for accreditation status.	SDG Ref	230905-76					
** % 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.	Lab Sample No.(s)	28582276					
(F) Trigger breach confirmed	AGS Reference						
1+4+@ Sample deviation (see appendix)							

Component	LOD/Units	Method						
Dibromofluoromethane**	%	TM116	105					
Toluene-d8**	%	TM116	96.3					
4-Bromofluorobenzene**	%	TM116	77.5					
Methyl Tertiary Butyl Ether	<0.5 µg/kg	TM116	<0.5 M					
Benzene	<1 µg/kg	TM116	<1 M					
Toluene	<1 µg/kg	TM116	<1 M					
Ethylbenzene	<1 µg/kg	TM116	<1 M					
p/m-Xylene	<2 µg/kg	TM116	<2 #					
o-Xylene	<2 µg/kg	TM116	<2 M					
Sum of Detected Xylenes	<0.02 mg/kg	TM116	<0.02					
Sum of BTEX	<7 µg/kg	TM116	<7					

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CERTIFICATE OF ANALYSIS

SDG: 230905-76 **Report Number:** 703981 **Superseded Report:**
Client Ref.: Murray Stone **Location:** Drumbeagh

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
1-44 [g] Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BOREHOLE3	BOREHOLE2(N)	BOREHOLE1(W)			
			Depth (m)	5.00 - 5.00	1.00 - 1.00	2.00 - 2.00			
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
			Date Sampled	31/08/2023	31/08/2023	31/08/2023			
			Sample Time	14:30:00	14:15:00	14:00:00			
			Date Received	05/09/2023	05/09/2023	05/09/2023			
			SDG Ref	230905-76	230905-76	230905-76			
			Lab Sample No.(s)	28582274	28582273	28582272			
			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			

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CERTIFICATE OF ANALYSIS

SDG: 230905-76 **Report Number:** 703981 **Superseded Report:**

Client Ref.: Murray Stone **Location:** Drumbeagh

VOC MS (W)

Results Legend	Customer Sample Ref.	BOREHOLE3	BOREHOLE2(N)	BOREHOLE1(W)			
# ISO17025 accredited.	Depth (m)	5.00 - 5.00	1.00 - 1.00	2.00 - 2.00			
M mCERTS accredited.	Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
aq Aqueous / settled sample.	Date Sampled	31/08/2023	31/08/2023	31/08/2023			
diss.filt Dissolved / filtered sample.	Sample Time	14:30:00	14:15:00	14:00:00			
tot.unfiltTotal / unfiltered sample.	Date Received	05/09/2023	05/09/2023	05/09/2023			
* Subcontracted - refer to subcontractor report for accreditation status.	SDG Ref	230905-76	230905-76	230905-76			
** % 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	Lab Sample No.(s)	28582274	28582273	28582272			
(F) Trigger breach confirmed	AGS Reference						
1+#+@ Sample deviation (see appendix)							

Component	LOD/Units	Method						
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			

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