

Contents

Introduction.....	7-4
Background	7-4
Water Management	7-4
Scope of Work	7-6
Project Team	7-6
Limitations / Difficulties Encountered	7-6
Regulatory Background	7-6
Legislation	7-6
Planning Policy and Development Control	7-7
Guidelines and Technical Standards	7-8
Receiving Environment.....	7-8
Study Area.....	7-8
Baseline Study Methodology	7-9
Sources of Information.....	7-9
Detailed Site Investigations	7-10
Site Setting	7-11
Rainfall and Climate.....	7-11
Soils and Geology	7-12
Soils and Subsoils.....	7-12
Local Bedrock Geology	7-12
Karst	7-13
Groundwater - Hydrogeology	7-13
Aquifer Characteristics	7-13
Groundwater Vulnerability	7-14
Groundwater Bodies	7-15
Groundwater Supply Wells.....	7-15
Source Protection Areas	7-16
Groundwater Protection Scheme	7-17
Quarry Landholding Groundwater Monitoring Boreholes	7-18
Groundwater levels discussion.....	7-20
Groundwater Quality	7-23
Surface Water - Hydrology.....	7-24
Surface Water Bodies	7-24
Catchment.....	7-24
Flooding and Flood Risk.....	7-25
Water Framework Directive.....	7-26

RECEIVED: 05/12/2025

Surface Water Biological Quality in the Cross River and River Suck : Q Values.....	7-27
Surface Water Biological Quality in the Ballyglass River: Q Values	7-28
Surface Water Sampling	7-32
Surface Water Quality	7-33
Protected Areas	7-34
Water Environment Receptors.....	7-34
Receiving Environment - Baseline Summary	7-36
Impact Assessment	7-37
Evaluation Methodology	7-37
Construction and Operational Stage (No Mitigation)	7-37
Direct Impacts	7-38
Indirect Impacts	7-38
Cumulative Effects	7-39
Rating of Identified Potential Impacts	7-39
Significance of Impacts	7-39
Water Framework Directive	7-43
Mitigation Measures	7-43
Construction & Operational Stages	7-43
Assessment of Impacts with Mitigation Measures in Place	7-44
Residual Impact Assessment	7-45
Monitoring	7-45
References	7-46
Figures	
Appendices	
Appendix 7-A: Site Characterisation and Package WwTS with Percolation Area.....	
Appendix 7-B EU Directives / National Legislation and Regulations / Guidelines / Technical Standards	
Appendix 7-C Borehole Logs	
Appendix 7-D Field Record Sheets for Groundwater Monitoring and Surface Water Monitoring.	
Appendix 7-E Groundwater Screening Results	
Appendix 7-F Laboratory Results	
Appendix 7-G Biological Q Survey Data	
Appendix 7-H Surface Water Quality Results Screened	
Appendix 7-I Water Framework Directive Assessment	
Appendix 7-J 2004 Environmental Impact Assessment (EIS) Water Chapter	
Appendix 7-K Rating of Existing Environment Significance / Sensitivity	
Appendix 7-L Descriptions of Effects (EPA, 2022).....	
Appendix 7-M Classification of the Significance of Impacts	
Tables	
Table 7-1: Discharge flow estimates from 2004 Planning Application.....	7-5
Table 7-2: Discharge flow estimates for proposed development.....	7-5
Table 7-3: Required Information – Data Sources.....	7-9

Table 7-4: Average Monthly Rainfall (mm) 2024 for Athlone OPW	7-12
Table 7-5: Long Term Average Annual Rainfall (1981-2010), Mt. Dillon	7-12
Table 7-6: GSI Groundwater Vulnerability Rating	7-14
Table 7-7: Boreholes details (2003 and 2004)	7-18
Table 7-8: Details of 2023 Boreholes MW3 - MW6	7-19
Table 7-9: Summary of groundwater level logger data (August 2023 – April 2025)	7-21
Table 7-10: Summary of manual groundwater levels (August 2023 – April 2025)	7-21
Table 7-11: Cross River EPA Biological Water Quality Ratings	7-27
Table 7-12: River Suck EPA Biological Water Quality Ratings	7-28
Table 7-13: Q-Rating System and Invertebrate Indicator Groups	7-30
Table 7-14: Q-Rating and Assigned WFD Status	7-31
Table 7-15: Biological Water Quality Results for the Ballyglass River	7-32
Table 7-16: Existing Environment - Significance and Sensitivity / Importance	7-34
Table 7-17: Classification of Significance of Impacts (No Mitigation)	7-40
Table 7-18: Groundwater Quality (5 th August 2023)	7-56
Table 7-19: Groundwater Quality (11 th January 2024)	7-61
Table 7-20: Groundwater Quality (8 th October 2024)	7-65
Table 7-21: Freshwater Macroinvertebrate Taxa and Abundance (March 2025)	7-70
Table 7-22: Freshwater Macroinvertebrate Taxa and Abundance (July 2025)	7-71
Table 7-23: Description of Sampling Locations (July 2025)	7-72
Table 7-24: Surface Water Quality Results Screened	7-79

Figures

Figure 7-1: Onsite Borehole Locations Map
Figure 7-2: Karst Features Map
Figure 7-3: Surface Water Features Map
Figure 7-4: Bedrock Aquifer Map
Figure 7-5: Groundwater Vulnerability Map
Figure 7-6: Groundwater Body Map
Figure 7-7: Source Protection Areas

Introduction

Background

- 7.1 This Chapter of the Environmental Impact Assessment Report (EIAR) addresses the potential impacts on surface water and groundwater of the proposed development site of Cam Quarry, Brideswell, Co. Roscommon (currently permitted by P. Ref. 04/1479 and ABP PL20.215417).
- 7.2 It provides a description of the water, including surface water (hydrology) and groundwater (hydrogeology) conditions in the application area within the context of the site and regional setting, and assesses the potential impacts that the proposed development will have on surface water and groundwater. Mitigation measures, if required, are proposed.
- 7.3 Available information on the hydrology and hydrogeology of the Cam Quarry area and its surrounds was collated and evaluated. Refer to EIAR Chapter 2: Project Description for details of the site and a description of the proposed development.
- 7.4 Unmitigated potential impacts on hydrology and hydrogeology are considered for the initial assessment, before appropriate mitigation measures for the potential impacts identified are discussed, and then the identified potential impacts are reassessed assuming the identified mitigation measures are in place.
- 7.5 Impacts are focused on the quality and quantity of both surface water and groundwater. For the purposes of this assessment, the study area comprises the application site and the surrounding area up to 5 km radius around the site boundary.
- 7.6 The proposed site layout is shown on EIAR **Figure 2-2**. The overall proposed development area covers approximately 66.3 ha. (c. 163.8 acres). The proposed development includes the reduction of the previously permitted extraction area from 23.7 ha. to 17.1 ha. and the associated reduction of the overburden storage area required.

Water Management

- 7.7 There are no streams or surface water drainage channels within the immediate vicinity of the site.
- 7.8 Site drainage from the overall quarry is currently managed within the site by Roadstone. The quarry is currently worked without the need to discharge water off-site. Any rainfall or water ingress within the current quarry void is managed within the void where water accumulates in the lowest level of the quarry floor allowing the remainder of the quarry to remain dry for extraction operations.
- 7.9 As the quarry develops and deepens, and as the need arises, a water management system associated with discharge of treated clean water off-site will be installed and implemented. This water management system was granted permission under planning reference no. P. Ref. 04/1479 (ABP PL20.215417). The discharge of the treated clean water from the site will be carried out and will be subject to a Discharge Licence consent by Roscommon County Council. Calculations on the volume of water to be discharged were carried out in support of the 2004 Environmental Impact Statement (EIS) report associated with the original grant of planning permission at the site.
- 7.10 The discharge volumes are based on the 2004 EIA assessment and are set out below in **Table 7-1** for the 2004 discharge estimates and **Table 7-2** for the discharge estimates for the reduced quarry footprint area of 17.1 ha. proposed as part of this planning application.

- 7.11 The revised discharge volume include an uplift factor of 20% for predicted climate change based on the Office Of Public Works (OPW) modelled Mid-Range Future Scenario (MRFS) for climate change.

Table 7-1: Discharge flow estimates from 2004 Planning Application

Item	Detail
Discharge rate for 2004 quarry extraction area of 23.7 ha. (source - 2004 EIA)	2,600 m ³ /day
Discharge rate for 2004 extraction area including 20% uplift for Climate Change under OPW modelled MRFS	3,120 m ³ /day

Table 7-2: Discharge flow estimates for proposed development

Item	Detail
Discharge rate for quarry extraction area of 17.1 ha. (pro rata for quarry extraction area based on 2004 Planning Application)	1,876 m ³ /day
Discharge rate for quarry extraction area of 17.1 ha. including 20% uplift for Climate Change under OPW modelled MRFS	2,251 m ³ /day (0.03 m ³ /s)

- 7.12 When the need arises for dewatering, Roadstone will apply for an abstraction licence from the EPA, along with the discharge licence from the Local Authority in order to dewater and discharge water from the site to maintain dry working conditions, in line with the current permitted development under planning permission P. Ref. 04/1479 (ABP PL20.215417).
- 7.13 The off-site discharge surface water management system will consist of a sump to be provided on the floor of the quarry that will cater for increasing volumes of water which will require attenuation and treatment as the quarry deepening progresses.
- 7.14 Any surface water falling over the site will be directed to the sump along the northern quarry face. From here, the water will be pumped up to ground level to a water settlement pond. The water will pass through the settlement pond (c. 54 m x 15 m). From the settlement pond, the water will flow through a hydrocarbon interceptor before being discharged off site via a gravity fed buried pipe along the verge of the R363 road before discharge to the Ballyglass river.
- 7.15 A hydrological / hydrogeological assessment has been carried out taking into consideration the existing water regime at the quarry site and to determine what the requirements are for the proposed development. It addresses mitigation measures to eliminate and/or minimise the potential impacts, if any, on surface water and groundwater. These measures will be incorporated into the quarry design and operation.
- 7.16 There is a hard stand refuelling area with hydrocarbon separator at the refuelling station area. All runoff from the hard stand refuelling pad goes to the hydrocarbon separator before the treated runoff percolates to the ground.
- 7.17 Effluent from toilet facilities is treated using an existing Wastewater Treatment System (WwTS) and percolation area.
- 7.18 As part of this planning application, it is proposed to upgrade the overall effluent treatment system by decommissioning the existing WwTS and replacing it with a Secondary Wastewater Treatment System with a constructed soil polishing filter area for final

treatment. The existing WwTS will be decommissioned and the contents of the tank will be taken off site for appropriate treatment by a licenced contractor.

- 7.19 As part of documentation submitted with this planning application, a site characterisation assessment was undertaken in September 2025 for the new waste water treatment system by Dr. Eugene Bolton. The site characterisation form and details of the Secondary WwTS (Molloy Tanks: Chieftain SBR sewage treatment system) and polishing filter area (90m²) are included in **Appendix 7-A**.
- 7.20 The package WwTS is designed to cater for 30 staff on site with a Population Equivalent (PE) of eight persons, based on daily hydraulic load.

Scope of Work

- 7.21 The scope of this chapter includes:
- An assessment of the existing surface water and groundwater within approximately 5 km of the application area;
 - An assessment of the potential impact of the proposed development on surface water and groundwater; and
 - Where necessary, recommendation(s) for mitigation measures to reduce or eliminate any potential impacts.

Project Team

- 7.22 This chapter of the EIAR was prepared by SLR Consulting Ireland. The project team consists of:
- Dominica Baird Technical Director (Hydrogeology) BSc (Earth Science), MSc (Hydrogeology), CGeol, EurGeol;
 - Peter Glanville Technical Director (Hydrology & Hydrogeology) PGeo EurGeol and MCIWEM; and
 - Michelle Sherry Graduate Hydrogeologist BSc (Environmental Bio-Science).

Limitations / Difficulties Encountered

- 7.23 The evaluation of the hydrological and hydrogeological environment provided here relies on the detailed assessment, visual inspections conducted during site visits, a comprehensive dataset of monitoring records, publicly available information, and anecdotal evidence from local personnel.
- 7.24 No constraints or challenges were encountered during the compilation of this chapter in the EIAR.

Regulatory Background

Legislation

- 7.25 The key European Directives / European Union Legislation which apply to this Chapter of the EIAR and the hydrology and hydrogeology assessment presented herein are:
- Environmental Impact Assessment Directive (2011/92/EU); and

- Directive of the European Parliament and of the Council amending Directive 2011/92/EU on assessment of effects of certain public and private projects on the environment (2014/52/EU).
- 7.26 Other European Directives to which this EIAR makes reference, or has had regard, are listed in **Appendix 7-B**.
- 7.27 Irish Government Acts, National Legislation and Regulations which apply to this Chapter of the EIAR and the surface water and groundwater assessment presented herein are also listed in **Appendix 7-B**.
- 7.28 Most notably, under Regulation 4 of the Groundwater Regulations 2010, a duty is placed on public authorities to promote compliance with the requirements of the regulations and to take all reasonable steps including, where necessary, the implementation of programmes of measures, to:
- “(a) prevent or limit, as appropriate, the input of pollutants into groundwater and prevent the deterioration of the status of all bodies of groundwater;*
- (b) protect, enhance and restore all bodies of groundwater and ensure a balance between abstraction and recharge of groundwater with the aim of achieving good groundwater quantitative status and good groundwater chemical status by 2015 or, at the latest, by 2027;*
- (c) reverse any significant and sustained upward trend in the concentration of any pollutant resulting from the impact of human activity in order to progressively reduce pollution of groundwater;*
- (d) achieve compliance with any standards and objectives established for a groundwater dependent protected area included in the register of protected areas established under Regulation 8 of the 2003 Regulations [S.I. No. 722 of 2003] by not later than 2015, unless otherwise specified in the Community legislation under which the individual protected areas have been established.”*

Planning Policy and Development Control

- 7.29 The project site lies within the scope of the Roscommon County Development Plan 2022-2028.
- 7.30 The County Development Plan, under Section 7.9 Surface Water Drainage, sets out objectives in relation to the Water Framework Directive and the protection of water sources.
- 7.31 These objectives are set out under Infrastructure, Transport and Communications Policy Objectives.
- 7.32 **Objective ITC 7.36** states “Protect both ground and surface water resources including taking account of the impacts of climate change, support the implementation of the Rural Water Programme and to support Irish Water in the development and implementation of Drinking Water Safety Plans and the National Water Resources Plan”
- 7.33 **Objective ITC 7.48** states “Ensure new development is adequately serviced with surface water drainage infrastructure which meets the requirements of the Water Framework Directive, associated River Basin Management Plans and CFRAM Management Plans. Furthermore, the Council will undertake its obligations under the European Union (Good Agricultural Practice for Protection of Waters) Regulations 2017.”
- 7.34 Section 7.9 also states that, “For new developments, Roscommon County Council will require that all developments incorporate Sustainable Urban Drainage Systems (SuDS) as part of the development proposals. SuDS are effective technologies which aim to reduce flood risk, improve water quality and enhance biodiversity and amenity.”

Water (Hydrology & Hydrogeology) 7

- 7.35 The County Development Plan, under Section 10.10, also mentions the importance of the inland waterways in Roscommon, including the River Suck and the River Shannon, which are mentioned later in this EIAR chapter.
- 7.36 There are two National Heritage objectives set out in relation to Roscommon's waterways relevant to this EIAR.
- 7.37 **Objective NH 10.19** states "*Ensure that the county's watercourses are retained for their biodiversity and flood protection values and to conserve and enhance where possible, the wildlife habitats of the County's rivers and riparian zones, lakes, canals and streams which occur outside of designated areas to provide a network of habitats and biodiversity corridors throughout the county. The Council shall be available to engage with the NPWS with the objective of facilitating the monitoring and surveying of wetland sites in Roscommon.*"
- 7.38 **Objective NH 10.20** states "*Protect waterbodies and watercourses from inappropriate development, including rivers, streams, associated undeveloped riparian strips, wetlands and natural floodplains. To this effect, consideration should be given to Inland Fisheries Ireland's guidance document Planning for Watercourses in the Urban Environment (2020).*"
- 7.39 Under Section 10.6 of the Plan, the River Suck Callows is named as a County Geological Site and a National Heritage Area (NHA). In relation to the protection of NHA's in Roscommon, the following objective was set out.
- 7.40 **Objective NH 10.11** "*Preserve and protect sites of county geological importance from inappropriate development where they comprise designated sites or national heritage areas.*"

Guidelines and Technical Standards

- 7.41 The following key guidelines apply to this hydrology and hydrogeology assessment:
- Environmental Protection Agency (EPA), 2006. Environmental Management in the Extractive Industry: Non-Scheduled Minerals;
 - Geological Survey of Ireland (GSI) - Irish Concrete Federation (ICF), 2008. Geological Heritage Guidelines for the Extractive Industry;
 - Institute of Geologists of Ireland (IGI). Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements, April 2013;
 - Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports: Environmental Protection Agency;
 - National Roads Authority (NRA) (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
 - DEHLG and OPW, 2009. The Planning System and Flood Risk Management: Guidelines for Planning Authorities.
- 7.42 Additional guidelines and technical standards which apply to this report and the hydrology and hydrogeology assessment presented herein are listed in **Appendix 7-B**.

Receiving Environment

Study Area

- 7.43 For the purposes of this assessment, the study area comprises the application site and the surrounding area c. 5km from the site, reflecting the sensitivity of the hydrology and

hydrogeology; this is in line with the Institute of Geologists of Ireland's (IGI) guidelines (2013).

- 7.44 The IGI guidelines state that the minimum distance of 5km should be reviewed in the context of the hydrogeological / geological environment as well as the scale of development and increased to reflect the sensitivity of the subsurface with Limestone and karst geology present, and where present the distance should be increased to 5km to reflect the more complex karst geology. The use of a wider 5km radius for the study area is therefore considered to be a conservative approach.
- 7.45 The IGI guidelines also state that maps should be sourced to allow for the review of the geological and hydrogeological conditions that exist within a minimum of 5km of the site boundary for geology with Limestone and karst identified (from the outer limit of the planning and/or licence area) and presented at a scale of 1:25,000.

Baseline Study Methodology

- 7.46 The investigation methodology adheres to the Environmental Protection Agency's (EPA) 2022 guidelines on environmental impact assessments and the IGI's recommendations on Geology in Environmental Impact Statements (2013).
- 7.47 Existing data on the geology, hydrogeology, and hydrological characteristics of the area and its surroundings was collated and evaluated. Recent groundwater, surface water and groundwater level data is available for the Cam Quarry site. Data and information from an Environment Impact Statement (EIS) produced for Roadstone Ltd in 2004 was also collated and assessed.
- 7.48 The methodology for assessing hydrology and hydrogeology in the Cam area and the development vicinity is outlined as follows:
- A desk study, in which existing data and relevant regional data sources for the area were examined;
 - A review of the Proposed Development design details;
 - Review of all available water monitoring data;
 - Assess the potential impacts that the Proposed Development may have on the receiving water environment; and
 - Analyse and summarise the information gathered.

Sources of Information

- 7.49 The desk study involved the examination of available datasets to determine the geological and hydrogeological setting of the area (IGI, Required Information), together with all available studies and technical reports in time of preparation of this report, as detailed in Table 7-3.

Table 7-3: Required Information – Data Sources

Data	Dataset Source
Topography and aerial photography	• Tailte Éireann • GeoHive map viewer
Designated Sites	• Environmental Protection Agency (EPA); • Geological Heritage Sites and County Geological Sites; and

Data	Dataset Source
	Natura 2000 Sites (National Parks and Wildlife Service)
Bedrock Geology	GSI Groundwater Data Viewer - Bedrock Geology
Subsoil Geology	Subsoil mapping (GSI and EPA)
Soils	Irish Soils Information System (Teagasc)
Groundwater	- GSI Groundwater Data Viewer - bedrock and gravel aquifers, vulnerability, karst features, water supplies, groundwater recharge. - GSI Groundwater body description documents and - EPA water maps.
Surface Water	- Watercourses and water quality (EPA); - Water Framework Directive (EPA); and - Flooding (OPW CFRAM and NIFM maps).
Abstractions	Surface water and groundwater (EPA abstractions register)
Permitted Sites	EPA licence register
Rainfall/Climate data	Met Éireann
Environmental Pressures	Water Framework Directive (EPA)

Detailed Site Investigations

7.50 In addition to the above desk study of publicly available data, extensive data gathering has been undertaken at the site. The works carried out for assessing hydrology and hydrogeology in the Cam area is outlined as follows with the borehole locations shown on **Figure 7-1:**

- Drilling of four groundwater monitoring boreholes (MW3 - MW6) was undertaken in June 2023 by Petersen Drilling Services Ltd and supervised by SLR Consulting Ltd. The boreholes were drilled to between 35m and 67m depth below ground level;
- There are a number of pre-existing boreholes on-site, located around the processing areas in the quarry, which have been drilled at different times. All of the boreholes were found to be inadequate for monitoring;
- Groundwater level data loggers (Van Walt Rugged Troll 100) were installed on the 5th August 2023 in boreholes MW3 - MW6 by SLR Consulting Ltd and were set to take water level readings every hour;
- Quarterly manual dipping of groundwater wells and groundwater level logger downloads since August 2023;
- Three groundwater quality monitoring results at MW3 - MW6 from August 2023 to October 2024;
- The comprehensive Water Chapter from the Cam EIS report (2004) prepared by O'Neill Ground Water Engineering (OGE); and
- Hydrogeology report and calculations (2004 EIS Water Chapter, Appendix 3.4.1).

Site Setting

- 7.51 The application site is for the continued development of the Roadstone Cam Quarry (area c. 66.3 hectares) which lies in Curry and Cloonacaltry, County Roscommon and is located c. 4km west of Brideswell and 12km west of Athlone. The proposed site is located c. 12km west of the Dublin to Galway Motorway (M6) and is accessible from the M6 via the R362. The site is currently being used as an active limestone quarry and has an elevation of between 80m AOD and 110m AOD.
- 7.52 The surrounding landscape consists primarily of agricultural land with some areas of unmanaged scrub, wetland and bog. There are few residences in the immediate vicinity of the site. Most residences comprise of isolated farm dwellings and of owner-occupied bungalow/residences (Refer to EIAR **Figure 1-2**). There are no large residential settlements close to the site.
- 7.53 The land holding is surrounded by walls which separate it from reclaimed fields to the east and west. The lands surrounding the site consists of unimproved pasture and scrub land.
- 7.54 The area in the south of the site (where MW3 is located) is used as an overburden storage area. Other than its use as overburden storage, the remainder of this area appears to have been unmanaged, allowing for the development of a mosaic of semi-natural grassland and scrub.
- 7.55 The lands in the quarry are undulating with a hummocky topography varying in elevation from approximately 80 mAOD along the north, eastern and southeastern margins of the application site and rising in the central and western portion of the site to approximately 110 mAOD.
- 7.56 The Cam EIS (2004) notes that several lineaments are visible when assessing the topography of the application site. The possible lineament trending north-west to south-east may link Corkip Lough with a linear valley structure to the north-west and probable enclosed depression in the north part of the application site. This lineament may represent a fault that has undergone preferential weathering and karstification. Another less developed lineament /fault like structure can be seen on the south-western flank of the hill forming the central upland area of the site which has a north-west to south trend although this swings to a north-northwest-south-southeast trend southwards. A third lineament is seen on the north-western faces of the hill form the uplands of the application site, Cam Hill and a hill to north of the townland of Boleyduff form a general south-west to north-east trend.
- 7.57 There are three surface water systems at the proposed development area. The Ballyglass system which features Coolagarry Lough, Cuilleenirwan Lough (turlough) and Ballyglass River (BALLYGLASS_010) which flows into the River Suck (SUCK_0130). The Cross River System which features the Corkip Lough and the Cross River (CROSS (ROSCOMMON)_010), which is located c. 2km north of the quarry. It flow downwards in an easterly direction towards Athlone where it eventually flows into the River Shannon (located c. 13.7km southeast of the site). The Killeglan System located south of the site features the Killeglan River, located c. 3.6km south of site, the Killeglan Public Water Supply (PWS) and Feacle Lough.

Rainfall and Climate

- 7.58 The nearest Met Éireann rainfall gauging station to the proposed application site is Athlone OPW which is c. 14.4km east of the site. The monthly precipitation amount (mm) for 2024 is tabulated in **Table 7-4**.

Table 7-4: Average Monthly Rainfall (mm) 2024 for Athlone OPW

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
68.9	106.9	108.7	71.4	58.1	27.3	43.8	84.1	30.6	71.8	78.5	66

7.59 There is no Long-Term Average (LTA) annual rainfall data available for Athlone O.P.W so the nearest Met Éireann station with LTA available was chosen instead. Mt. Dillon, which is c. 28.8km northeast of the site is the closest station with this data. The most recent period published is 1981-2010. The LTA annual rainfall for Mt Dillon is 1047.1mm/yr for the period 1981-2010 (Met Éireann, 2021). The LTA monthly rainfall for the period 1981-2010 are shown in **Table 7-5** below.

Table 7-5: Long Term Average Annual Rainfall (1981-2010), Mt. Dillon

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
105.0	77.7	88.2	66.6	70.5	74.2	73.1	88.3	79.4	111.8	102.4	109.8

7.60 According to Met Éireann's Past Weather Statement, 2024 was defined as being mild and wet during the first half of the year and dry for the second half. The highest daily rainfall total was 57.4 mm at Knock Airport, Co. Mayo on Saturday 23rd November. According to the report, all monthly rainfall totals from across Ireland were below their LTA.

Soils and Geology

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

Soils and Subsoils

- 7.62 The Irish Soil Information System project has developed a national association soil map for Ireland; the project is co-funded by Teagasc and the Environmental Protection Agency (EPA). The soils are discussed in detail in Chapter 6 of this EIAR.
- 7.63 The soils surrounding the overall Quarry landholding are a mixture between fine loamy drift with limestone stones known as the Rathowen Association (1030RA) and coarse loamy over calcareous gravels known as Baggotstown (1150BG), see **Figure 6-2**.
- 7.64 The EPA website publishes subsoil maps created by the Spatial Analysis Unit and Teagasc in collaboration with the Geological Survey Ireland (GSI). The subsoils are discussed in detail in Chapter 6 of this EIAR.
- 7.65 The subsoils at the site are limestone till (Carboniferous) which are mainly derived from calcareous parent materials. These subsoils are moderately permeable. Other subsoils at the site include poorly drained mineral tills chiefly derived from Limestone, see **Figure 6-3**. These subsoils are classified as being moderately permeable (GSI online map viewer).

Local Bedrock Geology

7.66 The GSI online map viewer (1:100,000 geology map) shows the site is underlain by undifferentiated limestone known as Visean Limestones. The local bedrock geology is shown in **Figure 6-4**. Rock core logs retrieved from the boreholes drilled in 2004, indicated that the limestone is a grey, crystalline and bioclastic with corals, brachiopods and crinoid fragments.

- 7.67 These rocks have experienced partial karstification, resulting in numerous clay-filled fractures and fissures. These fissures and fractures are most likely associated with the area's main faulting and jointing pattern, which is thought to be south-west to north-east and north-west to south-east, reflecting the wider regional faulting pattern around the site. The regional fault patterns can be seen on GSI's bedrock geology maps.

Karst

- 7.68 There are several karst features recorded by the GSI and located within 5km of the proposed application site, see **Figure 7-2**. There are tens of enclosed depressions located in the surrounding of the proposed development, except to the east of the site. The closest enclosed depression is located c. 200m north of the site. The closest turlough is Feacle Lough, located approximately 550m southeast of the site boundary (reference IE_GSI_Karst_40K_949). Cuileenirwan Lough located approximately 1.4km north of the site (reference IE_GSI_Karst_40K_948). Corkip turlough is located approximately 2km southeast of the site boundary (IE_GSI_Karst_40K_950). A traced underground connection between Corkip turlough and Killeglan Spring to the southeast was confirmed by the GSI.
- 7.69 According to the 2004 Cam EIS, a further three possible enclosed depressions were identified in the northern section of the application site but were not featured on GSI's karst map database. These could be potential links between surface water and groundwater.
- 7.70 The Feacle Turlough is a proposed National Heritage Area (pNHA) and Corkip is protected as a Special Area of Conservation (SAC) called the Ballynamona Bog and Corkip Lough SAC.
- 7.71 The Cuileenirwan Lough feeds into the Ballyglass River. Unlike Corkip Lough and Feacle Lough, the water depth at Cuileenirwan Lough does not appear to fluctuate a significant amount seasonally. The 2004 EIS stated that the surface water level at Coolagarry Lough, connected to Cuileenirwan Lough, was 65 mAOD.
- 7.72 A study of the turloughs was carried out as part of the 2004 EIA application, and details are provided in **Appendix 7-J**. The extractive area of the quarry is located within the unfractured bedrock where the permeability is low and steep hydraulic gradient is likely to develop behind the quarry faces. Limited seepage of ground water may occur from the areas more fractured and karstified bedrock. However since Feacle Lough and Corkip Lough are fed by ground water predominantly from the epikarst the proposed development is unlikely to significantly impact on these.

Groundwater - Hydrogeology

Aquifer Characteristics

- 7.73 The GSI online map viewer shows the site is underlain by a regionally important karstic aquifer (Rkc). This aquifer is defined as being an aquifer capable of sustaining significant yields and supplying regionally important supplies, see **Figure 7-4**. The aquifer has an area of 1,099 km².
- 7.74 As part of the O'Neill Groundwater Engineering (OGE) hydrogeological investigations carried out for the Cam EIS (2004), a 72 hour pumping test was commenced on the 28th June 2004, and completed on the 1st July 2004. A hydrogeological report based upon the findings of the pump test was compiled by OGE, and is presented as Appendix 3.4.1 in the EIS chapter in **Appendix 7-J**.

- 7.75 Hydraulic gradients in the less fractured bedrock was noted at approximately 0.07 whereas in the fractured and karstified bedrock the hydraulic gradient falls to approximately 0.007.
- 7.76 Analyses of the time/drawdown graphs for the nearest monitoring well (Borehole BH10) during the pumping test suggested a Transmissivity (T) value of 12m²/d, and a storativity value of 1.4×10^{-4} . The geomean figure for Rkc from the GSI's Irish Aquifer Properties Manual 2015 is 20 m²/d. Assuming an aquifer thickness of 38 metres, then the Hydraulic Conductivity of the aquifer in this location is 0.14m/d (1.66×10^{-6} m/s). This Hydraulic Conductivity value would be considered medium to low. The GSI estimate for Rkc is 0.53m/d.
- 7.77 The Pumping Well (PW2A) is located within a zone of fractured bedrock. The value of Hydraulic Conductivity recorded is therefore likely to be at the upper range of values for the bedrock beneath the site as a whole.
- 7.78 The 2004 EIS notes that the geology of the application site and its environs is controlled by two sets of faults. The primary fault trend is north-west or north-northwest to south-east or south-southeast. The secondary fault trends north-east to south-west. These faults may have been preferentially weathered and karstified. The primary conduits for ground water flow beneath the site will be along these faults. The direction of groundwater flow beneath the site is influenced by both the topography and the structural bedrock geology. Surface water catchment areas do not define the boundaries of the groundwater catchment areas. Groundwater can move from one surface water catchment to another through groundwater conduits.

Groundwater Vulnerability

- 7.79 The GSI has developed a groundwater vulnerability classification for Ireland, refer to **Table 7-6** below. The groundwater vulnerability at a particular point is controlled by the natural geological and hydrogeological characteristics at that point. The vulnerability depends on the nature of the subsoils (i.e. their permeability characteristics), the type of recharge (point or diffuse) and the thickness of the unsaturated zone (depth to groundwater).
- 7.80 The groundwater vulnerability at the site is classed as High, see **Figure 7-5**.

Table 7-6: GSI Groundwater Vulnerability Rating

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand / gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/Gravel aquifers only)	(< 30 m radius)
Extreme (E)	0-3.0m	0-3.0m	0-3.0m	0-3.0m	-
High (H)	>3.0m	3.0-10.0m	3.0-5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0-10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A
Notes: (i) N/A= not applicable (ii) Precise permeability value cannot be given at present. (iii) Release point of contaminants is assumed to be 1-2m below ground surface.					

- 7.81 According to the GSI online database, the hydrogeological setting of the proposed development is described as having moderate permeability subsoil. The effective rainfall (rainfall after evaporation) is 565.60 mm/yr. The groundwater recharge at the site is 339.36 mm/yr and no recharge cap applies to this site.

Groundwater Bodies

- 7.82 The proposed development is located within the Suck South Groundwater Body (GWB). A description of the GWB is published by the GSI and is summarised below and refers to the karst limestone bedrock underlying the limestone till deposits at the site. The Funshinagh GWB is located to the east of the site. Groundwater bodies are shown in **Figure 7-6**.

Suck South GWB

- 7.83 This groundwater body has an area of 1,099km² and is bordered by twelve other GWBs. The Suck South GWB received a Good WFD status during the 2016-2021 period. The Suck South GWB is considered to be “Not at Risk”. Most of the surrounding GWBs are also considered “Not at Risk of deteriorating in quality” except for the GWDTE-Rahasane Turlough (SAC000322) GWB (located on the southwest border of the Suck South GWB) which is considered “At Risk”.
- 7.84 Groundwater is recharged in this GWB through both point and diffuse recharge. Point recharge occurs as a result of karst features such as swallow holes and collapse features. Diffuse recharge is the dominant recharge mechanism in the GWB and it occurs via rainfall percolating through the subsoil. It is evident by the lack of surface drainage that potential recharge regularly infiltrates into the aquifer. The subsoil in the GWB is of predominantly moderate permeability so it's unlikely that recharge from percolation will be restricted. Recharge may get rejected in low lying areas where there is a high water table due to limited storage space.
- 7.85 Groundwater in this GWB is typically unconfined and most of the groundwater flow is found in the upper epikarst layer and in zones of interconnected fissures which have been enlarged by karstification. These fissures are typically 30m deep. Groundwater storage is low in karstified aquifers so there is a limited capacity for contaminant reduction.
- 7.86 Across the GWB, groundwater varies in hardness, alkalinity and conductivity. High turbidity was observed after periods of heavy rainfall due to sediment which had collected in fissures and cavities being washed out or where groundwater has a direct link to surface water containing sediment (such as in swallow holes).
- 7.87 According to the GSI's GWB Description Report, karstification is widespread in this GWB. Current records of karst features are considered to represent only a fraction of existing features. As with most karstic systems, permeability and transmissivity data are very variable. Transmissivity in karstified aquifers with conduit flow can range up to a few thousand m² /d. A pumping test carried out within this GWB at Ballinlough estimated a bulk transmissivity of 80 m² /d to 90 m² /d although the transmissivity of the intensely fractured zone is estimated as 400 m² /d (K.T. Cullen & Co., 1999). The aquifer supports a large number of high and intermediate yielding springs. Rapid groundwater flow velocities have been recorded. Rapid velocities recorded for groundwater in these areas imply flow through relatively sizeable conduits. Storativity in this aquifer will be low.

Groundwater Supply Wells

- 7.88 A survey of private water supplies was carried out to support the 2004 EIA application. The majority of the residences within the study area are on public water mains supply, so it was

- found there was little reliance on ground water. All the houses and farms in the local area use septic tanks.
- 7.89 The Cam area is within the Uisce Éireann Killeglan South Roscommon Regional Water Supply Scheme.
- 7.90 The Geological Survey Ireland (GSI) has a historical online database of wells and springs in Ireland; however it is noted that the well database is updated. According to the GSI well database there are a number of wells within a 2km radius of the site. The wells abstract from the regionally important Rkc karstified bedrock aquifer. The distances below are taken from the centre of the locational accuracy radius.
- 7.91 The closest GSI recorded well is an agricultural and domestic well located across from the entrance of the quarry (GSI name 1723NEW012), c. 700m north of the site. This well was drilled in March 1971 and reports a depth of 46m with a 5.8m depth to rock. The yield class is noted as poor (10.9 m³/day).
- 7.92 There is another well located just on the southern border of the site. This well is a domestic and agricultural well (GSI name 1723NEW024). The well was drilled in November 1971 and has a depth of 8.5m with a depth to rock of 8.5m. The well is classified as poor with a yield of 21.8 m³/day.
- 7.93 There are several other wells within 2km of the site which are of domestic / agricultural / unknown use or are used a public supply (Co Co) well. These wells range from having a yield class of poor to moderate.

Source Protection Areas

- 7.94 The Killeglan Public Water Supply (PWS) Source Protection Area, which exploits the Tobermore Spring, is located within the site redline boundary and along the southern border of the existing quarry and abstracts approximately 7,000 m³/day (see **Figure 7-7**). The Killeglan River flows in a west-south-westerly direction where it discharges to the River Suck. Feacle Lough is also located within this system.
- 7.95 The surface hydrology featured in the zone of contribution to the Killeglan Public Water Supply is quoted directly from the work of Kelly and Lee (2003):

"The surface water regime is closely interconnected with the groundwater regime. There are several springs, swallow holes and numerous collapse features that are linked to the main surface water bodies in the area.

There are four main stream networks in the vicinity of Tobermore Spring. These are as follows:

- i. Just north of Taghmaconnell, a stream rises in the townland of Bellaneeny. This stream flows west for approximately 4 km, to join the Killeglan River, which then discharges in the River Suck.*
- ii. A stream network exists to the south of Taghmaconnell, in the townlands of Knock and Sraduff. These streams flow to a turlough in the townland of Glennanea. This turlough appears to take all the flow from the stream network. Another section of stream rises east of this network and then disappears after flowing approximately 1 km to the north-east.*
- iii. An intermittent, seasonal stream is located to the east of the Tobermore Spring. This stream rises in the townland of Carrowduff and Garbally, and travels first north and then east. During wet weather the upper parts of the stream are flowing. Groundwater from the Tobermore Spring and discharge area joins this channel to form the head of the Killeglan River.*

- iv. *A small stream network is located in the townland of Esker. This stream network is recorded as having permanent flow, but has no apparent surface outlet. It is therefore likely that this area of surface water feeds into the groundwater system.*

The majority of outflow from this area is via the Killeglan River, which includes the Tobermore Spring discharge. A second smaller outflow is through the stream at Bellaneeny, south of the springs.”

- 7.96 The EPA carried out a site visit of the PWS on 16/04/2024, and issued a Site Visit Report, reference SV29550 - Uisce Éireann. The Site Visit Report states that the Killeglan PWS serves a population of 7,341. The drinking water treatment plant has three raw water sources comprising of two boreholes and a spring source however only the spring source is currently in use. The plant produces approximately 4,400m³ of treated water daily based on 20 hours production. The design capacity of the plant is 350m³/hour. Treatment consists of chemical conditioning, coagulation, flocculation (DAF), filtration, UV, chlorination, and fluoridation. There is one reservoir serving the plant with a capacity of 2,650m³ (6-7 hours storage). The plant is operated by Glanua under contract to Uisce Éireann. The spring source is situated in a highly karstified region which is classified as extremely vulnerable. The audit was conducted to examine all aspects of the treatment plant with a focus on compliance with the aluminium parametric value for drinking water. The Site Visit Report outlined a number of recommendations, including conducting a review of plant processes and controls to enable sustainable compliance with the aluminium parametric value in the public water supply.
- 7.97 The 2004 Water EIA application included calculations on the impact on the water supply from the lowering of the groundwater at the quarry. The calculations are presented in the Response to the RFI in **Appendix 7-J**. The likely impact on the Killeglan PWS from discharges of ground water that will ingress into the quarry are negligible, probably less than 1%.
- 7.98 There is no group water supply source protection area within the vicinity of the proposed site. The closest Group Water Scheme (GWS) Source Protection Area, Lowville No. 1, is located c. 15.5km southwest of the site.

Groundwater Protection Scheme

- 7.99 The County Roscommon Groundwater Protection Scheme (GWPS) published in June 2003, following The Geological Survey of Ireland (GSI), the Department of Environment and Local Government (DoELG) and the Environmental Protection Agency (EPA) methodology for the preparation of groundwater protection schemes (DoELG/EPA/GSI, 1999). The following is noted from the GWPS report.
- 7.100 At the time of writing, 12 public water schemes and 47 group water schemes were identified in Roscommon that were supplied by groundwater. The 12 public water schemes make up for about 73% of the water abstracted in the county.
- 7.101 Water samples were taken from 28 Public/Group Water Scheme wells in areas of Undifferentiated Visean Limestone for analysis and found that they mainly consisted of bicarbonate and calcium ions. The total hardness ranged from hard (250-350 mg/l CaCO₃) to very hard (>350 mg/l CaCO₃) and had a neutral pH.
- 7.102 A second report on Groundwater quality within Roscommon was also drafted. This report stated that the Killeglan Water Supply exceeded GSI's guide levels for phosphate and the potassium to sodium ratio. It also exceeded the EU MAC values for ammonia and potassium. Faecal coliforms in excess of 10 were also discovered in the water samples. According to the report, these results indicate that slurry or manure spreading from a nearby farm are the most likely cause of contamination.

Quarry Landholding Groundwater Monitoring Boreholes

- 7.103 There were previously fifteen groundwater monitoring well locations in total within the quarry landholding. Prior to 2023, only eleven boreholes existed on site. However, it was determined that these pre-existing boreholes were not viable for groundwater monitoring. Hence, four new wells were installed in 2023 for monitoring groundwater quality and groundwater levels using data loggers.
- 7.104 In 2004, O'Neill Ground Water Engineering carried out a hydrological investigation in Cam as part of an Environmental Impact Statement (EIS) for the original quarry planning application. In this EIS, it stated that Roadstone Provinces Ltd (Now Roadstone Ltd) drilled nine cored boreholes in June 2003 and as part of the hydrological investigation, O'Neill Ground Water Engineering drilled five more boreholes between March and May 2004, although two of them were terminated and backfilled. A list of these aforementioned boreholes and their details are presented in **Table 7-7** below.

Table 7-7: Boreholes details (2003 and 2004)

BH Ref.	Easting, Northing (ING)	Ground Level Elevation (m AOD)	Depth of well (m bgl)	Depth to water (m bgl)	Depth to water (m AOD.)	Date Drilled
BH1	E190455 N244044	84.20	46	16.51	67.70	June 2003
BH3	E190099 N244700	101.58	61.40	46.86	54.72	June 2003
BH5	E190606 N244222	95.99	84.50	41.85	54.14	June 2003
BH6	E190211 N244403	99.48	60	28.73	70.75	June 2003
BH8	E189939 N244576	91.00	61.40	35.36	55.64	June 2003
BH9	E189933 N244912	96.48	62	28.40	68.09	June 2003
BH10	E190273 N244912	96.71	61.80	41.89	54.82	June 2003
BH11	E189894 N245238	87.35	56	26.04	61.31	June 2003
MW1	E190056 N244348	88.40	39	34.61	53.79	22/03/2004
MW2	E190427 N245328	90.28	39	27.26	63.02	19/03/2004
PW2A	E190281 N2448897	96.84	80	42.60	60.40	26/04/04- 10/05/05

- 7.105 The four new wells (MW3, MW4, MW5 and MW6) were drilled in June 2023 by Peterson Drilling Ltd and supervised by SLR Consulting personnel. Each borehole was drilled to a depth between 35m and 67m. The boreholes each had a gravel pack installed in the annular space between the slotted casing and the borehole. A bentonite seal was installed above the gravel pack to prevent the entry of surface water runoff from surrounding areas

flowing directly into the boreholes. They were fitted with a stand-up cover with a concrete surround. Borehole logs are presented in **Appendix 7-C**.

- 7.106 Borehole MW3 is located south of quarry void, between the quarry void and Public Water Supply inner source protection area; borehole MW4 is located northeast of the quarry void; borehole MW5 is located in the central area of quarry void and upgradient of Public Water Supply inner source protection area. Borehole MW6 is located upgradient of the quarry void. The groundwater monitoring borehole locations are presented **Figure 7-1**.
- 7.107 The ground conditions encountered consisted of medium dense gravelly Sand, which ranged in thickness from 1.1m at MW5 to 6.1m at MW 4. This is underlain by weathered grey Limestone, which ranged in thickness from 1.1m at MW6 to 13.6m at MW5. The weathered limestone at MW6 had highly fractured rock zones with clay infill. The weathered limestone is underlain by strong grey limestone with rare fractures, proven to depths of up to 67m bgl at MW6. During drilling MW3 collapsed at 21.5m due to highly unstable clay. The standpipe was pushed to 36m through the clay. Water strikes were encountered at all locations except MW3.
- 7.108 Details of the groundwater monitoring boreholes installed on the Quarry landholding are presented in **Table 7-8**.

Table 7-8: Details of 2023 Boreholes MW3 - MW6

	MW3	MW4	MW5	MW6
Easting, Northing (I.T.M)	589943 744232	590373 745364	590238 745008	589959 745326
Ground Level Elevation (m AOD)	84.26	90.05	87.89	86.38
Reference Level* Elevation (m AOD)	84.66	90.41	88.30	86.72
Depth (m bgl)	36	59.5	56.50	67.00
Fractures (m bgl)	Occasional	Rare to Frequent	Rare	Rare
Water strikes (m bgl)	No water strike encountered	51.50	Seepage at 27.00 Rapid Flow at 42.00	Seepage at 22.00 Slow flow at 42.00
Standpipe installation (m bgl)	Plain 0 – 27, Slotted 27 – 36	Plain 0 – 44.50, Slotted 44.50 – 59.5	Plain 0 – 29.50, Slotted 29.50 – 56.50	Plain 0 – 37, Slotted 37 – 67
Gravel pack installation (m bgl)	Backfill Bentonite 12 – 16, Gravel 16-36	Backfill, Bentonite 40 – 43, Gravel 43 – 59.5	Backfill Bentonite 24 – 27, Gravel 27 – 56.50	Backfill Bentonite 30 – 35, Gravel 35 – 67
* Top of uPVC standpipe				

Groundwater Levels Discussion

- 7.109 Manual groundwater levels have been taken from MW3 – MW6 on a quarterly basis since August 2023 by SLR personnel. These manual readings were used to calibrate, verify and adjust the logger groundwater level data. Manual readings coupled with barometric data were used to correct the logger groundwater data for the site conditions.
- 7.110 Four water level loggers were placed in MW3, MW4, MW5 and MW6 on the 3rd August 2023 and set to record a groundwater level every hour. On the 23rd January 2025, the logger settings were reset to record a groundwater level every six hours. Groundwater level data from August 2023 to April 2025 is shown in **Chart 7-1** below.
- 7.111 A barometer was installed in borehole MW5 and set to take readings every hour. The barometer records variations in atmospheric pressure. One barometer is sufficient for a 25 km² area, therefore only one is needed for this site.
- 7.112 No rainfall gauge station was established on the site. Therefore, rainfall data was taken from Ballinasloe (Derrymullan) which is the closest rainfall gauging station c. 14.3km south-west.
- 7.113 At the time of writing this report, rainfall data is only available up to February 28th, 2025, and is graphed against groundwater levels in **Chart 7-1**. A summary of the groundwater levels recorded by the data loggers can be seen in **Chart 7-1** below. The groundwater levels manually recorded are summarised in **Table 7-9** and a combination of the groundwater levels is summarised in **Chart 7-1**. As previously mentioned, 2024 was defined as being mild and wet during the first half of the year and dry for the second half and all monthly rainfall totals were below their LTA 1981-2020.
- 7.114 A review of groundwater level data (maximum, average, minimum) in relation to the reference datum (mAOD) allows the hydraulic head at each location to be estimated. The groundwater flow can also be estimated. Groundwater levels are lower in MW3, MW4 and MW5, located the south to south-east of the quarry, and higher in MW6, located in the north-northwest of the quarry. This indicates a general groundwater flow direction of north-north-west to south-south-east.
- 7.115 Between 2023,2024 and January-April 2025, there has been limited variation in all four monitoring wells. MW3 and MW4 show greater groundwater fluctuation compared to MW5 and MW6. Since monitoring began, MW3 shows the highest range of 13.76 m, with a maximum groundwater level of 67.34m AOD and a minimum groundwater level of 53.59m AOD. The least variation can be seen in MW4 and MW6 with a range of 8.15m and 10.78, a maximum of 65m AOD and 75.2m AOD, and a minimum groundwater level of 56.85m AOD and 64.42m AOD. MW5 shows a range of 11.95m, with a maximum groundwater level of 63.85m AOD and a minimum groundwater level of 51.90m AOD.
- 7.116 There are a number of sharp, rapid, fluctuations that can be seen in MW3 and MW4, particularly throughout the October 2023 – April 2024 monitoring period. This period is accompanied by greater 'rain' days (over 2 mm rainfall in a 24-hour period). These fluctuations taper after April 2024, where less rainfall events occur over the summer months. From May 2024 to September 2024, groundwater levels (aMOD) in MW3, MW4 and MW5 show a decreasing trend, and from July - September 2024 in MW6, as seen on **Chart 7-1**.
- 7.117 The groundwater level decreased below the level of the loggers in borehole MW6 during 9th February 2024 to 11th May 2024 monitoring period, which was illustrated by a straight horizontal line on **Chart 7-1**. It appears that throughout the 2023,2024 and up-to-date 2025 monitoring period groundwater levels, while still variable, have remained above the level of the logger, allowing the full range of groundwater levels to be observed.

- 7.118 The groundwater levels in MW3 and MW4 correlate strongly with rainfall events and groundwater level response appears to quickly return to 'baseline' levels. This is particularly evident by more significant rainfall events in mid-2023 to late 2024, with less significant rainfall events throughout 2024.
- 7.119 The groundwater levels in MW5 show a flatlined pattern which is less reactive to heavy rainfall events. Groundwater levels (mAOD) slightly increased in September 2023, before dipping to their lowest range from September to November 2024. Groundwater levels returned to their 'typical' range in mid-December 2024, following a significant rainfall event on the 22nd of November where 34.3mm of rainfall fell in a 24-hour period. From May 2025, groundwater levels have shown a slight downward trend.
- 7.120 The groundwater levels in MW6 shows a similar pattern to MW5 and appear to stay continual and have no significant reaction to heavy or light rainfall events, with the exception of the 22nd of November rainfall event. During extended periods of no rain or limited rainfall, the groundwater levels remain similar. However from July – November the groundwater level in MW6 is significantly lower, decreasing by ~10 meters.

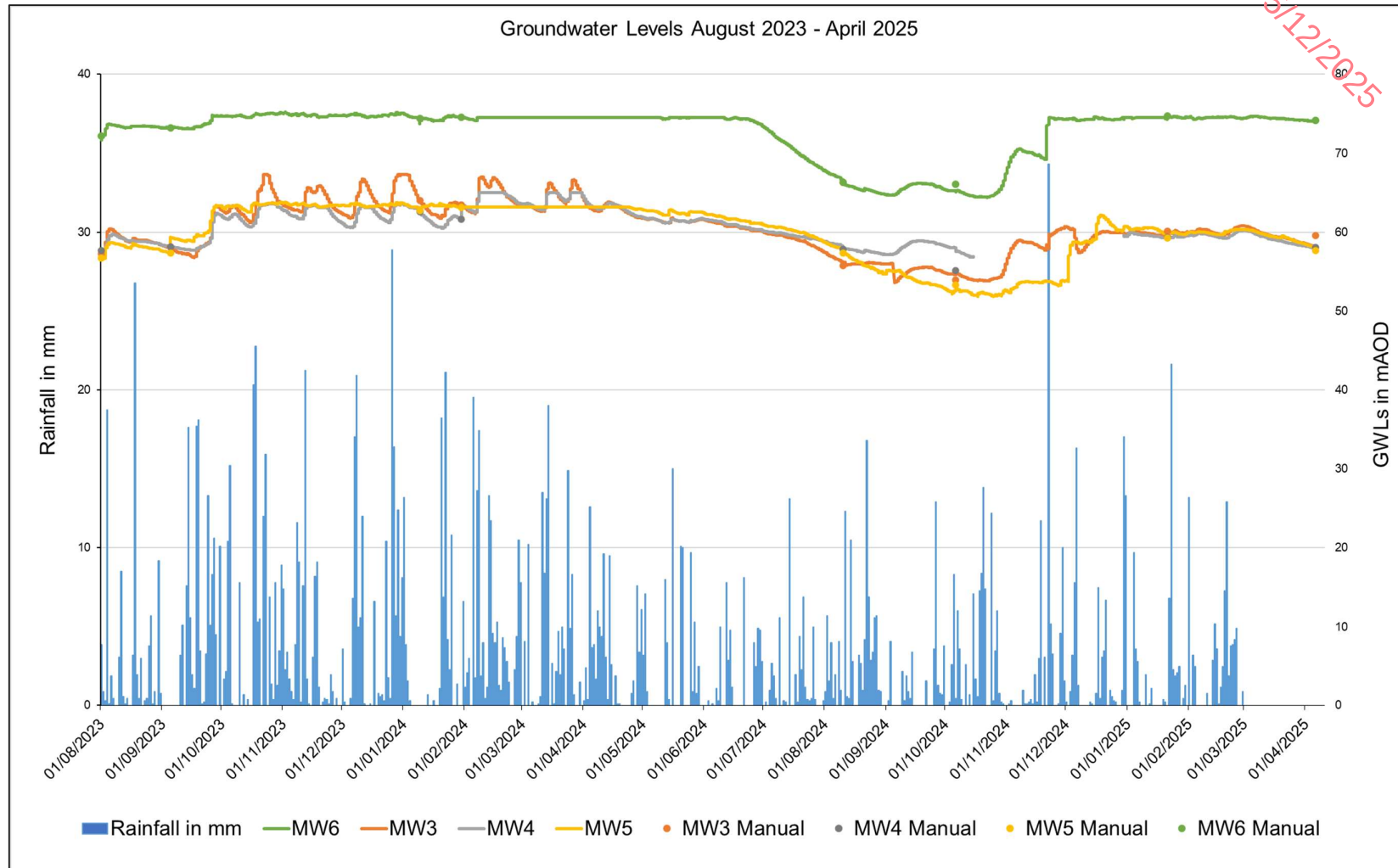
Table 7-9: Summary of groundwater level logger data (August 2023 – April 2025)

		MW3	MW4	MW5	MW6
Strata			Limestone	Limestone	Limestone
mAOD	Minimum	53.59	56.85	51.90	64.42
	Average	60.59	60.94	60.09	72.51
	Maximum	67.34	65	63.85	75.20
m	Range	13.76	8.15	11.95	10.78

Table 7-10: Summary of manual groundwater levels (August 2023 – April 2025)

	Units	MW3	MW4	MW5	MW6
Min	m AOD	53.97	55.17	53.36	66.06
Max	m AOD	64.01	62.63	63.14	74.73
Range	m	10.04	7.46	9.78	8.67

Chart 7-1: Groundwater levels at on-site boreholes and on-site rainfall



Groundwater Quality

Groundwater Quality Methodology

- 7.121 Groundwater quality monitoring was carried out on 5th August 2023, 11th January 2024 and 8th October 2024. The samples were collected by SLR personnel. A Waterra pump and tubing were used to pump water from depth in the borehole and ensure that recent surface water inflow was not collected. Each borehole was purged of three well volumes prior to taking the groundwater sample. Where the groundwater level was too deep to use the pump, the well was sampled using a bailer.
- 7.122 The samples were collected in the appropriate sample containers, which are supplied by the laboratory for the required analysis. Sample containers were filled so that there was minimum free air space. The containers were securely sealed so that there was no loss of volatile components such as moisture and no separation of components. All sample containers were clearly and uniquely labelled with details including ID and sampling date.
- 7.123 All samples were placed into a cooler box with ice packs to maintain a temperature at 5°C ± 3°C. The analysis required for each sample was listed on the Chain of Custody Record which accompanied samples. The samples were analysed at the ALS laboratories.
- 7.124 The following parameters were tested for on each water sample:
- Inorganics: Ammoniacal Nitrogen as N Low Level, Ammoniacal Nitrogen as NH₃ Low Level, Ammoniacal Nitrogen as NH₄ Low Level, Cyanide Free Low Level, Cyanide Total Low Level, Conductivity, Chloride, Fluoride, Nitrate as NO₃, Nitrite as NO₂, pH, Phosphate (Orthophosphate as P), Sulphate, Sulphide, Alkalinity Total as CaCO₃ and Total Oxidised Nitrogen as N.
 - Filtered (Dissolved) Metals: Aluminium, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Mercury, Nickel, Phosphorus, Potassium, Selenium, Sodium, Vanadium and Zinc.
 - Unfiltered Metals: Aluminium, Magnesium and Manganese.
 - Microbiological: *Escherichia coli* (*E.coli*) and Total Coliforms
 - Phenols, Volatile Organic Compounds (VOCs), Total petroleum hydrocarbons (TPHs) and Extractable Petroleum Hydrocarbons (EPHs), Polyaromatic Hydrocarbons (PAHs)
- 7.125 Field record sheets were completed for each round of sampling and these sheets are included in **Appendix 7-D**.

Groundwater Quality Results

- 7.126 The results were compared against several screening criteria, including SI No 366 of 2016 (GW Regs), SI No 122 of 2014 (DW Regs), and EPA IGVs, in that order, see **Appendix 7-E**.
- 7.127 The results compared against assessment criteria are presented in **Table 7-18**: Groundwater Quality (5th August 2023)
- 7.128 Phenols, VOCs, TPHs, EPHs and PAHs are only reported if detected or exceedances occur. Across the three monitoring rounds, exceedances for TPHs, VOCs or EPHs were only reported for the August 2023 round.
- 7.129 There was no visual or olfactory evidence of contamination during monitoring. Phenols, VOCs, TPHs, EPHs and PAHs were detected in MW3 in August 2023 however, no further exceedances were noted in MW3 or any other monitoring location in the other monitoring rounds.

- 7.130 The most exceedances were observed in August 2023, mostly in MW3. In MW3, during the Q3 monitoring round, the following exceedances were reported: Ammoniacal Nitrogen as N (Low level) and Ammoniacal Nitrogen Low as NH₃, Manganese (unfiltered), total aliphatics & aromatics >C5-C35(aq), *E.coli*, total coliforms, phenanthrene and Benzo(a)pyrene as well as a few parameters exceeding the laboratory limit of detection (LOD).
- 7.131 In MW4, nitrite exceeded the EPA IGVs during the Q1/Q2 2024 monitoring round. In MW3, MW4 and MW5 manganese (total unfiltered) exceeded the DW Regs in all three rounds and it also exceeded the DW Regs in MW6 in Q1/Q2 2024. In MW3, MW4 and MW6, *E.coli* and total coliforms exceeded the DW Regs in all three monitoring rounds and in MW5 during Q1/2 and Q3/4 2024 monitoring rounds.
- 7.132 Borehole MW6 experienced the fewest exceedances of all four boreholes and is located in the northwest area of the site. It is upgradient of the quarry and away from the current working areas of the quarry.

Surface Water - Hydrology

Surface Water Bodies

- 7.133 Surface water bodies in the area are shown in **Figure 7-3**.
- 7.134 The BALLYGLASS_010 stream is located c. 1.1km northwest of the entrance of the quarry. This river flows from the Cuilleenirwan Lough / Coolagarry Lough in a south-westerly direction west of the site where it joins with the River Suck (SUCK_0130).
- 7.135 The River Suck then flows in a south to southeasterly direction until it eventually reaches the River Shannon c. 21km southeast of the proposed application area.
- 7.136 The Cross River (CROSS (ROSCOMMON)_010) is located c. 2km northeast of the proposed site which flows in a southeasterly direction until it also joins the River Shannon c. 15km southeast of the site.
- 7.137 Feacle Lough pNHA, Corkip Lough SAC, Lough Croan Turlough SAC/SPA/pNHA, as well as Cuilleenirwan Lough / Coolagarry Lough, are all turloughs located within 5km of the application site.
- 7.138 The closest turlough is Feacle Lough, located approximately 550m southeast of the site (reference IE_GSI_Karst_40K_949). Cuilleenirwan Lough located approximately 1.4km northwest of the site (reference IE_GSI_Karst_40K_948). Corkip turlough is located approximately 2km southeast of the site (IE_GSI_Karst_40K_950). A traced underground connection between Corkip turlough and Killeglan Spring to the southeast was confirmed by the GSI.

Catchment

- 7.139 The site is located in the lower mid-east region of the Upper Shannon (Suck) Catchment (ID 26D) by the border of the Upper Shannon Catchment (ID 26G). The Upper Shannon (Suck) Catchment (ID 26D) has an area of 1,598km².
- 7.140 The catchment encompasses the region drained by the River Suck and all tributary streams eventually flow into the River Shannon.
- 7.141 In terms of local catchments under the WFD, the quarry is situated in the Suck_SC_090 Sub Catchment (ID 26D_5) and on the border of the Shannon[Upper]_SC_100 Sub Catchment (ID 26G_2). The quarry is located in the BALLYGLASS_010 River Sub-Basin. The southern border of the quarry is located on the cusp of the KILLEGLAN_010 River Sub-

Basin and the eastern border of the quarry is on the cusp of the CROSS (ROSCOMMON)_020 River Sub-Basin, see **Figure 7-1**.

Flooding and Flood Risk

- 7.142 Flood risk at a particular location can be from a number of sources, or combination of sources, including fluvial, groundwater, pluvial and coastal flooding, as well as from other sources such as reservoirs, artificial waterways and foul drainage systems.
- 7.143 The Office of Public Works (OPW) is the government agency with statutory responsibility for flooding in Ireland. The OPW produced two national datasets for flooding, the Catchment Flood Risk Assessment and Management (CFRAM) maps and National Indicative Flood Mapping (NIFM) maps for the preliminary assessment of flood risk. The CFRAM maps are more detailed, and cover areas identified as being at significant risk of flooding, which are mainly urban areas. The NIFM maps cover predominantly rural areas where the catchment area to the stream is greater than 5km² and not covered by CFRAM. Due to the national scale the NIFM mapping only provides an indication of areas that may be prone to flooding, the mapping detail is not necessarily locally accurate and should not be used as the sole basis for defining the Flood Zones nor for making decisions on planning applications.
- 7.144 CFRAM maps are not available for the site due to its rural location. The closest NIFM modelled stream to the site is the Ballyglass River located northwest of the site and is prone to local flooding; the closest modelled flood extent to the site is approximately 2km to the west of the site. Based on the available OPW flood mapping it is concluded that the site is at a low risk of fluvial flooding.
- 7.145 Groundwater flooding is caused when the water table rises up above ground level, causing flooding to occur at the surface. Such groundwater flooding tends to be seasonal occurring after seasonally higher rainfall. Rainfall infiltrates into the ground causing the groundwater level to rise and where it rises above the ground surface then groundwater flooding occurs. According to the Geological Survey of Ireland (GSI) groundwater flooding probability maps the site is at a low risk of groundwater flooding.
- 7.146 Given the distance of the site from the sea and its elevation above Mean Sea level, the site is not at risk of coastal flooding.
- 7.147 The site is not located within the OPW Arterial Drainage designated 'benefiting lands'. Benefitting lands are lands benefiting from works undertaken as part of the Arterial Drainage Scheme. The OPW have a statutory duty to maintain Arterial Drainage Schemes.
- 7.148 The OPW records of historical flooding events indicate six recurring flooding events identified by the within 5km of the site at Cam.
- 7.149 Four of the recorded recurring flood events relate to known Turloughs:
- Cuilleenirwan Lough turlough rises to c. 1.5 m above field level during the winter months when groundwater levels are elevated. There is a recurring flooding site close to the Cuilleenirwan Lough, c. 1.6 km north/northwest of the site, called Ballinteleava which is described as being a low-lying area that floods every winter. The road and a property in the area is liable to flooding;
 - Lough Croan turlough has an area of c. 106.9 ha and is located c. 2.6km north of the application site;
 - Feacle Lough turlough is a designated pNHA, is located c. 1.3km southeast of the site and has an area of approximately 15.7 ha.;
 - Corkip Lough turlough is located c. 3.7km southeast of the quarry at Cam.

- 7.150 The other two recurring flooding sites were identified by Roscommon County Council as sites that flood regularly as a result of the River Suck. One such area is located along the Ballyglass river c. 3km southwest of the site and the other area is located in a field in Dysert, c. 3.8km northwest of the site.
- 7.151 To date there has been no discharge of water from the existing quarry site to the Ballyglass River. However, the discharge of water from the quarry at a future date has the potential to increase the risk of flooding at the Ballyglass River. The planned discharge is approximately 2,251 m³/day (0.03 m³/s). This discharge volume is based on the information set out in the 2004 EIS, see **Table 7-1** above and **Appendix 7-J**), and has been revised here based on the reduction in the extraction area from 23.7 ha. in the 2004 application to 17.1 ha in this application and includes an uplift factor of 20% for predicted climate change under the OPW MRFS, see **Table 7-2** for details.
- 7.152 The flood index (median flow) has been determined for the Ballyglass River at the location close to the proposed discharge point for waters from the quarry.
- 7.153 The flood index at FSU Node 26_3745_2 is 1.63 m³/s. Therefore, discharging at the proposed rate during median flow conditions would increase the median flow in the river by c. 1.8%.
- 7.154 The peak flow for the 1% Annual Exceedance Probability (AEP) event in the Ballyglass River is estimated as 3.72 m³/s, including a Climate Change factor of +20% in flow; therefore, the potential increase in flow with the quarry discharge would be c. 0.7%, which is considered to be a negligible increase in the peak flood flow in the Ballyglass River.
- 7.155 The EPA's HydroTool allows for determination of various percentile flow values along watercourses in Ireland including low flows such as the 95th percentile flow; this is the flow rate that is exceeded in the river 95% of the time over a given period. In other words, 95% of flow values are equal to or greater than this flow rate.
- 7.156 The estimated 95th percentile flow in the Ballyglass River downstream of the discharge point is 0.16 m³/s. Discharging water from the quarry during the 95th percentile flow conditions would increase the flow to 0.19 m³/s only, which is only an increase of 0.03 m³/s in flow.

Water Framework Directive

- 7.157 A Water Framework Directive (WFD) Assessment report has been prepared to support the Planning Application and EIAR for the proposed development and the full report is provided in **Appendix 7-I**. In summary, the report includes three stages, a screening stage, a scoping stage and an assessment stage.
- 7.158 The WFD assessment includes information from the EIAR for the planning application, which includes a Hydrogeological report, a borehole ground investigation and groundwater monitoring. In addition, a baseline aquatic survey has been undertaken in SW2. An Appropriate Assessment Screening and Natura Impact Assessment Report has also been prepared for the proposed development.
- 7.159 A zone of influence was taken to be a 15km radius from the site boundary. The assessment identified eight potential receptors: Ballyglass River, River Suck, Cuilleenirwan Lough Turlough, Killeglan Public Water Supply (PWS) or Killeglan River Sub Basin, Corkip Lough SAC and Feacle Lough pNHA (Turloughs), River Shannon And Suck South groundwater body (GWB).
- 7.160 In terms of hydrological links between the proposed development and the identified WFD receptors it is considered that:
- there is no direct hydrological pathway between the proposed development and the adjacent surface water courses as there is currently no abstraction of surface water

or discharge to surface watercourses. However, Roadstone Ltd. have been granted permission under planning reference P. Ref. 04/1479 (ABP PL20.215417) to discharge to the Ballyglass River if the quarry is deepened below the water table and pumping is required to maintain a dry working area. As of 2025, there is no discharge to the Ballyglass River and hence, there is no direct hydrological pathway between the two;

- ii. there is no direct hydrological pathway between the proposed extraction and the bedrock aquifer as the extraction will not intersect the underlying aquifer;
- iii. there is a direct hydrogeological pathway via the shallow groundwater in the epikarst which feeds the majority of turloughs in the area;
- iv. there is direct hydrogeological link pathway via the groundwater underlaying the site and the Killeglan Spring as demonstrated by OGE in their report. They found that the ground water below the site discharges to both the Killeglan Spring catchment and the Cross River (Corkip Lough); and
- v. there is an indirect hydrological pathway between the proposed development and the River Suck SAC and NHA or the River Shannon via the shallow groundwater in the epikarst and the adjacent surface water courses.

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

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

Surface Water Biological Quality in the Cross River and River Suck : Q Values

7.163 The surface water quality data of surface water bodies within the study area, was obtained from EPA web map. The EPA has registered surface water monitoring stations through Ireland, which are continuously recording near real time river ecology monitoring results. The results are presented through “Q” values, that are reflecting average water quality at any location. These values are based primarily on the relative proportions of pollution sensitive to tolerant macroinvertebrates (the young stages of insects primarily but also snails, worms, shrimps etc.) resident at a river site. Results scores are in range from Q1 to Q5, from the lowest (Q1) to the highest (Q5) water quality rating.

7.164 The closest monitoring station to the site is Br E of Eskerbaun located c. 4.5km east of the application site on the Cross River. The monitoring station is located downstream of CROSS (ROSCOMMON)_010 which is located c. 2.5km northeast of the site.

7.165 The latest water quality reports a 3-4 Q value, meaning that the river is moderate, slightly polluted and in unsatisfactory condition. There has been no change in status since the last monitoring round in 2020. Table 7-11 summarises the monitoring station data.

Table 7-11: Cross River EPA Biological Water Quality Ratings

Station ID	RS26C100060
Station Name	Br E of Eskerbaun
Watercourse	CROSS (ROSCOMMON)_010
Distance	c. 4.5km east of site

Station ID	RS26C100060
Year	Q Value
2002	3-4
2006	3-4
2009	3
2014	3
2017	3
2020	3-4
2023	3-4

- 7.166 The Ballyglass rivers runs in a south-westerly direction to the west of the site where it joins the River Suck. The nearest monitoring station on the River Suck is the SUCK - Bridge W. of Feevagh located c. 7.9km southwest of the site.
- 7.167 The area along the River Suck received a 4 Q value in the most recent river Q survey (2005) which defines the river as good, unpolluted and in satisfactory conditions.
- 7.168 As there is no recent data past 2005, another monitoring station downstream of the River Suck and Ballyglass River (Bellagill Bridge c. 12.2km south of the site) was also investigated. This EPA station undertook a more recent river Q survey in 2024, where a 3-4 Q value was reported so the river was in a moderate, slightly polluted and unsatisfactory condition.

Table 7-12: River Suck EPA Biological Water Quality Ratings

Station ID	RS26S071100
Station Name	Bellagill Bridge
Watercourse	SUCK_130
Distance	c. 12.2 km south of site
Year	Q Value
2002	4
2005	4
2008	4
2011	4
2014	4
2017	4
2020	4
2023	4
2024	3-4

Surface Water Biological Quality in the Ballyglass River: Q Values

- 7.169 There is no published biological water quality information available for the Ballyglass River so two rounds of monitoring were undertaken in March and July 2025. Three biological quality samples were taken from the Ballyglass River to characterise the existing baseline

- water quality; One sample was taken in March 2025 and two samples were taken in July 2025, see **Appendix 7-G**.
- 7.170 The March 2025 sample was taken at SW2 as it was not possible to safely access the river at location SW1 at the time. The two samples taken in July 2025 were from locations SW1 and SW2; see **Figure 7-3** for the sampling locations.
- 7.171 The primary aim of the biological study is to provide an assessment on the indicative biological water quality in the Ballyglass River upstream and downstream of the point where treated water will be discharged from the Quarry at a future date.
- 7.172 The July 2025 samples were taken at a favourable time of the year for biological monitoring and during lower flow conditions in the stream. It is considered that all due care and attention to the sampling, sorting and the identification of organisms has been made to ensure that all taxa collected are representative of the macroinvertebrate communities present, at all the sites sampled, at the time of the survey.
- 7.173 The macroinvertebrate were identified to a family and where possible, at the species level also. However, it should be noted that for some macroinvertebrate, their genus and species are unidentifiable without the use of a microscope.
- 7.174 It should be noted that the assessment of biological water quality here is based on a single set of samples and therefore does not consider annual seasonal variation that may occur in the macroinvertebrate assemblage at the sampling locations. However, as macroinvertebrates are better short-term (i.e. in any one year) water quality indicators than would otherwise be achieved by physiochemical water quality analysis, they provide a robust overview of the prevailing water quality conditions at a site. They can also be used comparatively for inter-annual water quality comparison as applied in the current reporting.
- 7.175 The samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide using a 2-minute kick sample, as per Environmental Protection Authority (EPA) methodology (Feeley *et al.*, 2020). Large cobbles were also washed at each site for 1-minute (where present) to collect attached macro-invertebrates (as per Feeley *et al.*, 2020). Samples were converted to Q-ratings as per Toner *et al.* (2005) and assigned to WFD status classes, see **Table 7-13**. This system has been adopted by the EPA and therefore allows a comparison to be made on the results in context to national standards and in accordance with the Water Framework Directive (WFD).
- 7.176 All organic matter, woody debris and stones were returned to water once invertebrate specimens were separated. Invertebrates were identified to family level and or species level where possible.
- 7.177 The Q rating is determined by the presence and diversity of invertebrate groups from Group A (clean water indicator species) through to group E (most pollution tolerant group & indicative of very poor water quality).
- 7.178 The EPA classification groups, i.e. from group A through to group E, are set out in Appendix 1 of Toner *et al.* (2005). **Table 7-13** below shows a summary of the Q-rating system relative to invertebrate indicator groups and associated pollution tolerances. The sample community representation of groups of various pollution tolerances assigns a Q-Rating to indicate WFD status as shown in **Table 7-14** below.
- 7.179 The biological survey was conducted by Ms Michelle Sherry, a Graduate Hydrogeologist from SLR. Michelle has a BSc in Environmental Bioscience with a focus on surface water monitoring and reporting.

Plate 7-1: The sampling location for the Ballyglass River Q survey (SW2) March 2025



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Table 7-13: Q-Rating System and Invertebrate Indicator Groups

Q-Value	Water Quality & Invertebrate Indicator Groups (EPA)
Q5	Pristine. A good diversity of EPA group A stoneflies & mayflies should be present. High quality indicator cased caddis also normally present. EPA group C few in numbers with very limited or absent EPA group D and E invertebrates.
Q4	Unpolluted. At least one EPA group A stonefly and or mayfly present in reasonable numbers. Group B invertebrates few to numerous (i.e. Leuctrid stoneflies, cased caddis & narrow bodied Baetid mayflies (i.e. excluding <i>Baetis rhodani</i>).
Q3-4	Slightly Polluted. Group A invertebrates present, but diversity typically restricted to a single taxon in lower numbers. EPA group B taxon present, but with EPA group C invertebrates dominating the sample composition.
Q3	Moderately Polluted. No EPA group A invertebrates present. Few or absent EPA group B species present. EPA group C invertebrates dominant with smaller numbers of group D and E pollution tolerant invertebrates present.
Q1, Q1-2, Q2	Seriously polluted. Clean water EPA groups A and B absent. Few or absent EPA group C invertebrates. Class D dominant but being replaced by higher numbers of Class E (heavy pollution) indicator species at Q1 (lowest water quality class).

Table 7-14: Q-Rating and Assigned WFD Status

Q Value Quality Rating	WFD Description and Pollution Status
Q5, Q4-5	High (Pristine)
Q4	Good (Unpolluted)
Q3-4	Moderate (Slightly polluted)
Q3, Q2-3	Poor (Moderately polluted)
Q2, Q1-2, Q1	Bad (Seriously polluted)

7.180 The abundances of organisms present in each sample were measured as follows: Present (1 or 2 individuals); Scarce/Few (<1%); Small Numbers (<5%); Fair Numbers (5-10%); Common (10-20%); Numerous (25-50%); Dominant (50-75%); and Excessive (>75%).

March 2025 Q Survey Results

- 7.181 The macroinvertebrates were grouped according to their pollution sensitivity. The sample composition at the SW2 location on the Ballyglass River was dominated by *Baetis rhodani* (mayflies), *Gammarus duebeni* (freshwater shrimp) which are both Group C. The sample also featured a fair percentage of pollution tolerant *Asellidae* (Group D) and of clean water sensitive cased caddisfly of the *Hydropsychidae* family, which are Group B. The results for each of the sampling sites are provided in **Appendix 7-G** and summarised in **Table 7-15**.
- 7.182 The results indicated that the Ballyglass River has Q value of **Q3-4** which is of Moderate Status, indicating the river is slightly polluted.
- 7.183 Note that for some macroinvertebrates, in this case *Oligochaeta* and *Chironomidae*, their genus and species are unidentifiable without a microscope. The macroinvertebrates in this survey were identified on site and hence, cannot be placed in a specific EPA Group.

July 2025 Q Survey Results

- 7.184 The macroinvertebrate taxonomic composition, including an abundance for each taxonomic family was grouped according to their pollution sensitivity. The results for each of the sampling sites are shown in Appendix 7-G Table 7-22.
- 7.185 The sample composition at sites SW1 (i.e. proposed quarry discharge location) supported a small number of good water quality indicator species (i.e. second highest water quality indicator group B (Appendix 7-G Table 7-22). The sample was represented by the clean water indicator (EPA group B) cased caddisfly of the Limnephilidae family. The cleaner water indicator species (i.e. EPA Group B taxa) were also present at the site SW2 in the form of mayfly (*Baetis muticus*) and cased caddisfly (*Sericostoma personatum*), see Appendix 7-G Table 7-22.
- 7.186 However, sample SW1 was dominated by EPA Group E, blood worms (*Chironomus spp.*) and SW2 was dominated by EPA Group C, *Gammarus duebeni* freshwater shrimp. Both sites featured low numbers of pollution tolerant EPA Group D species, *Asellus aquaticus*), Appendix 7-G Table 7-22.
- 7.187 Both sites did not support any EPA group A taxa and SW1 displayed a wider biodiversity of taxa number and abundance compared to SW2. As a result, SW2 scored a lower Q value despite featuring some good quality species such as mayflies and cased caddisfly.

Biological Q Survey Findings

- 7.188 The results of the biological sampling are set out in Table 7-15 below. The results indicate that the Ballyglass river at the sample locations is Slightly Polluted to Moderately Polluted and of Moderate Status to Poor Status.
- 7.189 The results for the biological water quality assessment made in July 2025 indicates that the quality of water along the Ballyglass River is of Poor status. The SW1 location water quality was deemed to be moderately polluted (Q2-3) and the SW2 location decreased in water quality from being Slightly Polluted (Q3-4) in March 2025 to Moderately Polluted (Q3) in July 2025. The decrease in the diversity and abundance of EPA Group A and B clean water indicator species in the July 2025 monitoring round accounted for the deteriorated water quality at survey site SW2.
- 7.190 Under the WFD, the Ballyglass River is assigned as under review and has not yet received a risk status. The surrounding lands of both SW1 and SW2 are all agricultural pastures and SW2 displayed evidence of bank and channel disturbance as a result of livestock poaching. The water quality pressures to the Ballyglass River at SW2 appear to be from agriculture.
- 7.191 The variations in recorded water quality at SW2 between March and July 2025 are likely to be as a result of seasonal conditions during sampling. The optimum time of year for biological sampling for water quality is May to September.

Table 7-15: Biological Water Quality Results for the Ballyglass River

Parameter	SW2 (March 2025)	SW1 (July 2025)	SW2 (July 2025)
Q-Rating	Q3-4	Q2-3	Q3
WFD Pollution Status	Slightly Polluted	Moderately Polluted	Moderately Polluted
WFD Status	Moderate Status	Poor Status	Poor Status

Surface Water Sampling

- 7.192 Surface water sampling was undertaken at two locations on the Ballyglass River to the west of the site in August 2023, January 2024, October 2024, July 2025 and September 2025. The surface water field record sheets are included in **Appendix 7-D** and the screened results are shown in **Appendix 7-H, Table 7-24**
- 7.193 During the July 2025 round of quality sampling an additional water sample (SW3) was taken from the River Suck at Derrycahill Bridge, which is downstream of the Ballyglass River. Derrycahill Bridge is at ITM GR E582521, N742463.
- 7.194 During the September 2025 round of quality sampling an additional water sample was taken from the sump at Cam Quarry for comparison.
- 7.195 Sampling locations SW1 and SW2 are situated on the Ballyglass River. SW1 is located upstream of the proposed quarry discharge site along the R363 approximately 1.6km west of the site and SW2 is located c. 2.8km downstream of SW1, see **Figure 7-3**. SW2 is located upstream from the EPA monitoring station on the Suck River mentioned above (Bridge W. of Feevagh). This station has been monitored since 1983; however, the most recent Q survey was undertaken in 2005 and from other EPA stations located downstream from this station (i.e. Bellagill Bridge), it can be seen that water quality has deteriorated since 2005.
- 7.196 These sample points are safe, with ease of access. These are grab sampling points only and a telescopic grab sampler was used to collect samples.
- 7.197 The samples were collected in the appropriate sample containers, which are supplied by the laboratory for the required analysis. Sample containers were filled so that there was

- minimum free air space. The containers were securely sealed so that there was no loss of volatile components such as moisture and no separation of components. All sample containers were clearly and uniquely labelled with details including ID and sampling date.
- 7.198 All samples were placed into a cooler box with ice packs to maintain a temperature at $5^{\circ}\text{C} \pm 3^{\circ}\text{C}$. The analysis required for each sample was listed on the Chain of Custody Record which accompanied samples. The samples were analysed at ALS laboratories.
- 7.199 The following parameters are tested for:
- Metals (Filtered): Aluminium, Arsenic, Barium, Boron, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Mercury, Nickel, Phosphorus, Potassium, Selenium, Sodium and Vanadium.
 - Metals (Unfiltered): Aluminium, Magnesium and Manganese.
 - Inorganics: Alkalinity, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Phosphate (Ortho as P), pH, Total Suspended Solids and Total Oxidised Nitrogen as N.
 - Speciated Extractable Petroleum Hydrocarbons Criteria Working Group (EPH CWG).
 - Volatile Organic Compounds (VOCs) and Total Petroleum Hydrocarbons CWG (TPH CWG)

Surface Water Quality

- 7.200 The surface water quality monitoring were screened against the Environmental Quality Standards (EQS) for Inland Surface Water SI No. 272 of 2009 and SI No. 77 of 2019. The laboratory results are presented in **Appendix 7-F** and the screened results are presented in **Appendix 7-H, Table 7-24: Surface Water Quality Results Screened**.
- 7.201 For all four monitoring rounds all hydrocarbons and volatiles were reported at less than detection limit. During the 8th August 2023 round (Q3/Q4 2023) and the 8th October 2024 (Q3/Q4 2024) monitoring rounds, SW1 exceeds the High status (≤ 1.3) and Good status (≤ 1.5) mean MAC value for BOD at a value of 2.36 mg/l and 2.04 mg/l, respectively.
- 7.202 Total Suspended Solids in SW1 during Q3/Q4 2023 and Q3/Q4 2024 were significantly higher than in SW2.
- 7.203 In Q3/Q4 2023, SW1 exceeded the High status mean of 10 $\mu\text{g/l}$ for Phosphorus at a value of 12.2 $\mu\text{g/l}$. In Q3/Q4 2024, the High and Good status (25 $\mu\text{g/l}$) for Phosphorus at a value of 31.2 $\mu\text{g/l}$ in SW1 and at a value of 22.1 $\mu\text{g/l}$.
- 7.204 The water quality results for the Ballyglass River in July and September were below the surface water EQS for all parameters.
- 7.205 The water quality at SW3 (Derrycabill Bridge) on the River Suck in July 2025 was below the surface water EQS for parameters. The Alkalinity was higher at SW3 than SW1 or SW2 (Ballyglass River) during this round of monitoring and this reflects the limestone geology and catchment size at SW3 compared to the sample locations on the Ballyglass River, see Appendix 7-H, **Table 7-24**.
- 7.206 A water quality sample was taken from the quarry sump in September 2025. The water in the quarry sump is considered to represent the surface water runoff / groundwater which will be discharged from Cam Quarry at a future date when dewatering is required. BOD and COD are both below laboratory detection levels. A number of parameters tested are elevated compared to the surface water quality in the Ballyglass River, and these parameters reflect the geological conditions at the quarry and the mix of surface water and groundwater present in the sump; elevated parameters include TON, Mg, B, Ni and Se, while parameters lower than the surface water in the river include Alkalinity, As, Fe and Mn.

Protected Areas

- 7.207 The following Natura 2000 sites (SAC or SPA) are within 5km of the site.
- Ballynamona Bog and Corkip Lough SAC (002339), c. 2km southeast of the proposed development.
 - Lough Croan Turlough SPA (004139) and Lough Croan Turlough SAC (000610), located c.3.1km north of the proposed application site.
 - Killeglan Grassland SAC (002214), located c. 3.25km southwest of site
 - Castlesampson Esker SAC (001625), located c. 3.6km southeast of site
 - River Suck Callows SPA (004097), located c. 4.6km west of site
- 7.208 There are four pNHA and NHA sites within 5 km of the site.
- Lough Croan Turlough pNHA (000610), located c. 3.1km north of site
 - Castlesampson Esker pNHA (001625), located c. 3.6km southeast of site
 - Suck River Callows NHA (000222), located c. 4.6km west of site
 - Feacle Turlough pNHA (001634), located c. 550m southeast of site

Water Environment Receptors

- 7.209 From the baseline study undertaken here, the following water environment sensitive receptors have been identified in the receiving environment:
- Local rivers and streams (moderate WFD status, at risk);
 - Regionally important karstic aquifer, within Suck South Groundwater Body (good WFD status, not at risk);
 - Corkip Lough SAC (002339 and Feacle Lough pNHA (001634) which are both turloughs influenced by the groundwater levels in the area.
 - Private and Public Scheme groundwater supply wells;
 - River Suck Callows SPA (004097) and NHA (000222), located c. 4.6km west, which is in confluence with the Ballyglass river located c. 1.1km northwest; and
 - River Shannon Callows SAC/pNHA (000216) / Middle Shannon Callows SPA (004096), downstream of both the River Suck and Cross River.
- 7.210 For each identified receptor, the significance and sensitivity of the receptor is assessed in **Table 7-16** below and a rating (High / Medium / Low / Negligible) applied, based on the methodology outlined in existing guidance and reproduced in **Appendix 7-K**.

Table 7-16: Existing Environment - Significance and Sensitivity / Importance

No.	Existing Environment	Significance	Sensitivity	Existing Environment Significance / Sensitivity Rating (H / M / L / N)
1	Local Rivers and Streams	Surface watercourses Ballyglass river and Cross River location within c. 2km of site.	Ballyglass river has a Good WFD status and is under review. Cross River is Moderate WFD status and at risk.	Medium – Attribute has a medium quality or value on a local and regional scale due to regionally important karstic aquifer

Water (Hydrology & Hydrogeology) 7

No.	Existing Environment	Significance	Sensitivity	Existing Environment Significance / Sensitivity Rating (H / M / L / N)
		Site is within Upper Shannon (Suck) Catchment (ID 26D)	High degree of interaction between surface water and groundwater due to numerous karst features (e.g. turloughs, swallow holes, springs etc). surface and groundwater quality are closely linked.	
2	Regionally important karstic aquifer	Located within the Suck South Groundwater Body (GWB)	All GWBs received 'Good Status' 2016-2021.	High - Attribute has a high quality or value on a local scale (Regionally Important Aquifer)
3	Corkip Lough SAC and Feacle Lough pNHA turloughs	The turloughs are fed by groundwater. In wintertime, when groundwater levels rise, the turloughs fill with water.	The groundwater levels under the turloughs may be affected if groundwater levels under the site are affected.	High - Attribute has a high quality or value on an international (SAC & SPA status) and regional scale (pNHA status)
4	Private and Public Groundwater Supplies	Most local residents are assumed to have a private water supply or via Killeglan PWS. Other nearby public water supplies identified by GSI.	The private wells will supply many homes in the local area and may be sensitive to changes at the local scale.	High - Outer source protection area for regionally important water source. Regionally important potable water source supplying >2,500 homes SPZ within site boundary along southern border of existing quarry. PWS supply located south of site
5	River Suck Callows SPA (004097) and NHA (000222)	Downstream surface watercourse, confluence c. 4.6km west of site.	The River Suck has a Good WFD status and is not at risk of meeting targets by 2027.	High - Attribute has a high quality or value on an international (SAC & SPA status) and regional scale (NHA status)
6	River Shannon Callows SAC/pNHA (000216) / Middle Shannon Callows SPA (004096)	River Shannon is located downstream from River Suck and Cross River	The confluence where the River Suck and the River Shannon meet is of Moderate WFD status (2016-2021) and is under review. The confluence where the Cross River and the River Shannon meet is of Poor WFD status (2016-2021) and is at risk.	High - Attribute has a high quality or value on an international (SAC & SPA status) and regional scale (pNHA status)

Receiving Environment - Baseline Summary

- 7.211 The site is underlain by undifferentiated limestone known as Visean Limestones. The soils surrounding the quarry site are both, fine loamy drift with limestone stones known as the Rathowen (1030RA) and coarse loamy over calcareous gravels known as Baggotstown (1150BG) Soil Association.
- 7.212 The GSI online map viewer shows the site is underlain by a regionally important karstic aquifer (Rkd). This aquifer is defined as being a good aquifer capable of supplying regionally important supplies e.g. large public water supplies, see **Figure 7-2**. The aquifer has an area of 1,099 km².
- 7.213 The site is within the Water Framework Directive (WFD) Suck_SC_090Sub Catchment (ID 26D_5) and the BALLYGLASS_010 River Sub-Basin catchment.
- 7.214 The closest surface water body to the site is the Ballyglass river located to the northwest of the site.
- 7.215 Under the WFD classification, the River Suck is of Good WFD status and 'Not At Risk' and the Ballyglass river is classified as being of 'Good' WFD status and is 'Under Review'.
- 7.216 There is no risk of potential flooding within the site. Previous recurring flooding events, known as turloughs, have been identified within 2km of the proposed development area. The closest flooding event is the Cuilleenirwan Lough turlough, c. 1.4km north/northwest of the site boundary.
- 7.217 The proposed development is located within the Suck South Groundwater Body (GWB). The groundwater flow in this aquifer is expected to be close to the surface through karstic conduits and enlarged fissures, mainly along fault zones. This GWB is bordered by twelve other GWBs. All of these GWBs, including Suck South GWB, received a Good WFD status during the 2016-2021 period. The Suck South GWB is considered to be Not At Risk. All of the surrounding GWBs are considered Not At Risk or deteriorating in quality except for the GWDTE-Rahasane Turlough (SAC000322) GWB
- 7.218 The groundwater vulnerability at the site is classed as High.
- 7.219 There is the Killeglan Public Scheme Source Protection Area which exploits the Tobermore Spring, is located along the southern border of the existing quarry and abstracts approximately 7,000 m³/day. There is no group water supply source protection area within the vicinity of the proposed site. The closest Group Water Scheme (GWS) Source Protection Area, Lowville No. 1, is located c. 15.5km southwest of the site. The Cam area is within the Uisce Éireann South Roscommon Regional Water Supply Scheme supply zone for Killeglan.
- 7.220 There are four groundwater monitoring well locations on site, see **Figure 7-6**: Groundwater Body Map
- 7.221 SLR monitor these wells for groundwater levels, groundwater quality and for data loggers. There are eleven other boreholes present on site that were drilling between June 2003 and May 2004 but they have been labelled as not viable for monitoring purposes.
- 7.222 Between 2023 and 2025, significant variations have been observed in all four monitoring wells. Since monitoring began, the largest variation in groundwater levels is in MW03 with a range of 13.76m, a maximum groundwater level of 67.34m AOD and a minimum groundwater level of 53.59m AOD. The least variation was seen in MW4 with a range of 8.15m, a maximum groundwater level of 65m AOD and a minimum level of 56.85m AOD.
- 7.223 Groundwater levels are generally highest at MW6, which is located in the north-west of the quarry and lower in MW3, MW4 and MW5. This indicates a general groundwater flow direction of north-north-west to south-south-east.

- 7.224 Groundwater quality monitoring was carried out on 5th August 2023, 14th January 2024 and 8th October 2024. The results were compared against several criteria: SI No 366 of 2016 (GW Regs), SI No 122 of 2014 (DW Regs), and EPA IGVs, in that order. Across the three monitoring rounds, microorganisms and manganese (total unfiltered) exceeded regulations at MW3.
- 7.225 Surface water quality testing was also undertaken during all three monitoring rounds. All hydrocarbons and volatiles were reported at less than detection limit for all three rounds. During Q3/Q4 2023 and the Q3/Q4 2024, SW1 exceeded the High status and Good status mean MAC values for BOD. In Q3/Q4 2023, SW1 exceeded the High status mean for Phosphorus and in Q3/Q4 2024, phosphorus exceeded the High and Good status for Phosphorus SW1 and SW2.

Impact Assessment

Evaluation Methodology

- 7.226 The potential direct and indirect impacts to surface water and groundwater associated with the proposed continuance of use of all previously permitted development at Cam Quarry are initially assessed in this chapter without any mitigation measures in place.
- 7.227 The methodology applied here is a qualitative risk assessment methodology in which the nature of the potential impacts are described in terms of the character, magnitude, duration, probability and consequence of the impact are considered. The terms used to describe the potential hydrological and hydrogeological impact or effects are explained in tables reproduced in **Appendix 7-L**. The cumulative impact of any potential impacts is also assessed.
- 7.228 The description of the potential impact is then screened against the significance and sensitivity of the receiving environment to establish the overall significance of the potential impact (without mitigation). The classification of the impact significance is determined using the matrix from the EPA Guidelines (2022) which is reproduced in **Appendix 7-L**.
- 7.229 This approach provides a mechanism for identifying the key areas where mitigation measures are required, and for identifying mitigation measures appropriate to the risk presented by the proposed development. Following consideration of mitigation measures (existing and proposed) an assessment of the residual impacts arising from the proposed development is provided.
- 7.230 The following sections identify the potential impacts of the proposed development on the hydrogeological and hydrological environments. It also assesses the likelihood of occurrence of each identified impact. As previously noted, the impacts are initially assessed with no mitigation or design measures incorporated to reduce the risk.
- 7.231 The potential direct and indirect impacts to surface waters and groundwater during the Construction Stage, the Operation Stage and Post Operational Stage (site restoration) are discussed below.

Construction and Operational Stage (No Mitigation)

- 7.232 As this application primarily relates to continued use of the existing permitted development, the construction and operational phases are effectively considered the same. The potential direct and indirect construction and operational stage impacts to surface waters and groundwater are discussed below. In the context of the proposed continuance of use of all previously permitted development, the construction stage is taken to comprise the soil stripping of the Block Yard, Block Storage and Workshop area, and construction of the Block Yard concrete slab and hardstanding. The operational stage comprises the continued

quarrying within the existed permitted area. These stages are likely to take place concurrently.

Direct Impacts

Surface Water

- 7.233 Surface water discharge from the site is to the Ballyglass River. During the construction and operational stages, there is the potential impact of elevated suspended solids entering the surface water runoff and being discharged to the Ballyglass River.
- 7.234 The accidental leaking or spillage of fuel and/or other petroleum-based products could also impact on surface water being discharged to the Ballyglass River. The accidental leakage or spillage of concrete during the construction of the Block Yard concrete slab and hardstanding could also impact on surface water discharge from the site.
- 7.235 The surface water discharge will increase the flow in the Ballyglass River.

Groundwater

- 7.236 Elevated suspended solids could impact on groundwater in the regionally important karstified bedrock aquifer.
- 7.237 The accidental leaking or spillage of fuel and/or other petroleum-based products could also impact on groundwater in the regionally important karstified bedrock aquifer. The accidental leakage or spillage of concrete during the construction of the Block Yard concrete slab and hardstanding could also impact groundwater at the site.

Indirect Impacts

Surface Water

- 7.238 Elevated suspended solids could indirectly impact on nearby rivers, streams and turloughs.
- 7.239 The accidental leaking or spillage of fuel and/or other petroleum-based products or concrete could also indirectly impact on nearby rivers, streams and turloughs.

Groundwater

- 7.240 Elevated suspended solids could indirectly impact on groundwater in the regionally important karstified bedrock aquifer could indirectly impact on local water supplies, PWS and turloughs.
- 7.241 The accidental leaking or spillage of fuel and/or other petroleum-based products or concrete could also indirectly impact on local water supplies, PWS and turloughs.
- 7.242 Groundwater levels will need to be lowered in the extraction area to approximately 40m AOD. Groundwater levels in the immediate area of the quarry will also be lowered. The evidence presented in the Hydrogeological Report (Appendix 3.4.1 in the EIS chapter in **Appendix 7-J**) is that the permeability of the bedrock aquifer relatively low and that relatively steep gradients will develop on the cone of drawdown around the site. The majority of the residences in the study area have access to mains water supply. The Cam area is within the Uisce Éireann Killeglan water supply zone.
- 7.243 The cone of depression is unlikely to impact third party wells adjacent to the site.
- 7.244 The likely impact on the Killeglan PWS from discharges of ground water that will ingress into the quarry are negligible, probably less than 1% (see **Appendix 7-J** for calculations).
- 7.245 The extractive area of the quarry is located within the unfractured bedrock where the permeability is low and steep hydraulic gradient is likely to develop behind the quarry faces.

Limited seepage of ground water may occur from the areas more fractured and karstified bedrock. However, since Feacle Lough and Corkip Lough are fed by ground water predominantly from the epikarst the proposed development is unlikely to significantly impact on these.

Protected Areas

- 7.246 Any indirect impact on the local rivers and streams could impact the downstream surface water bodies, i.e. River Suck Callows SPA and NHA and River Shannon Callows SAC/pNHA / Middle Shannon Callows SPA at distance from the site.

Cumulative Effects

- 7.247 The following plans were reviewed for strategies and objectives that may act in-combination with the project:
- Roscommon County Development Plan 2022-2028.
- 7.248 There are no strategies or objectives in the Roscommon County Development Plan 2022-2028 that are likely to result in significant effects when considered in-combination with the proposed development.
- 7.249 A search of recent (within the last five years) planning applications was carried out for applications that may give rise to in combination effects with the project. A 17-turbine wind farm (Seven Hills Wind Farm) surrounding the quarry to the south, east and west (with the closest infrastructure c. 100m from the site boundary) has been granted planning permission by An Bord Pleanála in November 2023 (ABP Ref. 313750-22).
- 7.250 The wind farm may require localised, short-term dewatering at the turbine bases and any borrow pits, during construction stage. It is not considered that the wind farm will give rise to any significant adverse cumulative impacts for the water environment.

Rating of Identified Potential Impacts

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

Significance of Impacts

- 7.252 The significance of impacts is based on the significance and sensitivity of the existing environment (**Table 7-16** above), and the description of identified potential impacts with likely significant effects outlined in **Table 7-17** below. The significance of Impact is determined from the Classification of the Significance of Impacts in **Appendix 7-M**.

Table 7-17: Classification of Significance of Impacts (No Mitigation)

No.	Potential Impacts	Impact Rating (No Mitigation)	Significance of Impact (No Mitigation)
Construction and Operational Stage – Direct – Surface Water			
1	Potential impact of elevated suspended solids entering the surface water runoff and being discharged to the Ballyglass River	Medium - Low. Potential to affect surface water quality in the Ballyglass River through increased sediment in run-off	Moderate - Slight
2	The accidental leaking or spillage of fuel and/or other petroleum-based products could impact on surface water being discharged to the Ballyglass River.	Medium. Potential to affect surface water quality in the Ballyglass River through contaminated runoff. Any leakage / spillage would be accidental only and of limited volume.	Moderate
3	The accidental leakage or spillage of concrete during the construction of the Block Yard concrete slab and hardstanding could also impact on surface water discharge from the site.	Low. Potential to affect surface water quality in the Ballyglass River through contaminated runoff. Any leakage / spillage would be accidental only and of limited volume.	Slight
4	Impact of discharge quantity on surface water.	Low. There will be a very small increase in the flow to the Ballyglass River associated with the proposed water discharge. It is calculated that quarry discharges would only add an additional 0.7% to the total flow of the Ballyglass River (at the point of discharge) during a 1% AEP flow event in the river.	Low
Construction and Operational Stage – Direct - Groundwater			
5	Elevated suspended solids could impact on groundwater in the regionally important karstified bedrock aquifer.	Medium - Low. Potential to affect groundwater quality in bedrock underlying facility through vertical migration of sediment in run-off.	Moderate - Slight
6	The accidental leaking or spillage of fuel and/or other petroleum-based products could also impact on	Medium. Potential to affect groundwater quality in underlying karstified bedrock aquifer through vertical migration of fuels etc. Any leakage / spillage would be accidental only and of limited volume.	Moderate

Water (Hydrology & Hydrogeology) 7

No.	Potential Impacts	Impact Rating (No Mitigation)	Significance of Impact (No Mitigation)
	groundwater in the regionally important karstified bedrock aquifer.		
7	The accidental leakage or spillage of concrete during the construction of the Block Yard concrete slab and hardstanding could also impact groundwater at the site.	Low. Potential to affect groundwater quality in underlying karstified bedrock aquifer through vertical migration of concrete. Impact to groundwater is unlikely due to short term nature of works. Any leakage / spillage would be accidental only and of limited volume.	Slight
Construction and Operational Stage – Indirect – Surface Water			
8	Elevated suspended solids could indirectly impact on local water courses and turloughs.	Low. Potential to affect surface water quality (suspended solids) in local water courses and turloughs, through groundwater baseflow to the watercourse. Groundwater may not be in hydraulic continuity with watercourses. Since Feacle Lough and Corkip Lough are fed by groundwater predominantly from the epikarst the proposed development is unlikely to significantly impact on these.	Slight
9	The accidental leaking or spillage of fuel and/or other petroleum-based products or concrete could also indirectly impact on local water courses and turloughs.	Medium - Low. Potential to affect surface water quality (fuels etc) in local water courses and turloughs, through groundwater baseflow to the watercourse. Groundwater may not be in hydraulic continuity with watercourses. Since Feacle Lough and Corkip Lough are fed by groundwater predominantly from the epikarst the proposed development is unlikely to significantly impact on these.	Moderate - Slight
10	The accidental leaking or spillage of concrete could also indirectly impact on local water courses and turloughs.	Low. Potential to affect surface water quality (concrete) in local water courses and turloughs, through groundwater baseflow to the watercourse. Groundwater may not be in hydraulic continuity with watercourses. Since Feacle Lough and Corkip Lough are fed by groundwater predominantly from the epikarst the proposed development is unlikely to significantly impact on these.	Slight
Construction and Operational Stage – Indirect – Groundwater			
11	Elevated suspended solids could indirectly impact on groundwater in the regionally important karstified bedrock aquifer could indirectly impact on PWS and local water supplies.	Low Potential to effect the Killeglan PWS and local supply wells through lateral migration in the bedrock aquifer. The majority of the residences in the study area have access to mains water supply. The Cam area is within the Uisce Éireann Killeglan water supply zone.	Slight
12	The accidental leaking or spillage of fuel and/or other petroleum-based	Medium – Low Potential to effect the Killeglan PWS and local supply wells through lateral migration in the bedrock aquifer. The majority of the residences in	Moderate - Slight

Water (Hydrology & Hydrogeology) 7

No.	Potential Impacts	Impact Rating (No Mitigation)	Significance of Impact (No Mitigation)
	products could also indirectly impact on PWS and local water supplies.	the study area have access to mains water supply. The Cam area is within the Uisce Éireann Killeglan water supply zone.	
13	The accidental leaking or spillage of concrete could also indirectly impact on PWS and local water supplies.	Low. Potential to effect the Killeglan PWS and local supply wells through lateral migration in the bedrock aquifer. The majority of the residences in the study area have access to mains water supply. The Cam area is within the Uisce Éireann Killeglan water supply zone.	Slight
14	Impact on private groundwater supplies from groundwater levels in the immediate area of the quarry being lowered.	Low The permeability of the bedrock aquifer is relatively low and relatively steep gradients are expected from the cone of drawdown around the site. The majority of the residences in the study area have access to mains water supply. The Cam area is within the Uisce Éireann Killeglan water supply zone.	Slight
15	Impact on Killeglan PWS from groundwater levels in the immediate area of the quarry being lowered.	Medium - Low. The likely impact on the Killeglan PWS from discharges of ground water that will ingress into the quarry are negligible, estimated at less than 1%.	Moderate - Slight
16	Impact on nearby turloughs from groundwater levels in the immediate area of the quarry being lowered.	Low. The extractive area of the quarry is located within the unfractured bedrock where the permeability is low and steep hydraulic gradient is likely to develop behind the quarry faces. Limited seepage of ground water may occur from the areas more fractured and karstified bedrock. Since Feacle Lough and Corkip Lough are fed by groundwater predominantly from the epikarst the proposed development is unlikely to significantly impact on these.	Slight
Construction and Operational Stage – Indirect – Protected Areas			
17	Any indirect impact on the local rivers and streams could impact the downstream surface water bodies, i.e. River Suck Callows SPA and NHA and River Shannon Callows SAC/pNHA / Middle Shannon Callows SPA at distance from the site.	Low. Any reduction in quality in local water bodies (suspended solids / fuel / concrete leakages) could migrate downstream and impact on protected areas. The protected areas are located at distance; the Suck River Callows is located c. 4.6km from the site.	Slight

Water Framework Directive

- 7.253 The Water Framework Directive (WFD) assessment is based on the information outlined in this EIAR including baseline data, groundwater and surface water monitoring data for the site and the identification of sensitive receptors under the WFD and the mitigation measures outlined above. An Appropriate Assessment Screening and Natura Impact Assessment Report has also been prepared for the proposed development which identifies ecological sensitive receptors.
- 7.254 A potential zone of influence was taken to be a 15 km radius from the site boundary. The assessment identified eight potential receptors; they are:
- Ballyglass River;
 - River Suck;
 - Cuilleenirwan Lough Turlough;
 - Killeglan Public Water Supply (PWS) or Killeglan River Sub Basin;
 - Corkip Lough SAC and Feacle Lough pNHA (Turloughs);
 - River Shannon; and
 - Suck South groundwater body (GWB).
- 7.255 Mitigation measures, outlined below in relation to water, will be embedded within the proposed development to protect surface water and groundwater and the identified WFD receptors. The measures for the proposed development will be secured via any future planning permission and associated conditions relating to an approval.
- 7.256 It is considered here, that based on the nature of the proposed development, which has been operational since 2006 and with the designed embedded mitigation measures in place, that the proposed development will not result in a deterioration in the status of the identified WFD receptors or prevent them from achieving their status objectives.

Mitigation Measures

Construction & Operational Stages

- 7.257 As the quarry develops and deepens, and as need arises, a water management system associated with discharge of treated clean water off-site will be installed and implemented. This water management system was granted permission under planning reference no. P. Ref. 04/1479 (ABP PL20.215417). The discharge of the treated clean water from the site will be carried out and subject to a Section 4 Discharge Licence consent by Roscommon County Council.
- 7.258 The off-site discharge surface water management system will consist of a sump to be provided on the floor of the quarry that will cater for increasing volumes of water which will require attenuation and treatment as the quarry deepening progresses.
- 7.259 Any surface water falling over the site will be directed to the sump along the northern quarry face. From here, the water will be pumped up to ground level to a water settlement pond. The water will pass through the settlement pond (c. 54m x 15m). From the settlement pond, the water will flow through a hydrocarbon interceptor before being discharged off site via a gravity fed buried pipe along the verge of the R363 road before discharge to the Ballyglass river.

- 7.260 Roadstone propose to upgrade the overall effluent treatment system by decommissioning the existing WwTS and replacing it with a Secondary Wastewater Treatment System (WwTS) at the site with a constructed soil polishing filter for final treatment. The Site Characterisation form and details of the Secondary WwTS and polishing filter are included in **Appendix 7-A**. The package WwTS is designed to cater for 30 staff on site with a Population Equivalent (PE) of eight persons, based on daily hydraulic load.
- 7.261 In order to mitigate against the risk of pollution to groundwater and surface water occurring at the site the following management measures will be implemented.
- A double skinned fuel storage tank is located at the site and stands on a concrete pad area. Oil and lubricants for plant and machinery are stored on spill pallets in designated storage areas;
 - A hard stand refuelling area with hydrocarbon separator for treating runoff waters is in place at the refuelling station area;
 - Spill Kits and spill training has been provided. All new employees are given an induction which includes spill kit training and how to respond to a fuel spill;
 - To control dust, water sprayed from a tractor drawn bowser on dry exposed surfaces and stockpiles (paved roads, unsealed haul roads and hardstand areas) will be implemented as required;
 - Fixed sprinkler system on the hard surface site access road between the site entrance and the weighbridge;
 - Areas of bare or exposed soils will, insofar as practicable, be kept to a minimum through the phased extraction proposals;
 - Dust blows at the existing site are largely screened by the side walls of the existing quarry and the vegetated screening berms and existing boundary hedgerows;
 - All HGVs exiting the site routed through the existing wheelwash. This minimises the transport of fines by HGVs over the access / egress road and the public road network;
 - Periodic sweeping of the internal paved site access road and surrounding public roads carried out as and when required by a mechanical road sweeper;
 - When the concrete batching plant is operational, all admixtures will be stored in suitably bunded tanks at the site. Water will be stored in a water tank (c. 3,000 gallon capacity) adjacent to the Concrete Batching Plant. This will be topped up as required; and
 - Concrete trucks will be washed out in a washing bay adjacent to the Concrete Batching Plant. The wash water will be pumped from the trucks for recycling through a closed series of settlement ponds.
- 7.262 Implementation of these measures at the application site will further reduce the potential impacts identified above.

Assessment of Impacts with Mitigation Measures in Place

- 7.263 With the above mitigation measures in place at the application site, it is projected that the following reduction in the assessed significance of impacts will result in the significance of all other potential impacts during the construction and operational stage will be “**slight**” or lower to the water environment receptors.

Residual Impact Assessment

- 7.264 Examination of the identified potential impacts on the receiving environment show that with the mitigation measures in place, there are no significant residual impacts with respect to groundwater and surface water during the construction and operational stages of the proposed continued use of the quarry.
- 7.265 Following mitigation, the significance of all potential impacts identified will be reduced to “**slight**” or lower.

Monitoring

- 7.266 The following monitoring activities will continue to be carried out to demonstrate that the development is not having an adverse impact on the surrounding environment and will document any changes in water quality:
- Monitoring of ground and surface water quality, levels and discharges - Condition 6 (g);
 - Groundwater levels in all boreholes monitored on a quarterly basis for the duration of the proposed development - Condition 7 (d);
 - Recording of any breaches over the previous year for water quality monitoring to be provided in the annual environmental audit - Condition 7 (e);
 - Submission of quarterly reports with full monitoring records of surface water quality monitoring and groundwater monitoring - Condition 7.

References

Feeley, H. B., Baars, J. R., Kelly-Quinn, M., & Nelson, B. (2020). Ireland Red List No. 13: Stoneflies (Plecoptera). National Parks and Wildlife Service.

Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C., ... & MacCarthy, M. (2005). Water quality in Ireland. Environmental Protection Agency, Co. Wexford, Ireland.

RECEIVED: 09/12/2025

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Figures

Figure 7-1: Onsite Borehole Locations Map

Figure 7-2: Karst Features Map

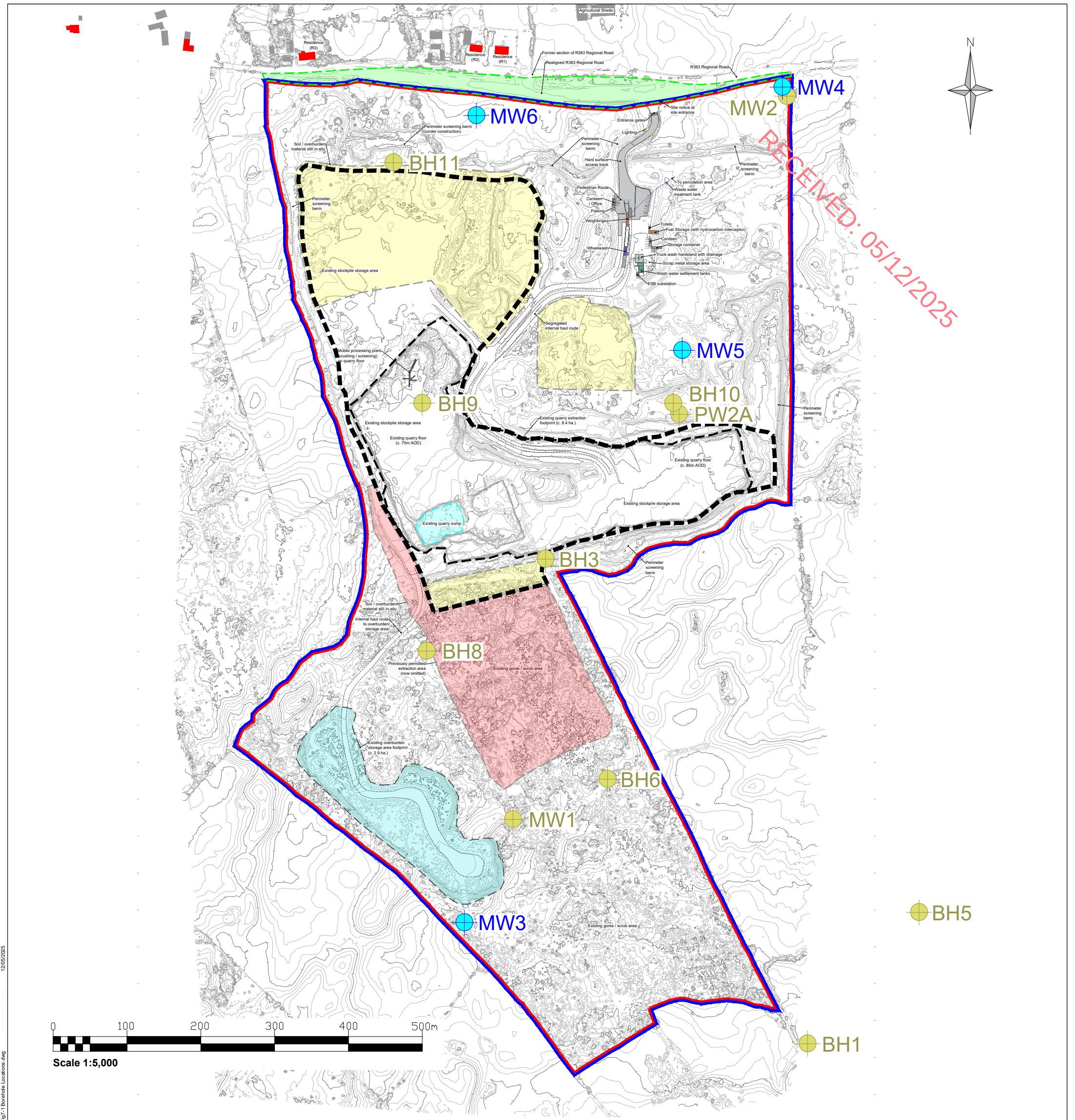
Figure 7-3: Surface Water Features Map

Figure 7-4: Bedrock Aquifer Map

Figure 7-5: Groundwater Vulnerability Map

Figure 7-6: Groundwater Body Map

Figure 7-7: Source Protection Areas



Notes:

1. Based on 6 inch scale *Tailte Eireann* Discovery raster mapping RN047, RN048, RN050, RN051

Legend:

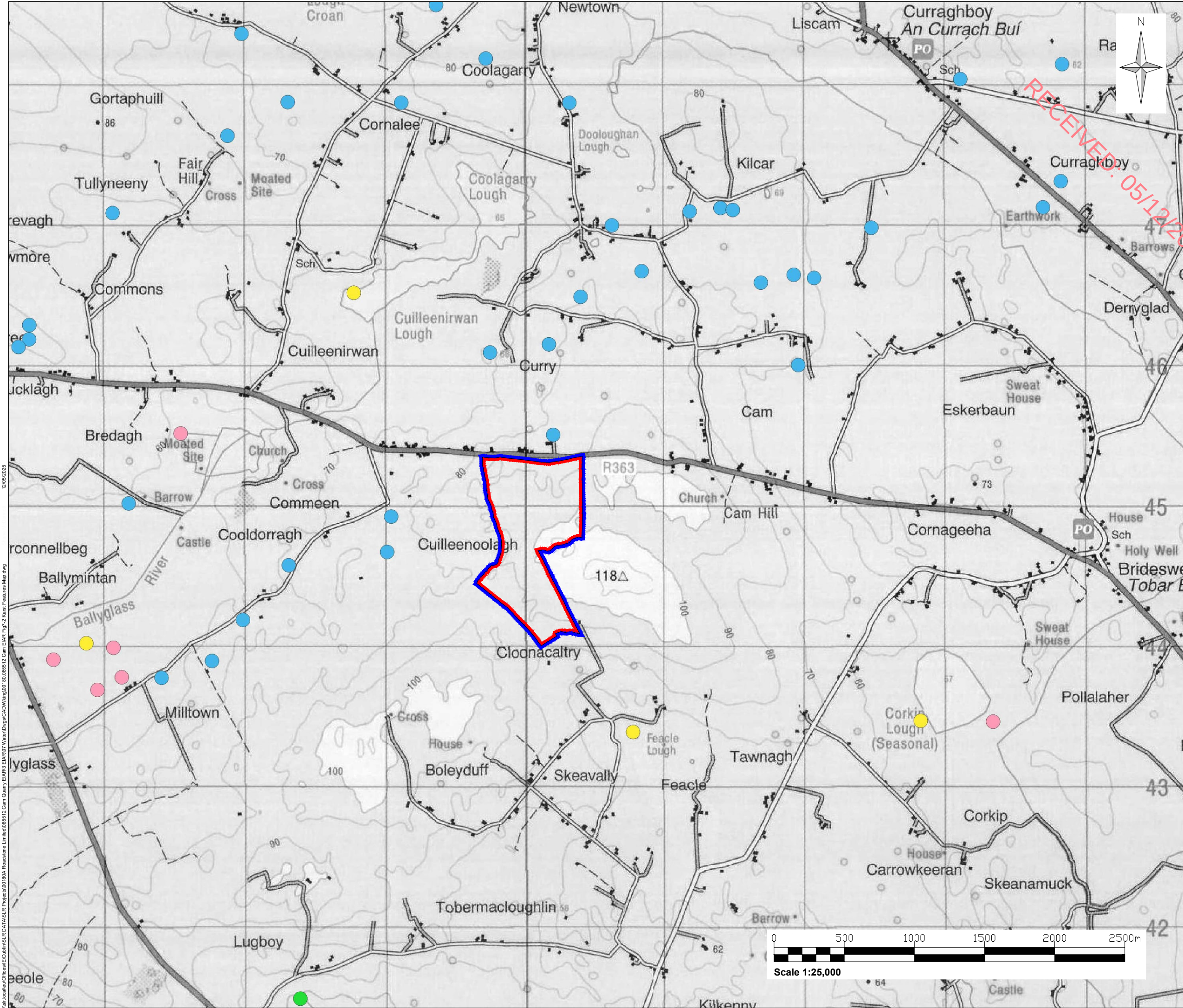
Landholding (c. 66.3 hectares)

Planning Application Area (c. 66.3 hectares)

Groundwater Monitoring Well Locations

Other Site Boreholes

Rev	Amendments	Date	By	Chk	Auth
www.slrconsulting.com					
Client Roadstone Limited					
Project Continued Use of Existing Cam Quarry at Curry & Cloonacaltry townlands, Co. Roscommon					
Figure Title Onsite Borehole Locations Map					
Scale 1:5,000 @ A3		SLR Project No. 501.065512.00001			
Designed mcob	Drawn mcob	Checked pg	Authorised pg		
Date 03/25	Date 03/25	Date 04/25	Date 04/25		
Figure Number Figure 7-1					Rev. 0



Notes:

1. Based on 6 inch scale Tailte Eireann Discovery raster maping RN047, RN048, RN050, RN051

Legend:

Landholding (c. 66.3 hectares)

Planning Application Area (c. 66.3 hectares)

Surface Water Bodies

Karst Features

Enclosed Depression

Spring

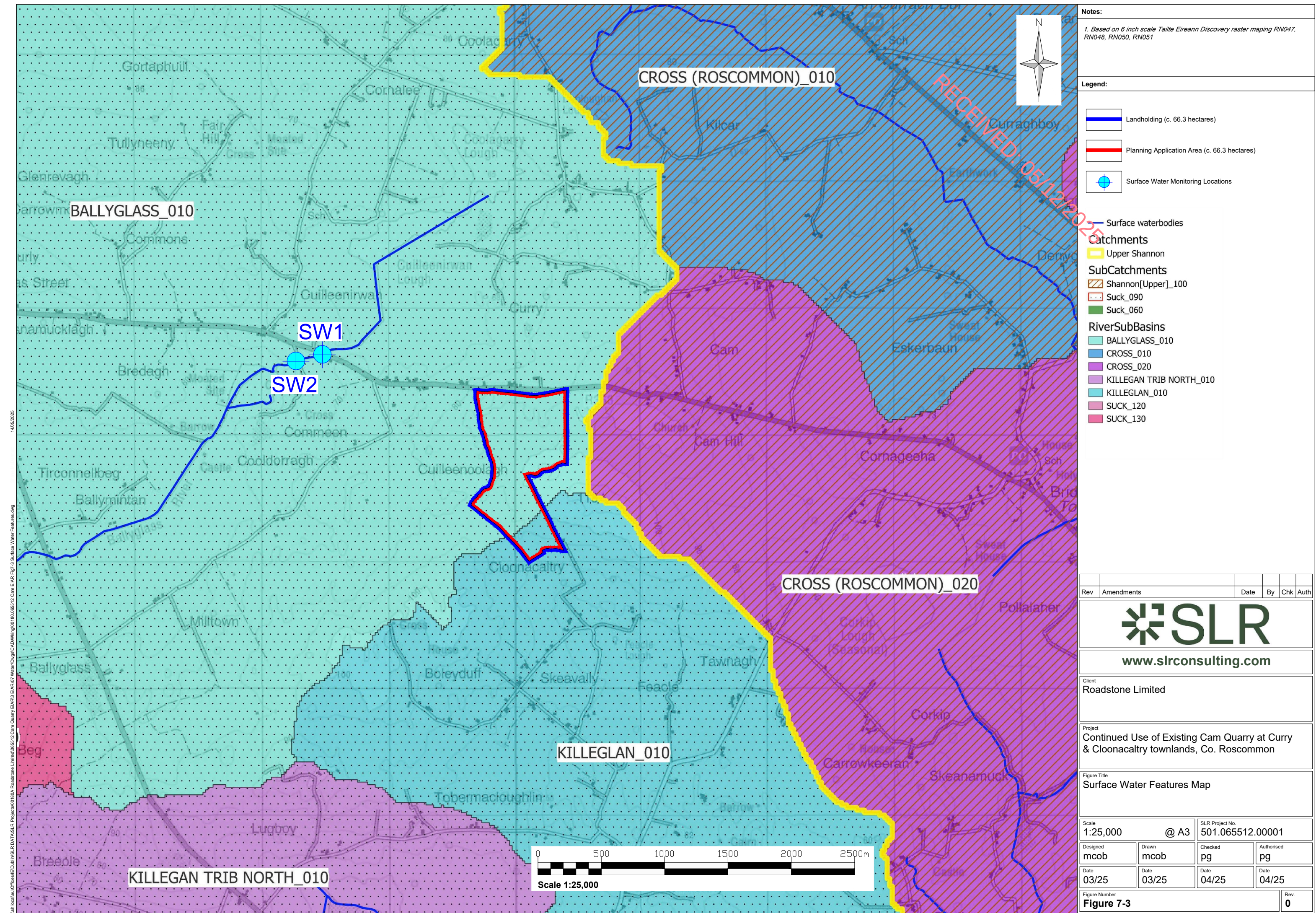
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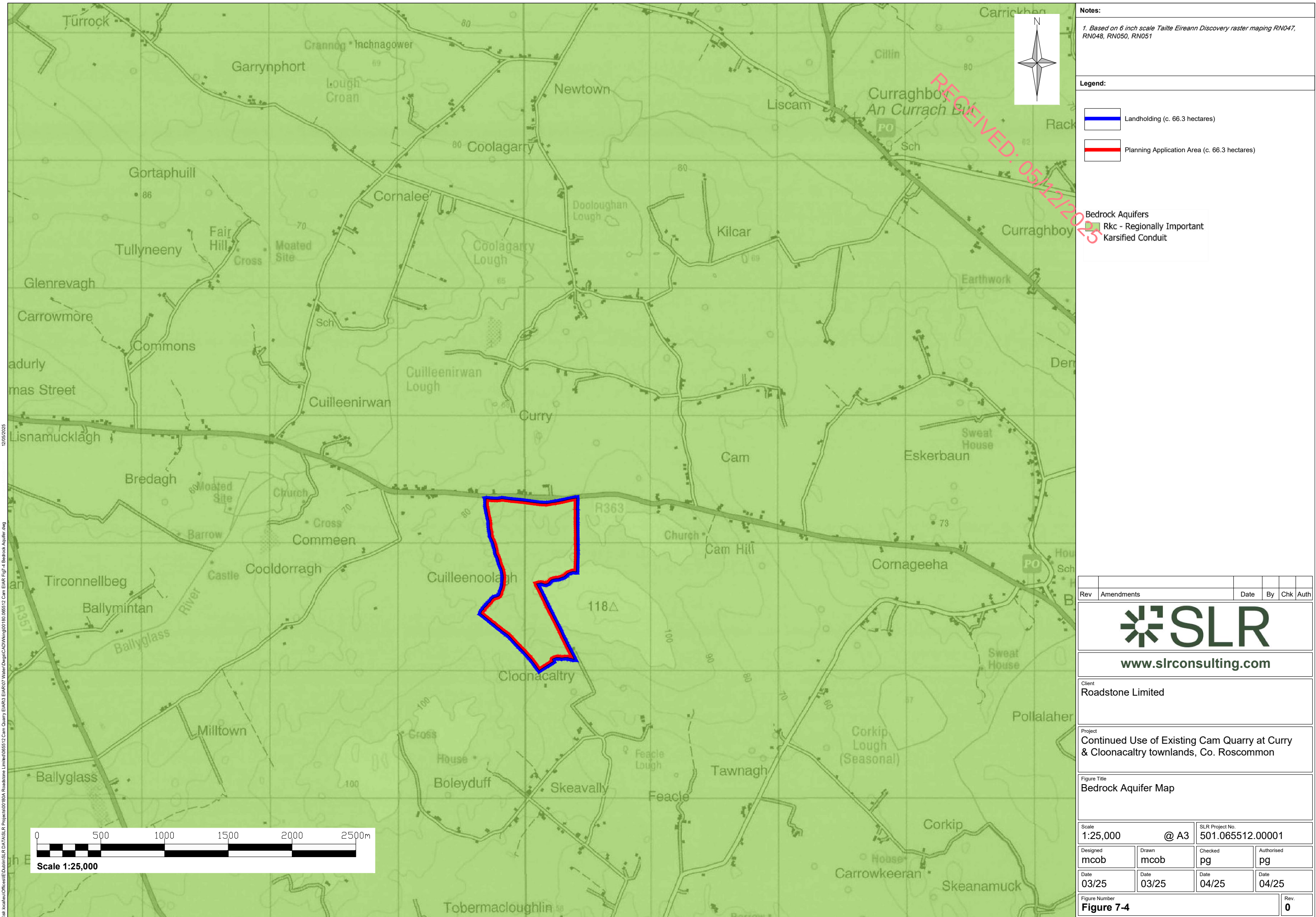
Turlough

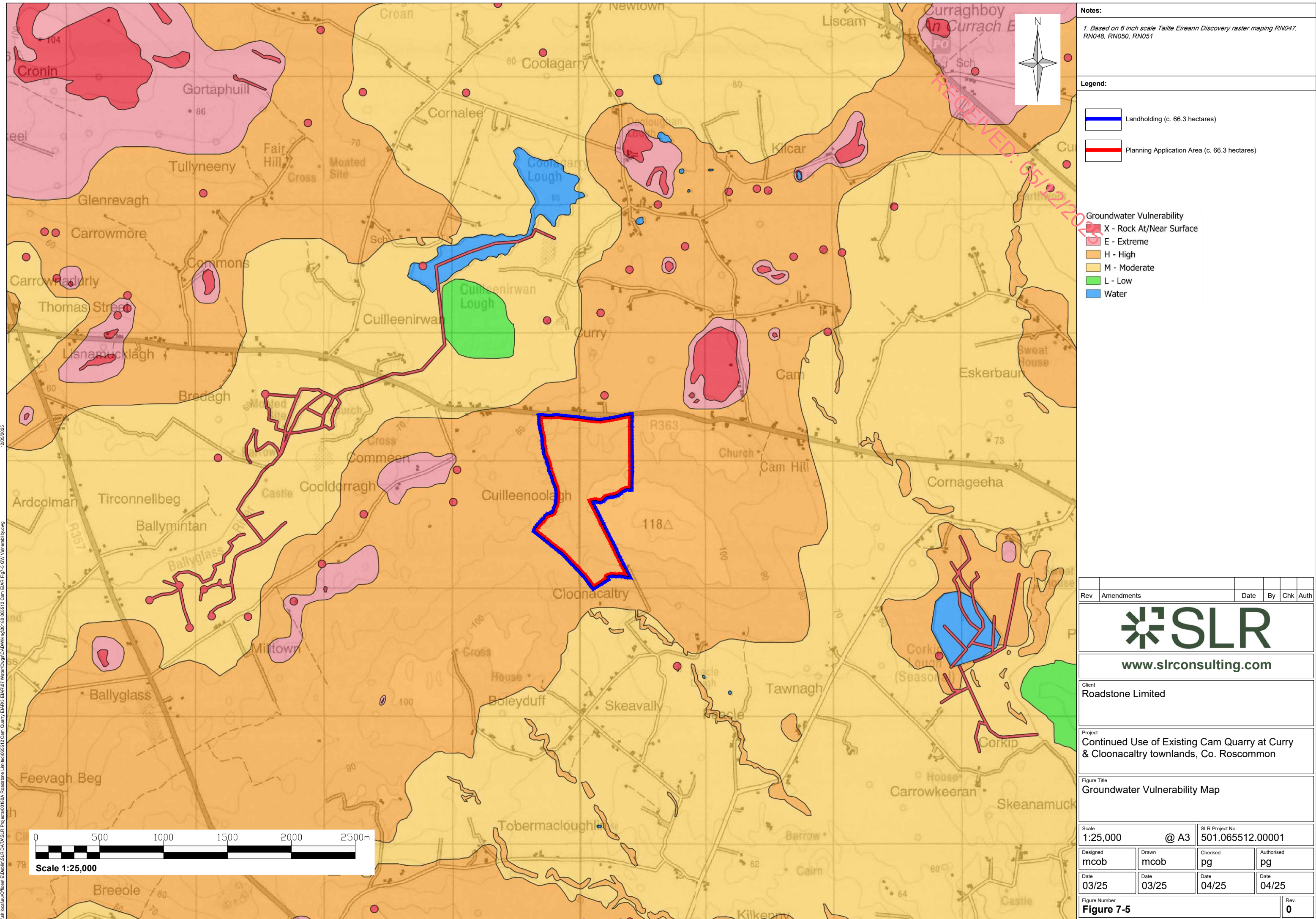
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Client Roadstone Limited					
Project Continued Use of Existing Cam Quarry at Curry & Cloonacaltry townlands, Co. Roscommon					
Figure Title Karst Features Map					
Scale 1:25,000 @ A3		SLR Project No. 501.065512.00001			
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Date 03/25	Date 03/25	Date 04/25	Date 04/25		
Figure Number Figure 7-2					Rev. 0

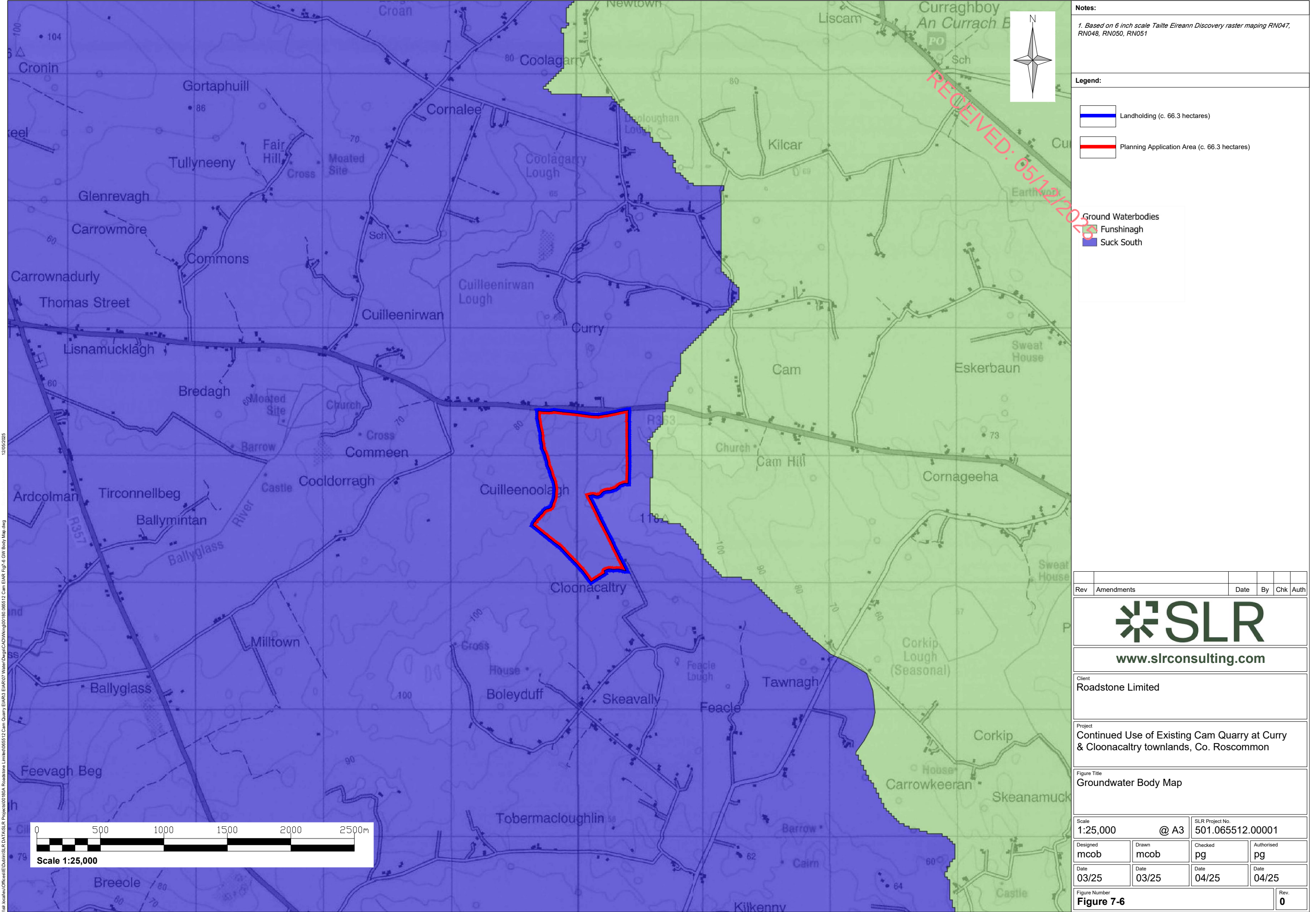
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Rev		Amendments		Date	By	Chk	Auth
 www.slrconsulting.com							
Client Roadstone Limited							
Project Continued Use of Existing Cam Quarry at Curry & Cloonacaltry townlands, Co. Roscommon							
Figure Title Groundwater Body Map							
Scale 1:25,000 @ A3				SLR Project No. 501.065512.00001			
Designed mcob		Drawn mcob		Checked pg		Authorised pg	
Date 03/25		Date 03/25		Date 04/25		Date 04/25	
Figure Number Figure 7-6							Rev. 0

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Appendices

Appendix 7-A: Site Characterisation and Package WwTS with Percolation Area

RECEIVED: 05/12/2025

REVISED: 05/12/2025

Site Characterisation Report

By

Dr. Eugene Bolton

Applicant: Roadstone Ltd.

APPENDIX A: SITE CHARACTERISATION FORM

File Reference:

1.0 GENERAL DETAILS (From planning application)

Prefix: First Name: Surname:

Address: Site Location and Townland:

Number of Bedrooms: Maximum Number of Residents:

Comments on population equivalent

There will be a max of 30 workers @ 40 Litres and 25 Grams BOD = 1200 litres and 750 Grams BOD.
This equates to 8 PE based on hydraulic Load and 12PE based on Organic load

Proposed Water Supply:

Mains ☒ Private Well/Borehole ☒ Existing well on-site Group Well/Borehole ☐

2.0 GENERAL DETAILS (From planning application)

Soil Type, (Specify Type):

Subsoil, (Specify Type):

Bedrock Type:

Aquifer Category: Regionally Important Locally Important Poor

Vulnerability: Extreme ☐ High ☒ Moderate ☐ Low ☐

Groundwater Body: Status:

Name of Public/Group Scheme Water Supply within 1 km:

Source Protection Area: ZOC ☐ SI ☐ SO ☐ Groundwater Protection Response:

Presence of Significant Sites
(Archaeological, Natural & Historical):

Past experience in the area:

Comments:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, and/or any potential site restrictions).

Bedrock Aquifer is Rkc - Vulnerability is High - Groundwater will be the main target at risk. Surface water will also be a target at risk.

Note: Only information available at the desk study stage should be used in this section.

3.0 ON-SITE ASSESSMENT

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3.1 Visual Assessment

Landscape Position:

Slope: Steep (>1:5) ☐ Shallow (1:5-1:20) ☐ Relatively Flat (<1:20) ☒

Slope Comment

Surface Features within a minimum of 250m (Distance To Features Should Be Noted In Metres)

Houses:

There are 4 houses to North or northwest of the site within 300m

Existing Land Use:

Quarry

Vegetation Indicators:

Nothing to suggest poor soakage

Groundwater Flow Direction:

Likely to Northwest

Ground Condition:

Dry

Site Boundaries:

Within the quarry

3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment (contd.)

Roads:

R363 is to north of quarry

Outcrops (Bedrock And/Or Subsoil):

Sand and gravels with Limestone rock exposed

Surface Water Ponding:

None

Lakes:

None within 500m

Beaches/Shellfish Areas:

None

Wetlands:

None

Karst Features:

enclosed depression to north of the R563

Watercourses/Streams:*

None within 500m

*Note and record water level

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3.0 ON-SITE ASSESSMENT

3.1 Visual Assessment (contd.)

Drainage Ditches:*

No ditch bordering site

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Springs:*

None

Wells:*

Area on mains and Mains serves the quarry
However there are wells in the quarry rhiugh not in use and all are in excess of 100m from location of percolation area

Comments:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, the suitability of the site to treat the wastewater and the location of the proposed system within the site).

The site is dry.
Likely to be acceptable

*Note and record water level

3.2 Trial Hole (should be a minimum of 2.1m deep (3m for regionally important aquifers))

To avoid any accidental damage, a trial hole assessment or percolation tests should not be undertaken in areas which are at or adjacent to significant sites, (e.g. NHAs, SACs, SPAs, and/or Archaeological etc.), without prior advice from National Parks and Wildlife Service or the Heritage Service.

Depth of trial hole (m):

Depth from ground surface
to bedrock (m) (if present):

Depth from ground surface
to water table (m) (if present):

Depth of water ingress:

Rock type (if present):

Date and time of excavation:

Date and time of examination:

Depth of
Surface and

Subsurface
Percolation
Tests

Soil/Subsoil

Texture &
Classification**

Plasticity and
dilatancy***

Soil
Structure

Density/
Compactness

Colour****

Preferential
flowpaths

0.1 m		Sandy CLAY	Diklatent	Blocky	Firm	Brown	Rootlets
0.2 m							
0.3 m		Sandy Silty GRAVEL	No Trds or Ribs	Structureless	Firm	Dark Grey	None
0.4 m		with lots of cobbles					
0.5 m		and boulders if varying					
0.6 m		sizes					
0.7 m							
0.8 m							
0.9 m							
1.0 m							
1.1 m							
1.2 m							
1.3 m							
1.4 m							
1.5 m							
1.6 m							
1.7 m							
1.8 m							
1.9 m							
2.0 m							
2.1 m							
2.2 m							
2.3 m							
2.4 m							
2.5 m							
2.6 m							
2.7 m							
2.8 m							
2.9 m							
3.0 m							
3.1 m		Base of Pit					
3.2 m							
3.3 m							
3.4 m							
3.5 m							

Likely Subsurface Percolation Value:

Likely Surface Percolation Value:

Note: *Depth of percolation test holes should be indicated on log above. (*Enter Surface or Subsurface at depths as appropriate).

** See Appendix E for BS 5930 classification.

*** 3 samples to be tested for each horizon and results should be entered above for each horizon.

**** All signs of mottling should be recorded.

3.2 Trial Hole (contd.) Evaluation:

The subsoil is Gravel with silt present - soakage will be good
High cobbles and some large boulders - may give rise to some preferential flow. However depth of overburden is in excess of 3m

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3.3(a) Subsurface Percolation Test for Subsoil

Step 1: Test Hole Preparation

Percolation Test Hole

	1	2	3
Depth from ground surface to top of hole (mm) (A)	600	600	700
Depth from ground surface to base of hole (mm) (B)	1,000	1,000	1,100
Depth of hole (mm) [B - A]	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

Pre-soak start	Date	19-Sep-2025	19-Sep-2025	19-Sep-2025
	Time	08:15	08:15	08:15
2nd pre-soak start	Date	19-Sep-2025	19-Sep-2025	19-Sep-2025
	Time	17:00	17:00	17:00

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.

	1	2	3
Date of test	20-09-2025	20-09-2025	20-09-2025
Time filled to 400 mm	08:10	08:11	08:12
Time water level at 300 mm	08:36	08:22	08:42
Time (min.) to drop 100 mm (T_{100})	26.00	11.00	30.00
Average T_{100}			22.33

If $T_{100} > 480$ minutes then Subsurface Percolation value >120 – site unsuitable for discharge to ground

If $T_{100} \leq 210$ minutes then go to Step 4;

If $T_{100} > 210$ minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	Δt (min)
1	08:36	09:04	28.00	08:22	08:39	17.00	08:42	09:17	35.00
2	09:04	09:41	37.00	08:39	08:56	17.00	09:17	10:04	47.00
3	09:41	10:35	54.00	08:56	09:17	21.00	10:04	11:08	64.00
Average Δt Value			39.67			18.33			48.67
	Average $\Delta t/4 =$ [Hole No.1] 9.92 (t_1)			Average $\Delta t/4 =$ [Hole No.2] 4.58 (t_2)			Average $\Delta t/4 =$ [Hole No.3] 12.17 (t_3)		

Result of Test: Subsurface Percolation Value = 8.89 (min/25 mm)

Comments:

Soakage is good

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No.	1					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T - Value = $4.45 / K_{fs}$
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			1,439.0	0.01	454.15
Average	T- Value		T- Value Hole 1 = (T_1)		113.54	

Percolation Test Hole No.	2					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T - Value = $4.45 / K_{fs}$
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 2 = (T_2)		0.00	

Result of Test: Subsurface Percolation Value =

56.77 (min/25 mm)

Percolation Test Hole No.	3					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T - Value = $4.45 / K_{fs}$
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value		T- Value Hole 3 = (T_3)		0.00	

Comments:

3.3(b) Surface Percolation Test for Soil

Step 1: Test Hole Preparation

Percolation Test Hole	1	2	3
Depth from ground surface to top of hole (mm)	0	0	0
Depth from ground surface to base of hole (mm)	400	400	400
Depth of hole (mm)	400	400	400
Dimensions of hole [length x breadth (mm)]	300 x 300	300 x 300	300 x 300

Step 2: Pre-Soaking Test Holes

Pre-soak start	Date	19-Sep-2025	19-Sep-2025	19-Sep-2025
	Time	08:15	08:15	08:15
2nd pre-soak start	Date	19-Sep-2025	19-Sep-2025	19-Sep-2025
	Time	17:00	17:00	17:00

Each hole should be pre-soaked twice before the test is carried out.

Step 3: Measuring T_{100}

Percolation Test Hole No.	1	2	3
Date of test	20-Sep-25	20-Sep-25	20-Sep-2025
Time filled to 400 mm	08:15	08:16	08:17
Time water level at 300 mm	09:00	09:00	09:02
Time to drop 100 mm (T_{100})	45.00	44.00	45.00
Average T_{100}			44.67

If $T_{100} > 480$ minutes then Surface Percolation value >90 – site unsuitable for discharge to ground

If $T_{100} \leq 210$ minutes then go to Step 4;

If $T_{100} > 210$ minutes then go to Step 5;

Step 4: Standard Method (where $T_{100} \leq 210$ minutes)

Percolation Test Hole	1			2			3		
Fill no.	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)	Start Time (at 300 mm)	Finish Time (at 200 mm)	ΔT (min)
1	09:00	09:46	46.00	09:00	09:51	51.00	09:02	09:52	50.00
2	09:46	10:53	67.00	09:51	11:01	70.00	09:52	11:07	75.00
3	10:53	12:19	86.00	11:01	12:28	87.00	11:07	12:38	91.00
Average ΔT Value			66.33			69.33			72.00
	Average $\Delta T/4 =$ [Hole No.1] 16.58 (T_1)			Average $\Delta T/4 =$ [Hole No.2] 17.33 (T_2)			Average $\Delta T/4 =$ [Hole No.3] 18.00 (T_3)		

Result of Test: Surface Percolation Value = 17.31 (min/25 mm)

Comments:

Soakage in topsoil, is good

Step 5: Modified Method (where $T_{100} > 210$ minutes)

Percolation Test Hole No.	1					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T - Value = $4.45 / K_{fs}$
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value	T- Value Hole 1 = (T_1)				0.00

Percolation Test Hole No.	2					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T - Value = $4.45 / K_{fs}$
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value	T- Value Hole 2 = (T_2)				0.00

Result of Test: Surface Percolation Value =

0.00 (min/25 mm)

Percolation Test Hole No.	3					
Fall of water in hole (mm)	Time Factor = T_f	Start Time hh:mm	Finish Time hh:mm	Time of fall (mins) = T_m	$K_{fs} = T_f / T_m$	T - Value = $4.45 / K_{fs}$
300 - 250	8.1			0.00		
250 - 200	9.7			0.00		
200 - 150	11.9			0.00		
150 - 100	14.1			0.00		
Average	T- Value	T- Value Hole 3 = (T_3)				0.00

Comments:

4.0 CONCLUSION of SITE CHARACTERISATION

Integrate the information from the desk study and on-site assessment (i.e. visual assessment, trial hole and percolation tests) above and conclude the type of system(s) that is (are) appropriate. This information is also used to choose the optimum final disposal route of the treated wastewater.

Slope of proposed infiltration / treatment area:

Are all minimum separation distances met?

☒

Depth of unsaturated soil and/or subsoil beneath invert of gravel (or drip tubing in the case of drip dispersal system)

Percolation test result: Surface:

Sub-surface:

Not Suitable for Development

☐

Suitable for Development

☒

Identify all suitable options

1. Septic tank system (septic tank and percolation area) (**Chapter 7**)
2. Secondary Treatment System (**Chapters 8 and 9**) and soil polishing filter (**Section 10.1**)
3. Tertiary Treatment System and Infiltration / treatment area (**Section 10.2**)

Discharge Route ¹

Groundwater

5.0 SELECTED DWWTs

Propose to install:

Secondary Treatment System and soil polishing filter

and discharge to:

Ground Water

Invert level of the trench/bed gravel or drip tubing (m)

Site Specific Conditions (e.g. special works, site improvement works testing etc.

It is recommend to install a secondary treatment unit followed by a soil polishing filter with discharge to ground.
As there is in excess of 3m of free draining soil the base of the infiltration gravel can be at about 500mm below existing ground level - Area is cleared and leveled.
A 300mm deep, bed of distribution gravel (20mm pebble) is placed on the prepared area. The 32mm diameter distribution pipes are placed on this.
Load filter at 20 Litres/M2
PE is 12 area required is a minimum of 90m2

¹ A discharge of sewage effluent to "waters" (definition includes any or any part of any river, stream, lake, canal, reservoir, aquifer, pond, watercourse or other inland waters, whether natural or artificial) will require a licence under the Water Pollution Acts 1977-90. Refer to Section 2.4.

6.0 TREATMENT SYSTEM DETAILS

SYSTEM TYPE: Septic Tank Systems (Chapter 7)

Tank Capacity (m ³)	3.50	Percolation Area	Mounded Percolation Area
No. of Trenches		No. of Trenches	
Length of Trenches (m)		Length of Trenches (m)	
Invert Level (m)		Invert Level (m)	

SYSTEM TYPE: Secondary Treatment System (Chapters 8 and 9) and polishing filter (Section 10.1)

Secondary Treatment Systems receiving septic tank effluent (Chapter 8)

Media Type	Area (m ²)*	Depth of Filter	Invert Level
Sand/Soil			
Soil			
Constructed Wetland			
Other			

Packaged Secondary Treatment Systems receiving raw wastewater (Chapter 9)

Type	SBR
Capacity PE	12
Sizing of Primary Compartment	5.00 m ³

Polishing Filter*: (Section 10.1)

Surface Area (m ²)*		Option 3 - Gravity Discharge Trench length (m)	
Option 1 - Direct Discharge Surface area (m ²)		Option 4 - Low Pressure Pipe Distribution Trench length (m)	
Option 2 - Pumped Discharge Surface area (m ²)	90.00	Option 5 - Drip Dispersal Surface area (m ²)	

SYSTEM TYPE: Tertiary Treatment System and infiltration / treatment area (Section 10.2)

Identify purpose of tertiary treatment	Provide performance information demonstrating system will provide required treatment levels	Provide design information

DISCHARGE ROUTE:

Groundwater ☒	Hydraulic Loading Rate * (l/m ² .d)	20.00	Surface area (m ²)	90.00
Surface Water ** ☐	Discharge Rate (m ³ /hr)			

* Hydraulic loading rate is determined by the percolation rate of subsoil

** Water Pollution Act discharge licence required

6.0 TREATMENT SYSTEM DETAILS

QUALITY ASSURANCE:

Installation & Commissioning

Install as specified & supervised by appropriately qualified person

On-going Maintenance

Regular desludging & Maintenance contract with supplier or installer

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7.0 SITE ASSESSOR DETAILS

Company:

Prefix:

First Name:

Surname:

Address:

Qualifications/Experience:

Date of Report:

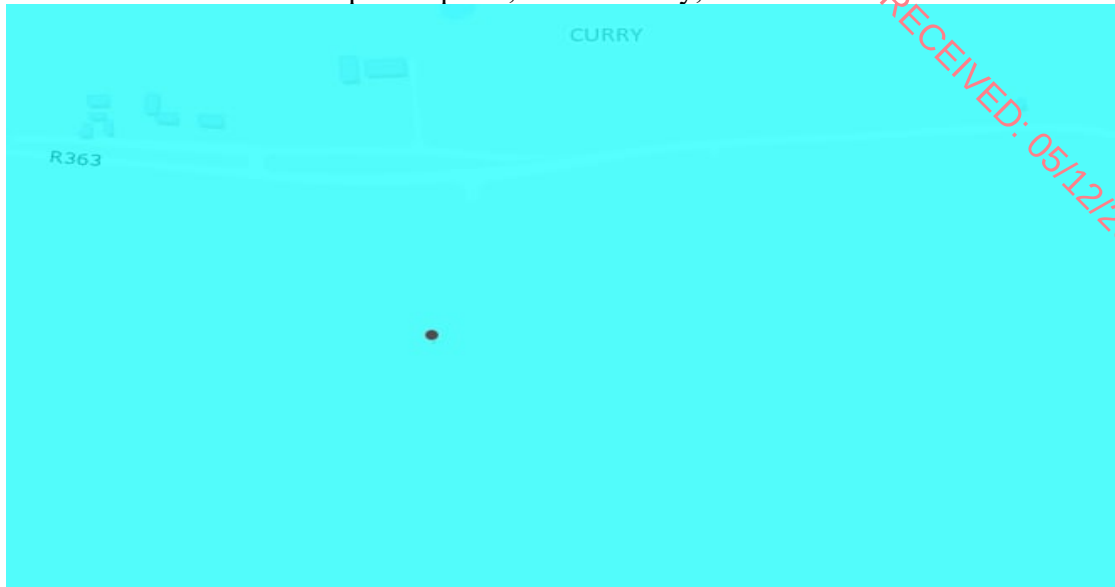
Phone:

E-mail:

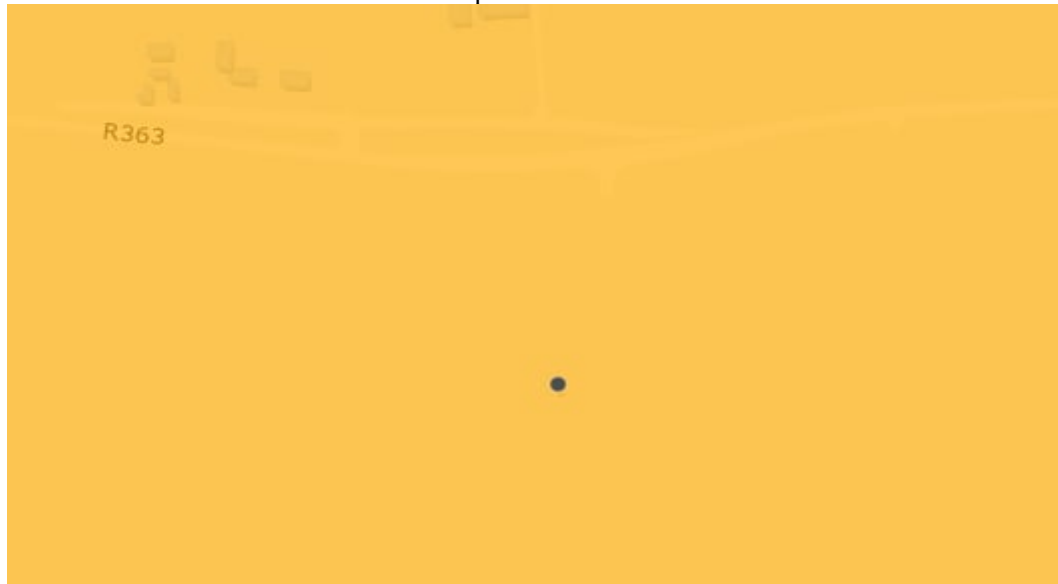
Indemnity Insurance Number:

Signature: _____

Maps – Aquifer, Vulnerability, bedrock



Aquifer is RKc



Vulnerability is High



Bedrock is Dinantian Pure Bedded Limestone

Soil



Parent Material Code	TLs		
Parent Material Name	Till derived chiefly from limestone	Irish Forest Soils (IFS) Soil Description	Derived from mainly calcareous parent materials
Parent Material Description	Limestone till (Carboniferous)	County	ROSCOMMON
Soil Group	Grey Brown Podzolics, Brown Earths (medium-high base status)	Category	Deep well drained mineral (Mainly basic)
Irish Forest Soils (IFS) Soil Code	BminDW	Legend	BminDW - Deep well drained mineral (Mainly basic)
Irish Forest Soils (IFS) Code	12		

Subsoil



Quaternary Sediment Type	Till derived from limestones
Quaternary Sediment Code	TLs

Photos

Row 1 – P1, P2



Row 2 – P3, T1



Row 3 – T2, T3



Trial Pit



Excavated Material

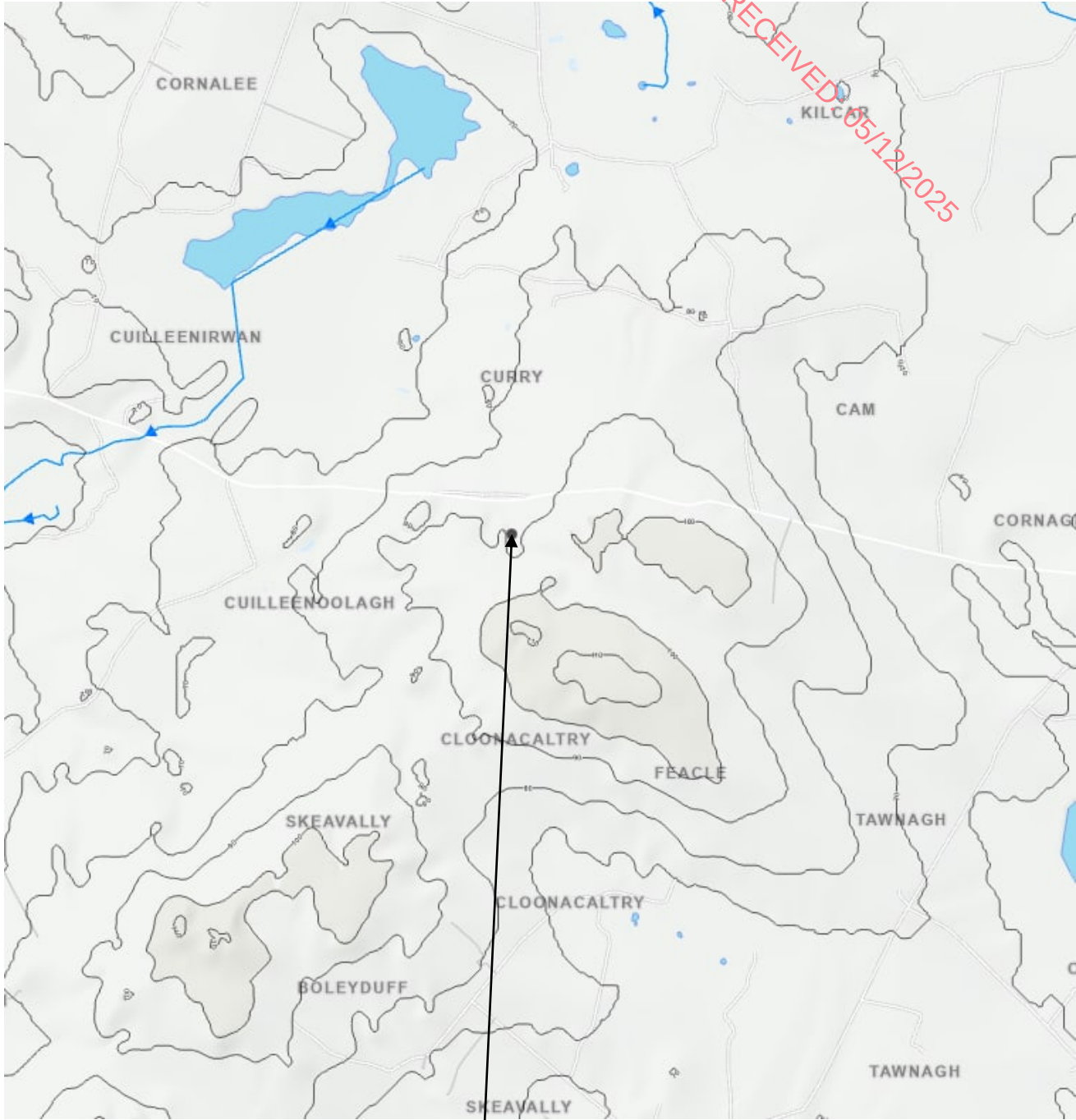


Site Overview



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Site Location



Site

RECEIVED: 05/12/2025

Eugene Bolton
T/a Trinity Green
Clonfert
Maynooth
Co Kildare
W23H6F3

2nd May, 2025
Our Ref: 70290275

Dear Eugene,

Client Name: Eugene Bolton COVER NOTE 2025-2026

We, Howden Insurance (Ireland) Limited, as insurance brokers, provide services to you in accordance with our terms of business agreement only. We are writing to you to confirm that the contracts of insurance described below (the '**Insurances**') are in force at the date of this letter. All of the Insurances are subject to their specific policy terms, conditions, exceptions, warranties, and limitations, not all of which are summarised below, but which are detailed in the policy document.

The Business Description covered under the Insurances (unless qualified under individual headings below) is as follows: Environmental Consultant.

Class:	Professional Indemnity
Policy Number:	PI/C/12453/21/1
Insurer:	Howden Insurance (Ireland) Limited t/a RL Underwriting
Ultimate Insurer:	Aspen
Period:	02/05/2025 to 01/05/2026
Limit of Indemnity:	€1,000,000

Any queries, please do not hesitate to contact the undersigned.

Yours sincerely,

Ger Brennan

Ger Brennan
Commercial Account Manager
Howden Insurance

Unit 3, Swords Business Campus, Balheary Road, Co. Dublin, K67TY09

T: 01 840 8060 E: info@howdeninsurance.ie W: www.howdenbroking.com/ie-en

Directors: Robert Kennedy, Mark Nolan, Mark Boland, Mark Whelan, Denise Behan
Howden Insurance (Ireland) Limited trading as Howden, Build-Zone, CRS Yachts, Haven Knox-Johnston, Lark Music, Performance Film and Media Insurance, Principal Insurance, Protean Risk, RL Underwriting, Robertson Low, Sanctum Health, Sanctum Superyacht Insurance, Self-Build Zone and Wright Insurance Brokers is regulated by the Central Bank of Ireland. Howden Insurance (Ireland) Limited is authorised and regulated by the Financial Conduct Authority, No. 973308. Registered in Ireland under company registration number 338916. Registered Office: 10 The Courtyard, Kilcarbery Park, Nangor Road, Dublin 22, Ireland. Calls may be monitored and recorded for quality assurance purposes.

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SITE SUITABILITY REPORT FOR A PROPRIETARY SEWAGE TREATMENT SYSTEM

Clients: CAM Roadstone Quarry
Cam Quarry
Phone: n/a
Email:

AGENT: Dr. Eugene Bolton PhD Microbiology, Fetac
Assessor
Phone: 086 2434 828;
Email: info@trinitygreen.ie

Site Address: Brideswell
Co. Roscommon

Assessors: Trinity Green
Clonfert
Maynooth
Co. Kildare
Phone: 086 2434 828;
Email: info@trinitygreen.ie

Preparation Date: 29/09/2025

File Reference: (MES4205)



Coleraine,
Clara Road,
Tullamore,
Co. Offaly

Tel: +353 (0)57 93 26000
Fax: +353 (0)57 93 26060

E-mail: info@molloyprecst.com
Web: www.molloyprecst.com

Directors: Donal Molloy
Dolores Molloy

PROPOSED SEWAGE TREATMENT SYSTEM DETAILS

PROPOSED SYSTEM: Chieftain SBR sewage treatment system (8 PE) or (12PE)

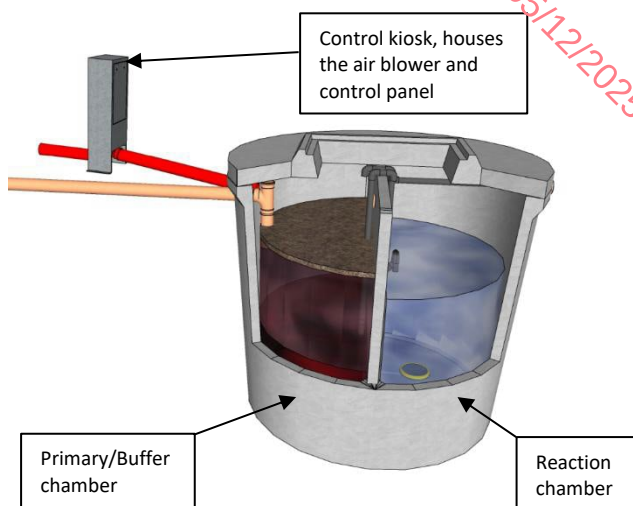
Certification: EN12566-3, SR66 (PIA2020-SR66-1909-1055)

HOW DOES AN CHIEFTAIN SBR SEWAGE TREATMENT SYSTEM WORK?

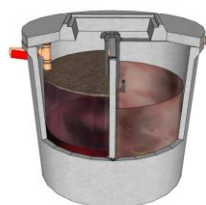
The Chieftain SBR sewage treatment system uses sequencing batch reactor (SBR) technology to achieve the required treatment standards and ensure low running costs. This system has two chambers: a primary/buffer chamber and a reaction chamber.

The primary/buffer chamber is used to separate gross solids and “fats oils and greases” (FOG) from a typical house. This chamber also buffers shock loads (e.g. morning showers) and allows the reaction chamber process sewage over a 24-hour period.

The reaction chamber treats sewage to the required standard using bacteria and oxygen. SBR technology operates the air blower optimally, introducing oxygen only when required, limiting running costs. SBR technology achieves this in a four-phase cycle, which is repeated 4 times daily:



1
Fill



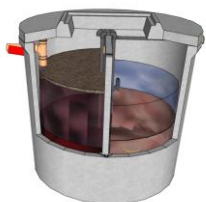
A batch of sewage is transferred from the primary/buffer chamber into the reaction chamber using our airlift system. Airlift technology uses an air blower (used for aeration also) to push water through the pipework from one chamber to the other.

2
React



When a batch is transferred into the reactor the Chieftain SBR uses bacteria (in the form of a sludge) already in the reactor to degrade the contaminants. Bacteria require oxygen to thrive and efficiently remove impurities to the required levels. To prevent excess sludge in the reaction chamber, a small portion is transferred to the primary/buffer chamber using airlift technology during each cycle.

3
Settle



During the settle phase, the sludge is allowed to settle to the bottom of the reaction chamber. This creates a layer of treated water at the top of the chamber and a layer of sludge at the bottom (for use in the next cycle).

4
Discharge



During the discharge phase, the treated water is removed from the top of the chamber. This can be achieved with Airlift technology when using a gravity percolation system; or a mechanical pump if using a pressurised percolation system or a tertiary treatment system

PROPOSED SEWAGE TREATMENT SYSTEM DETAILS

TECHNOLOGY:

Molloy Environmental Systems Chieftain SBR (Sequencing Batch Reactor), (Ref: EPA, CoP, 2021)

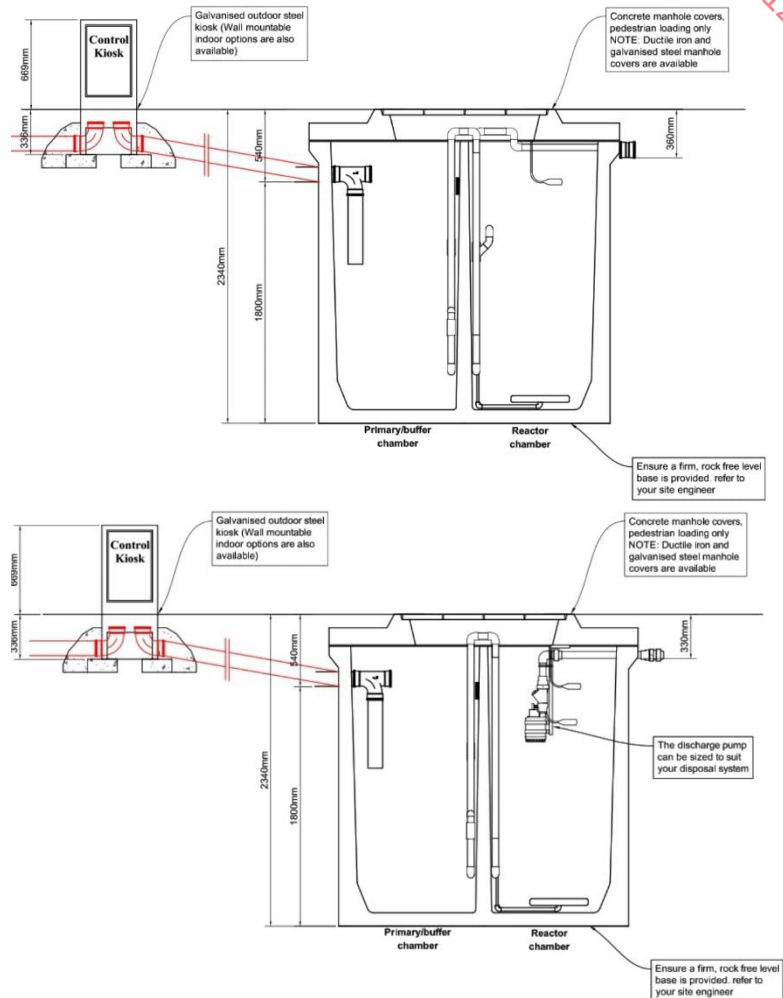
SYSTEM FEATURES:

- Delivery, installation, and commissioning by Molloy Environmental Systems trained personnel
- An alarm system indicates pump overload/underload and high-water events
- The precast concrete tank is installed underground and will not give rise to any noticeable noise nuisance or any unpleasant odours once the system is correctly vented and maintained
- High quality and discreet galvanised steel control kiosk
- A certificate of conformance will be issued by the commissioning technician; on the condition that the sewage treatment system has been correctly installed and the relevant civil works have been correctly carried out. (certification is confined to Molloy Environmental Systems installed components only)

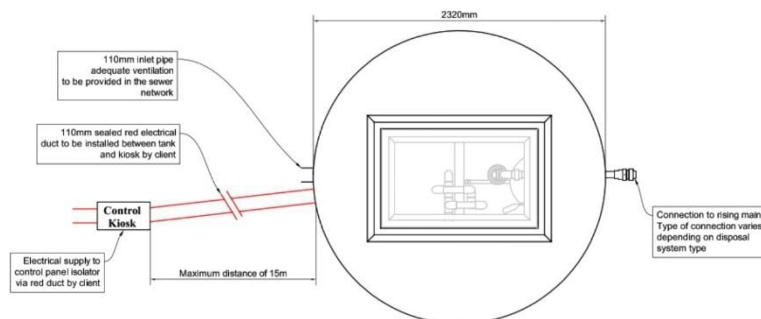
[ALL CIVIL WORKS BY OTHERS]

A service team of trained technicians are available to service and maintain each system. It is recommended that the system is serviced once per year. De-sludging frequency can be identified by the technician

The SBR Recommended for this site is an L Tank with a capability of up to 17PE Organic loading. See attached drawing.



8PE SECTION



8PE PLAN

and on the percolation test
RY, FETAC SITE ASSESSOR a
 and no liability can be acce
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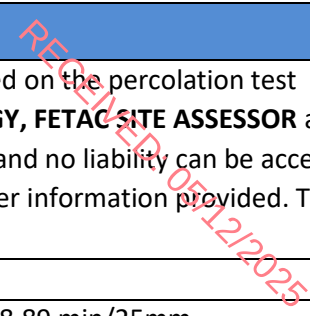
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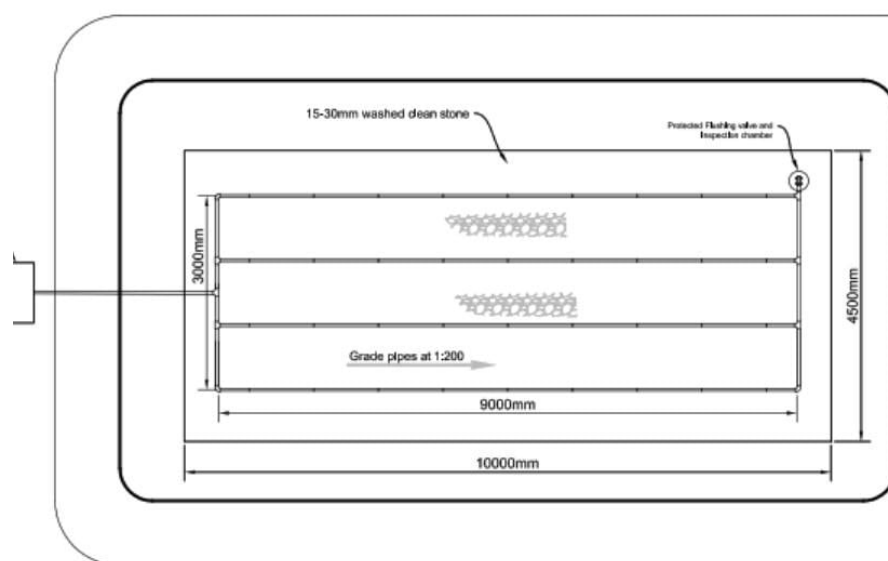
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GENERIC PLAN (See recommended plan for this site in Appendix C)

SYSTEM GUARANTEE

Molloy Environmental Systems fully guarantees the sewage treatment system as suitable for the development in question. The system must be installed as per the manufacturer's guidelines and commissioned by trained personnel. To ensure the efficient treatment of the wastewater the following is recommended:

- The soil polishing filter is installed as per the supplied installation guidelines (issued with the pipework kit)
- The sewage treatment system is installed as per the supplied precast concrete tank installation guidelines
- Only domestic sewage, which includes all effluent from the kitchen, toilets, bathroom, showers, appliances, should be discharged to the sewage treatment system
- No rainwater, surface water etc., should be discharged to the sewage treatment system
- Excessive fats, oils and greases should be removed upstream of the system
- Care should be taken not to discharge large materials such as rags etc. Into the system
- An adequate ventilation system should be installed by others (a 4-5m minimum high vent stack should be installed depending on site conditions. A taller vent stack should be installed where possible or necessary). Please refer to your site engineer for specification
- Urinals and any other automatically flushing apparatus should be operated in a water conservative manner and only operate during the occupied time.
- Good practice would be to monitor all water usage, using a water meter. This would alert the caretaker of unusual excessive water usage and hence a leak
- It is advisable to avoid excessive use of detergents and household cleaning agents and to use the phosphate free alternative products

Molloy Environmental Systems provides a 2-year warranty to remedy any fault in products provided:

- That the fault is due to defects in design, materials or workmanship
- That the fault is reported to Molloy Environmental Systems during the guarantee period
- That the product has been used only under the conditions described in the care and maintenance instructions, and in applications for which it is intended
- That all service and repair is carried out by Molloy Environmental Systems personnel as per the maintenance requirements
- Therefore, this warranty does not apply to faults resulting from lack of maintenance, inadequate civil works, repair works carried out improperly or normal wear and tear
- Furthermore, Molloy Environmental Systems disclaims any liability in case of physical injuries, material or economic damages for those mentioned above

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Note: The recommendation in this report are only recommendations, as Molloy Environmental Systems do not assess materials or supervise the percolation construction, they cannot be held responsible for incorrectly constructed or failed percolation systems. Notwithstanding the percolation test results, or the recommendations based on the percolation test results given above, it is essential that the client, or prospective site occupier, is fully satisfied that the position chosen on the site and imported soil (if applicable) chosen for percolation, is capable of soaking away the full amount of treated water that the household will produce each day and that any imported soil is suitable for the percolation.

Visit Ireland's most extensive percolation demonstration and training facility at Molloy Environmental Systems, Clara Road, Tullamore, Co. Offaly.

- See how to install your percolation area properly
- See full scale percolation areas and soil polishing filter with cross sections
- See every type of percolation system, soil polishing filter and tertiary system used in Ireland
- All demonstrations are fully operational
- Avail of the expertise of our specialists in sewage treatment

Please contact me should you require any additional information.

Yours sincerely,

A handwritten signature in black ink that reads 'M F Cahill'.

Michael F. Cahill
Technical Manager

APPENDIX A- CHIEFTAIN SBR EN12566-3 AND SR66 CERTIFICATE

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TREATMENT PERFORMANCE RESULTS

Molloy Environmental Systems
Coleraine, Clara Road, Tullamore, Co. Offaly, Ireland

EN 12566-3
Results corresponding to EN 12566-3 and S.R. 66
PIA2020-SR66-1909-1055

Chieftain SBR
SBR system in concrete tanks

Nominal organic daily load	0.37 kg/d															
Nominal hydraulic daily load	1.20 m ³ /d															
Material	Concrete															
Watertightness	Pass															
Structural behaviour (Crushing resistance)	Pass (also wet conditions)															
Durability	Pass															
Treatment efficiency (nominal sequences)																
	<table><thead><tr><th></th><th>Efficiency</th><th>Effluent</th></tr></thead><tbody><tr><td>COD</td><td>94.6 %</td><td>45 mg/l</td></tr><tr><td>BOD₅</td><td>98.2 %</td><td>6 mg/l</td></tr><tr><td>NH₄-N</td><td>98.4 %</td><td>0.7 mg/l</td></tr><tr><td>SS</td><td>96.5 %</td><td>14 mg/l</td></tr></tbody></table>		Efficiency	Effluent	COD	94.6 %	45 mg/l	BOD ₅	98.2 %	6 mg/l	NH ₄ -N	98.4 %	0.7 mg/l	SS	96.5 %	14 mg/l
	Efficiency	Effluent														
COD	94.6 %	45 mg/l														
BOD ₅	98.2 %	6 mg/l														
NH ₄ -N	98.4 %	0.7 mg/l														
SS	96.5 %	14 mg/l														
Number of desludging	Not more than once															
Electrical consumption	0.85 kWh/d															

Performance tested by:

PIA – Prüfinstitut für Abwassertechnik GmbH
(PIA GmbH)
Hergenrather Weg 30
52074 Aachen, Germany

This document replaces neither the declaration of performance nor the CE marking.



Verschütz / Wermier April 2020

Noriss Body
No.: 1739

Certified according to
ISO 9001:2015

Page 1 of 15

APPENDIX B- MAINTENANCE CONTRACT

MAINTENANCE CONTRACT AGREEMENT FOR A MOLLOY ENVIRONMENTAL SYSTEMS SECONDARY SEWAGE TREATMENT SYSTEM		
NAME:	CAM Roadstone Quarry Cam Quarry Phone: n/a Email:	TERMS AND CONDITIONS: - Molloy Environmental Systems trained service technicians will conduct the servicing of the designated sewage treatment system in a safe and efficient manner in accordance with the Molloy Environmental System company safety statement - The site occupier/owner should ensure that the site is accessible and safe - This contract does not bind Molloy Environmental Systems to effluent quality; however, every effort will be made to advise the occupier and to make any adjustments to the plant that will ensure the best possible effluent quality - The occupier should ensure that all manholes pertaining to the sewage treatment system are accessible - Access to the control panel is required. (if access to the control panel is not available at the time of a service call, the service will proceed without that component of the service) - Access to a water tap is needed to clean components during the service - It is advisable that children and pets are not present in the vicinity of the sewage treatment system during servicing (open manholes present a significant risk of injury or drowning) - The service visit includes the items and visits that are paid for and indicated on the maintenance contract only - Replacement, broken or unserviceable parts will be charged for additionally - Breakdowns, alarms, etc. requiring a call out, are subject to the charges below - This maintenance contract only covers the sewage treatment system. It does not extend to any fowl sewer pipework or blockages or house fittings external to the sewage treatment system. It does not cover any problems relating to soil polishing filters, percolation systems, soakaways etc. - A call out request, that occurs close to a due service call date, may be combined with the service by mutual agreement Failure to have the system serviced, on an annual basis, will invalidate any current warranty after the first 12 months of operation Call out costs are €100 per visit plus mileage @ €0.75 per km from Tullamore and €40 per hour for every hour after the first hour, all plus vat at 13.5% Access and mutually acceptable times must be arranged beforehand. No access at the time of an arranged call will incur the full callout charge. Please mark the services required on the signed document and return to Molloy Environmental Systems with payment with VAT for the required services. The counter-signed document will be returned with a receipt Optional laboratory testing of effluent on request
SITE ADDRESS:	Brideswell Co. Roscommon	
SITE ID	TBC	
Molloy Environmental Systems undertake to service the secondary sewage treatment system as follows: - Sludge level in the primary settlement tank (to determine de-sludging frequency) - Sequential batch reactor (SBR) sludge volume check (settled sludge volume – SSV30) - System test run through the control panel and check alarm log - Adjustment of system settings on the control panel where necessary - Issue a maintenance report of tests when completed		
ANNUAL CHARGE	€310 per annum including VAT for one call Payable in advance. Renewable yearly. Call out charges are at our standard rates plus parts and mileage. Equipment under warranty is dependent on Molloy Environmental Systems servicing the system as advised. As a minimum the system should be serviced once annually.	
FIRST SERVICE CALL DUE AFTER:	TBC	
SECOND SERVICE CALL DUE AFTER:	TBC	Call out costs are €100 per visit plus mileage @ €0.75 per km from Tullamore and €40 per hour for every hour after the first hour, all plus vat at 13.5%
SECOND SERVICE CALL DUE AFTER:	TBC	
DISCLAIMER:	Molloy Environmental Systems cannot take responsibility for the effluent quality as the treatment achieved will depend on household input, good system operation and maintenance. Molloy Environmental Systems cannot take responsibility for equipment damage owing to flooding/unfavourable site conditions.	Access and mutually acceptable times must be arranged beforehand. No access at the time of an arranged call will incur the full callout charge.
Signed:	 Donal Molloy Managing Director Molloy Environmental Systems	Signed:
Date:	29/09/2025	Date:
Prices valid for 1 year – VAT @ 13.5% - see terms & conditions, this contract is not valid until both the system and the service have been paid for in full		

APPENDIX C- PERCOLATION INSTALLATION RECOMMENDATIONS

Area: 90m² of soil polishing filter

Invert of percolation stones is to be at the present prepared ground level.

Suggested dimensions: 13m x 7m

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Construction of the Soil Polishing Filters – Pumped Discharge

- The treated wastewater from the secondary treatment unit is pumped to a distribution manifold and percolation pipes using typically 32mm over a 300-mm layer of gravel. The detail design should conform to best practice as outlined in design manuals. The loading rates should conform to those listed in EPA CoP 2021 (Section 10, Table 10.1 option 2)
- **To construct the percolation area**, clear the vegetation from an area of at least **15m by 9m and ensure that the area is perfectly level.**
- (Take note of the Site Engineers instructions as to placing the soil filter and constructions details when work is to proceed on site.)
- In this area, place a pad, **13m by 7m**, of **very clean** stones, sized 12mm to 32mm to a thickness of **250mm** and ensure that it is level.
- Place the 32mm diameter pipes on the stones **with the orifices pointing down** as indicated on the accompanying drawing and ensure that they are at a gradient of no more than 1:200 away for the manifold.
- Secure the pipes with a further 50mm of stones.
- Add a further 150mm of stone to complete the 450mm of distribution stones as indicated in the drawing and as per the EPA CoP Fig. 8.3 and Table 8.1 for intermittent soil filters.
- The stone pad must then be covered with a geo-textile membrane before the final covering of soil is applied. A minimum recommended cover depth of soil is 300mm.
- A percolation area constructed in this manner is equivalent to an area of **90m²** allowing a dosing rate of **10 litres** of effluent per m² per day for **6 P.E.** which complies with EPA CoP 2021 (Section 10, Table 10.1 option 1).
- Constructed mounds can be surrounded by interceptor drains. These interceptor drains should be constructed at 2m from the percolation pad. (EPA CoP 2021 Section 11.5.3)
- Planting of large shrubs or trees in the area is not recommended.
- During construction, compaction of any kind is to be avoided by ensuring machinery does not cross the area.
- Soakaways for rainwater and surface water should not be in the vicinity of the **Chieftain® SBR treatment** system or percolation area (min. 10 m), if possible.
- It is essential that the treatment system tanks are properly located on site to ensure no ingress of rain or surface water to the tanks. Tanks should not be installed on sites where the highest wet weather water table reaches more than 1m above the base of the tanks. If there is a high-water table, precautions need to be taken to ensure that the tanks are anchored and sealed. It the client's responsibility to contact Molloy Precast Ltd for details of remedial action that maybe required.
- Backfilling of the tanks should be done with soil. It is the responsibility of the client to ensure that risers are installed where required and manhole covers are properly sealed. Molloy Precast Products Ltd. cannot take responsibility for incorrectly located tanks or deep installations that Molloy Precast Ltd have not recommended and failure to backfill appropriately.
- It is essential that the drainage contractor constructs the percolation area according to the recommendations cited in this report as Molloy Precast Products Ltd. cannot take responsibility for incorrectly constructed percolation areas.
- See attached cross section drawing for recommended installation and percolation construction.
- **Yearly Maintenance:**
- **Twice every year the pipes should be Flushed out.**
- **To achieve efficient flushing, open the flushing valve of the pipe layout for one whole day. Repeat this exercise twice per year.**