RECEIVED: 17/12/2025

CONTENTS

INTRODUCTION 1
Statement of Authority 1
EIAR Structure 1
Overview 1
The Site's Section 4 Discharge License 2
Site Location 4
Planning Context 4
Guidance and Legislative Instruments 8
Data and Maps 8
Consultations 8
Assessment Objectives 9
Overall Assessment Methodology 9

DESK STUDY RECEIVING ENVIRONMENT 10
Historic Land Use 10
Conservation Objective Sites 12
Water Framework Directive Mapping, Status & Risk Assessments 14
Rainfall & Recharge & Site Water Balance 17
Hydrology 19
Hydrogeology 26

WATER MANAGEMENT SYSTEM (WMS) 35
Existing Site WMS 35
Application Site Proposed WMS 44

SITE INVESTIGATIONS 45
Exposed Faces 45
Geophysical Surveying 46
Well Drilling 48
Aquifer Testing 58
Groundwater Regime 61
Water Quality 70

SITE METRICS 78
Rainfall-Runoff Water Balance 78

Making Sustainability Happen

RECEIVED: 17/12/2025

Extreme Rainfall Events 80
Greenfield Runoff Rate 81
Attenuation 83
Envisaged Dewatering Volumes 84
Hydrogeological Understanding & Conceptual Site Model 96

EFFECTS, IMPACT ASSESSMENT METHODOLOGY AND STRUCTURE 107
Development Phases Considered 108
Description of Likely Effects 108
Mitigation Measures 120
Residual Impacts 121
Unplanned Events 122
Cumulative & In Combination Impacts 132
Transboundary Impacts 137
Do Nothing Scenario 138
Monitoring Measures 139
Interaction with Other Measures 140
Application of Dewatering Impact Appraisal Methodology (UK EA) 140
Conservation Objective Site Protection Measures (NATURA 2000) 143
Water Framework Directive Compliance Assessment 144

APPENDICES 145

TABLES

Table 7-1: Historical Land Use at Application Site and Surrounding Area 11
Table 7-2: Long-term Mean Monthly Rainfall Data (mm) (Met Éireann) 17
Table 7-3: GSI Groundwater Recharge and Water Balance Inputs 18
Table 7.4: Summary Details of Wells on Application Site and Immediate Surrounds 50
Table 7-5: Bedrock Permeability Summary Results 60
Table 7-6: Summary Groundwater Results 73
Table 7-7: Summary Discharge Results (Hydro-G sampling) 75
Table 7-8: Quarterly Discharge Results (TMS sampling) 77
Table 7-9: Bedrock Rainfall derived water balance for extraction areas 79
Table 7-10: Potential Rainfall-Runoff Inflows to the Quarry Sump: Extreme Rainfall Events 81
Table 7-11: Linear Interpolation of QBAR for On-Site Hardstanding 83
Table 7-12: Design Rainfall Rates and Attenuation Storage using Outflow of 70 l/s 83
Table 7-13: Recharge volumes derived from aquifer properties 90
Table 7-14: Summary of Potential Effects on the Water Environment 112
Table 7-15: N compound concentrations for explosives in dewatering discharge 117
Table 7-16: WFD & GWB Scale Quantitative Status Compliance 119
Table 7-17: Summary of Mitigation Measures & Residual Effects 123

Making Sustainability Happen

RECEIVED: 17/12/2025

FIGURES

Figure 7-1: General Site Layout 6
Figure 7-2: Conservation Objective Sites and Designated Areas Relevant to The Application Site 13
Figure 7-3 – Regional Hydrology 21
Figure 7-4 – Local Hydrology 22
Figure 7-5 – Surface Water Catchment (source: https://gis.epa.ie/EPAMaps/) 23
Figure 7-6 - Groundwater Vulnerability (GSI) 30
Figure 7-7 - Bedrock Aquifer Classification and Karst Features (GSI) 31
Figure 7-8: Current Quarry Surface Water Management System 36
Figure 7-9: Boreholes drilled on application site and existing quarry 49
Figure 7-10: Groundwater levels beneath the application site on 9th September 2025..... **Error! Bookmark not defined.**
Figure 7-11: Calculated radius of influence to proposed quarry extension 87
Figure 7-12: Locations of Cross Section Lines used for Graphical CSM Sections 99
Figure 7-13: Hydrogeological Conceptual Site Model Cross Section A-A' 100
Figure 7-14: Hydrogeological Conceptual Site Model Cross Section B-B' 104
Figure 7-15: Hydrogeological Conceptual Site Model Cross Section C-C' 105
Figure 7-16: Hydrogeological Conceptual Site Model Cross Section D-D' 106

PLATES

Plate 7-1: Historical OSI 25" map (taken from: https://webapps.geohive.ie) 11
Plate 7-2: View North from Batching Plant to Existing Quarry Void 37
Plate 7-3: Quarry Sump Pump 38
Plate 7-4: Settlement Lagoon 39
Plate 7-5: Silt pond system serving truck washdown and wheelwash 41
Plate 7-6: Domestic wastewater treatment system 43
Plate 7-7: Views of exposed bedrock within existing quarry 46
Plate 7-8: Geophysics interpretation map in plan (Apex, 2009) 47
Plate 7-9: Geophysics interpretation map in plan (Apex, 2024) 48

APPENDICES

RECEIVED: 17/12/2025

Introduction

Statement of Authority

7.1 The evaluation of the Water (hydrological and hydrogeological) environment and the assessment of Effects and Potential Impacts, with Mitigation Measures and Residual Impacts, was completed collaboratively by Dr. Pamela Bartley (Hydro-G) and Dr. Colin O'Reilly (Envirologic Ltd.). Dr. Bartley is a karst groundwater specialist with expertise in the assessments of quarries, Section 4 Discharge Licencing and Public Water Supply. Dr. O'Reilly has key competencies in hydrogeology and hydrology with expertise in flood assessments in addition to assessment of quarries across a range of diverse hydrogeological conditions across Ireland.

7.2 More detailed Statements of Expertise are presented as **Appendix 7.1**.

EIAR Structure

7.3 The structure of the EIAR is presented in Chapter 1 of this EIAR. Also included in Chapter 1 is information on the Site Location and Context. Chapter 2 provides the Description of the Proposed Development and Chapter 15 address the Interactions and Cumulative Impacts.

7.4 This Chapter (Chapter 7) of the EIAR assesses the impact of the proposed development on the hydrological and hydrogeological environment.

Overview

7.5 This Water Section is to inform part of an EIAR for Breedon Materials Ltd., trading as Breedon Ireland (hereafter referred to as "Breedon") at their site at Rossmore, Carrigtwohill, Co. Cork.

7.6 The application consists of a proposed extension to the existing quarry. The centre of the application site has the following ITM Grid References: 582,700 m Easting; 571,200 m Northing. The application area is c. 22.3 ha.

7.7 The application site is currently in greenfield condition and natural land surface elevation of the application area lands fall from 28 mOD at the northeastern corner to 5 mOD along the southern boundary. It is proposed to extract bedrock to an elevation of -35 mOD across an area of c. 12.5 ha. Development works will require stripping of overburden, to be utilised as perimeter berms.

RECEIVED: 17/12/2025

7.8 Rossmore quarry has existed as a commercial quarrying operation for several decades and as such is an established part of the landscape. The application site adjoins an operational quarry previously granted permission by Cork County Council and upheld by An Bord Pleanála. The operational quarry is permitted to extract rock to an elevation of -50 mOD and is currently working the bench to -35 mOD. More details for Planning timelines are presented later.

7.9 The application has been described in Chapter 2 of the EIAR and hereafter, it will be referred to as "the site" for ease of reference throughout this chapter in which the hydrological and hydrogeological environment at and surrounding the proposed development are now described.

7.10 A Section 4 licence to discharge waters (WP(W)08/18(R)) is in place at the site, and the discharge point is in the southwestern corner of the application site (GW1, Figure 7.1). A copy of the site's Discharge Licence is included as **Appendix 7.2**. Further details relating to the Licence are presented in the following section of this Chapter.

7.11 The site lies within the Lee, Cork Harbour and Youghal Bay catchment, the Tibbotstown_SC_010 surface water sub-catchment and is underlain by the Midleton Groundwater Body (GWB).

7.12 The nearest European designated sites are the Great Island Channel SAC and the Cork Harbour SPA, which come to within 140 m southeast of the application site. The Great Island Channel SAC, also contains the Great Island Channel proposed Natural Heritage Area (pNHA). There is no direct hydrological link connecting the application site with any of the designated areas listed above. Under the current and proposed usage there is a licenced discharge to ground at the application site as referenced in Section 8.10.

The Site's Section 4 Discharge License

7.13 The quarry's Section 4 Discharge Licence was issued in 2019 (WP(W)08/18(R)). The Licence is therefore current with legislative requirements as determined in the enactment of the Surface Water Regulations (2009, as amended).

7.14 The discharge licence was granted in 2019 to accommodate waters arising from the existing quarry which has a permitted area of c. 12.6 ha, and a permitted lowest floor elevation of -50 mOD. The licence permits a daily discharge volume of 12,000 m^3/d and currently utilises 1/10th, approximately, of the permitted discharge volume Emission Limit Value (ELV). Therefore, sufficient capacity is present in the existing Water Management infrastructure

RECEIVED: 17/12/2025

and limits specified within the existing Section 4 Licence to serve the development currently under proposal.

7.15 As shown in

7.16 Figure 7-1, rainfall arising and running off the existing quarry floor, in combination with any wall seeps, flows naturally by gravity to the primary floor sump at the lowest elevation on the site (currently -35 mOD). Information presented later in this chapter will provide construction details confirming the ability of the existing Water Management System to cater for additional rainfall-runoff and groundwater ingress likely from the proposed extension area.

7.17 As previously stated, the site is permitted to discharge a maximum volumetric ELV of 12,000 m^3/d, or 500 m^3/hr to groundwater via an infiltration pond, located south of the application area, see

7.18 Figure 7-1**.**

7.19 The chemical and physicochemical ELVs of the Section 4 licence (WP(W)08/18(R)) are as follows:

- 35 mg/l Suspended Solids
- 1 mg/l Total Heavy Metals (Ba, Cd, Cr, Cu, Hg, Ni, Pb, Zn)
- 0.15 mg/l Chromium VI
- 1 mg/l Phenols
- 0.05 mg/l Benzo(a)pyrene
- 0.05 mg/l Napthalene
- 25 ^oC Temperature
- 6 to 9 pH range

7.20 The capacity of the as-built Water Management System (WMS) was specified and built to accommodate the 1:100 year storm event and the design specification included many other safe guards. Hence there is a large capacity (headroom) available to manage the surface water and groundwater arising from the proposed lateral extension. The site continuously measures discharge from the operational site to the Settlement Lagoons. These data are presented with Rainfall later in the Chapter to support the conclusion of available headroom in the existing Discharge Licence.

RECEIVED: 17/12/2025

7.21 Upon presentation of the Baseline Water Environment and Site Investigation Results, a Section in this Chapter entitled 'Site Metrics' will present mathematical justification for the available capacity in the WMS.

Site Location

7.22 Local towns are Carrigtwohill 1.5 km to the north, Midleton 6 km to the northeast and Cobh 5 km to the southwest. The coastline to Great Island channel, which is a part of Cork Harbour, is 40 m south of the application site. The site is approximately 15 km east of the centre of Cork city (Figure 7-2).

7.23 The site is located approximately 1.2 km south of Junction 4 on the N25, which connects Cork City with Waterford City.

Planning Context

Planning History

7.24 The site's recent planning history is very briefly summarised as follows:

2004 (02/5476 / PL04.203762)

- Extension of quarrying of sand, gravel and limestone over an area of 7.2 ha, construction of asphalt plant on overall site of 15.5 ha.

2006 (05/7362 / PL04.216454)

- Construction of concrete batching plant

2014 (14/406)

- Extension of duration of sand, gravel and limestone over an area of 7.2 ha, construction of asphalt plant on overall site of 15.5 ha.

2015 (PL04.SU0093)

- Substitute consent granted

2017 (QD.04.QD0010)

- Deepening of the quarry from 0 mOD to -20 mOD over an area of 7.6 ha
- Extend the life of the quarry by 15 years
- New infiltration pond system

RECEIVED: 17/12/2025

- All works within an overall application area of 20.45 ha.
- Settlement pond/infiltration pond system

2024 (21/6983 / PL04.313903)

- Deepening of existing quarry extraction from -20 mOD to -50 mOD, along with minor amendments to the permitted quarry layout (12.6 ha)

The Existing Development

7.25 The overall landholding boundary 'Blue Line' has an area of c. 43.7 ha. The existing quarry and proposed extension are to the east are included within this ownership boundary.

7.26 The existing operational quarry is in the western half of the ownership boundary. It is approximately rectangular in shape with a north-south length of 625 m and an east-west width of 275 m, having a permitted extraction area of 12.6 ha. This permitted area includes the Section 4 Licenced settlement lagoon and infiltration pond on the eastern side of the local road, which separates the operational quarry from the proposed extension area to the east. The settlement lagoon and infiltration pond are at the southern side of the application area.

7.27 The lowest part of the existing quarry is the sump which serves all parts of the quarry. The base of the sump is currently at c. -38 mOD, approximately 3m below the current quarry floor of -35 mOD, facilitating collection of rainfall runoff and groundwaters flowing by gravity across the quarry floor.

7.28 The rock in the existing quarry is permitted to extract by conventional methods comprising blasting and mechanical means, and the extracted material is crushed, screened in mobile crushers and graded in a designated part of the quarry floor. The excavated rock is stockpiled for sale and transportation off-site. Processed material is permitted to be sold or used on-site to produce readymix concrete and asphalt in dedicated plants which operate in compliance with their valid consents.

7.29 Quarried material is weighed on the weighbridge inside the site entrance, in the southeast corner of the existing site. This area also contains truck washdown area, site offices and fuel storage and refuelling area.

7.30 For ease of reference the existing site can be subdivided into four separate sections as evidenced on

RECEIVED: 17/12/2025

7.31 Figure 7-1, described as follows:

i. The existing quarry void.

ii. Concrete batching in the southwestern portion of the site.

iii. Asphalt plant, site offices, wheelwash, truckwash, fuel storage area, refuelling area and workshop. All of the facilities are located in the southeastern portion of the site.

iv. Settlement pond, which overflows into the infiltration area. These small bodies of water are located on the eastern side of the local road, opposite the existing site entrance.

7.32 Also shown on

7.33 Figure 7-1, the operational Kilsaran quarry is situated to the West of, an adjoins the Breedon landholding.

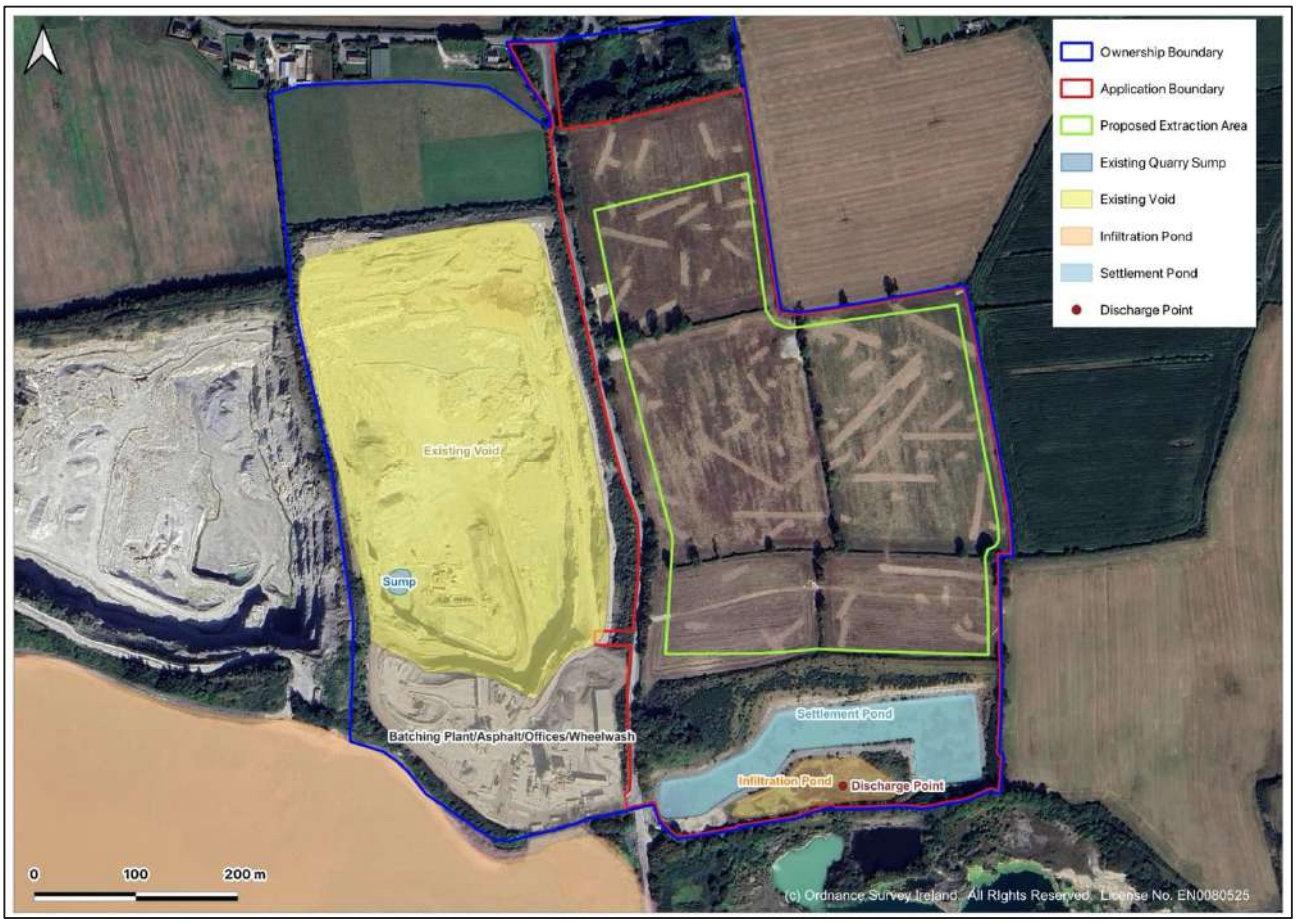


Figure 7-1: General Site Layout

RECEIVED: 17/12/2025

The Proposed Development

7.34 The application area 'Red Line' boundary comprises the proposed quarry extension and the existing permitted settlement pond and infiltration area to the south. The application area has a broadly similar shape to that of the existing permitted boundary, with a north-south length of 700 m and east-west width of 360 m, which narrows to 200 m in the northern third of the site. The application area is c. 22.3 ha.

7.35 Existing ground levels along the perimeter of the proposed extraction area fall from 26 mOD at the northeast corner, and 30 mOD close to the eastern boundary, towards 18 mOD along the southern boundary.

7.36 The proposed development involves extending the quarrying area onto a greenfield site on the eastern side of the local road. The proposed excavation will have a footprint of 12.5 mOD down to an elevation of -35 mOD.

7.37 The application area also accommodates the existing settlement lagoon and infiltration pond, along with a link tunnel to the existing quarry site.

7.38 To access the bedrock resource it will be necessary to strip the in-situ soils and subsoils. These will be deposited in a designated overburden storage area and used to construct perimeter screening berms.

7.39 The method of bedrock extraction will be as per the existing quarry, i.e. using industry standard blasting and mechanical means. Crushing and screening will be undertaken using mobile equipment and plant on the quarry floor.

7.40 Processed material shall be transported to the existing quarry *via* a proposed new link tunnel to be constructed beneath the local road. The tunnel base shall be 4 m below the surface of the road and have a width of 10 m. Refer to other elements of this EIAR and accompanying documentation for design and construction details proposed for this access tunnel.

7.41 Rainfall-runoff generated on the floor of the proposed extraction area, along with any groundwater ingress, shall be collected in a new sump within the working floor of the new extraction area. The sump's function and sizing will be for primary settlement of solids and attenuation of ordinary rainfall and waters arising at the site during operations. It is standard practice that extreme rainfall events can be accommodated on the working floors of quarries: large areas are available for the extreme event. Sump waters shall be pumped to

RECEIVED: 17/12/2025

the existing settlement lagoon to the south and discharged in compliance with the ELV's as per the current discharge license WP(W)08/18(R).

7.42 Upon completion, the proposed excavation shall be restored to natural habitat after use.

Guidance and Legislative Instruments

7.43 This report was prepared with consideration of Industry Guidance documents and ensuring compliance with European Legislation (Directives) and Irish Statutory Instruments and Regulations as listed in **Appendix 7.3**.

7.44 The author of this assessment hereby confirms that the assessment completed and reported adheres with EU EIA and EIAR Guidance and that the proposed project has been assessed in accordance with EPA (2022) Guidelines for EIA.

7.45 The author of this assessment hereby confirms that the assessment completed and reported has been completed with consideration of Irish Statutory legal instruments enacting the Water Framework Directive (WFD) and the Birds & Habitats Directive.

Data and Maps

7.46 This report was prepared using Desk Study available Data and Maps appropriate to the study site, and wider environment, and site-specific reports for the site as listed in **Appendix 7.4**. The data sources critical to the foundational development of an understanding of the hydrology of the area are provided in full in **Appendices 7.5, 7.8 & 7.9**.

Consultations

7.47 SLR, the site's main and co-ordinating agents for this EIAR, managed pre-planning and other stakeholder communications. Refer to details elsewhere in this EIAR.

7.48 In relation to water, Breedon's relevant personnel and their various agents have previously engaged with Cork County Council, An Bord Pleanála (now Coimisiún) and the Developments Application Unti (DAU). From a water perspective, the specifics of previous engagements have been in relation to the efficacy of the Settlement Lagoons, impact potential and monitoring. Historic responses to these stakeholder consultations are included in **Appendix 7.5**.

7.49 The Impacts tables at the end of this Chapter incorporate all information as normally required by statutory stakeholders such as the DAU, EPA, LA Waters and the GSI.

RECEIVED: 17/12/2025

Assessment Objectives

7.50 Under the European Union's Environmental Impact Assessment (EIA) Directive (2011/92/EU as amended by 2014/52/EU), major building or development projects in the EU must first be assessed for their impact on the environment.

7.51 In Ireland, the EPA (2022) Guidance for Information to be Contained in Environmental Assessment is used to guide assessments and the preparation of an Environmental Impact Assessment Report (EIAR). EPA (2022) has been used in this assessment and details relating to how the Impact Assessment is populated are presented in **Appendix 7.6.**

7.52 In summary, the objectives of this assessment are, as per the EIA Directive (2014/52/EU) and EPA Guidance (2022), to:

- Provide baseline hydrogeological and hydrological conditions for the site & update previous assessments, which had a strong foundation in drilling and monitoring information.
- Evaluate the current discharge licence WP(W)08/18(R) and potential requirement for review of the licence considering field investigations conducted for this EIAR.
- Assess the potential impact of the proposed development on the underlying groundwater body, associated surface water bodies and ecosystems.
- Assess the potential for Cumulative Impacts and Transboundary Impacts.
- Upon identification of all potential impacts, provide appropriate mitigation measures for any identified potential impacts, as deemed necessary. The proposal, its impacts and proposed mitigations will then be reassessed, and residual impacts defined.

Overall Assessment Methodology

7.53 The methodology adopted for this assessment is as follows:

- Review of current Legislation and Guidance relating to EIA and EIAR, quarry assessment guidance and water and habitats related legislation.
- Review of the 'Subject' development currently under consideration and assessment.
- Review of Project Scoping document's responses from Statutory Bodies.
- Characterisation of the receiving environment (hydrology and hydrogeology) in terms of:
- Determination of the Baseline.
- Evaluation of WFD reported characterisations for the environment.
- Evaluation of the site's own receiving environment.

RECEIVED 17/11/2025

- It is noted that Hydro-G (2021) reports completed previously which included details of extensive site investigations relating to the entire site's geology, hydrogeology and associated external hydrological systems are contained within an EIAR dated 2021.
- Hydro-G, Envirologic and Apex Geophysics Ltd. have since completed Site Investigations in 2023, 2024 and 2025 to inform this assessment specifically. Findings from these works are presented in detail later in this chapter.
- Review and analysis of Site Investigation Results and Long-Term site monitoring data.

7.54 Application of EPA (2022) and IGI (2013) Guidelines on the Assessment of Potential Effects. Identification of Potential Effects, Mitigation Measures, Assessment of Residual Impacts & Other Impacts, as specified in Guidance. (**Appendix 7.6**).

7.55 Application of the UK Environment Agency's Hydrogeological Impact Appraisal Methodology for Dewatering at Quarries (**Appendix 7.7**).

7.56 Consideration of PWS Protection Measures & Consideration of SAC Protection Measures, including the conservation objectives of designated Natura 2000 sites.

7.57 Completion of the Water Framework Directive Assessment.

Desk Study Receiving Environment

Historic Land Use

Historical land uses are detailed in

Table 7-1.

7.58 Historical OS 6" and 25" maps were consulted and show no evidence of any hydrological features of note being present within the site or surrounding area. OS 6" maps (1837-1842) show the site area mapped as agricultural field parcels. The later 25" OS map (1897-1913) (Plate 7-1) depicts evidence of quarrying to the south of an area which was indicated as Rossmore Cottage, now site of the settlement lagoon.

RECEIVED: 17/12/2025

Plate 7-1: Historical OSI 25" map (taken from: https://webapps.geohive.ie)

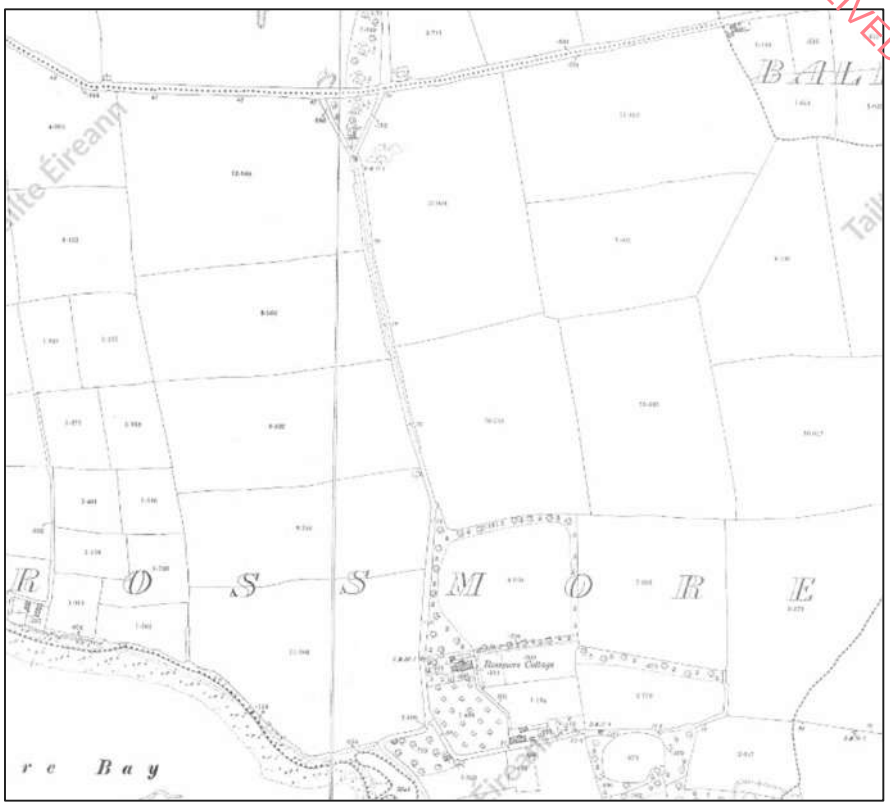


Table 7-1: Historical Land Use at Application Site and Surrounding Area

Ordinance Survey Map Reference (Dates)	Application Boundary	Immediate Surroundings
OS 6" First Edition (1837)	Nothing of note on proposed extraction area. Settlement pond was previously site of small building labelled 'Rossmore Cottage'.	Area south of site was mapped as agricultural field parcels and small woodland. Existing quarry and Kilsaran, to the west, are shown to be greenfield agricultural parcels.
OS 6" Final Edition (1842 - 1845)	Nothing of note on proposed extraction area. Settlement pond was previously site of small building labelled 'Rossmore House'.	Area south of site contained a pond. Quay indicated on coastline south of site. Existing quarry and Kilsaran are shown to be greenfield agricultural parcels.
OS 25" Historic (1888-1913)		Area south of site contained a sand pit.
Aerial Imagery 1995	The proposed quarry extension is in greenfield condition.	Rossmore Cottage no longer present. Area south of settlement lagoon appears to be gravel quarry extending to coastline, no apparent ponds. South of the coastal waters adjoining this are a series of 20 ponds; these are assumed to be part of a shellfish farm (Atlantic Shellfish Ltd.).

RECEIVED: 11/12/2025

		Minor quarrying has commenced on existing Breedon quarry site (under a previous owner). Significant quarrying and processing taking place on adjacent Kilsaran site. Brick Island, assumed formerly a quarry commenced use as a civic landfill. The landfill is now closed and used as a civic amenity centre.
Aerial Imagery 2006	The proposed quarry extension is in greenfield condition.	Large single pond remaining from previous quarrying south of settlement pond (Conroy (2012) states that this was extracted by dredging. Coastline intact. Quarrying established on existing Breedon quarry; quarrying established on adjacent Kilsaran quarry.
Aerial Imagery 2013	As per previous.	
Current Imagery 2024	Settlement lagoon in place at southern end of application site.	As per previous. Extent of quarrying on Breedon and Kilsaran sites has intensified.

Conservation Objective Sites

7.59 The site itself is not located within any Special Area of Conservation (SAC), Special Protection Area (SPA), Natural Heritage Area (NHA) or proposed Natural Heritage Areas (pNHA). The closest Conservation Objective (CO) features are shown in Figure 7-2.

7.60 Coastal waters in close proximity to, and south of, the site are conservation objective sites with the following designations:

- Great Island Channel SAC (001058)
- Cork Harbour SPA (004030)
- Great Island Channel proposed NHA (001058)

7.61 Parts of the CO sites, listed above, are within 140 m of the southwestern corner of the application site.

7.62 There is a direct discharge to ground of treated waters leaving the site. Historical applications for the site and the justification documents for the existing Section 4 Licence acknowledge this link to the CO sites. Previous determinations by the Board addressed and granted the site's functioning in the context of the CO sites.

7.63 There are also Statutory Instruments associated with the coastal waters to the south of the site:

- SI No. 206/2019 – EU Habitats (Great Island Channel Special Area of Conservation 001058) Regulations 2019.

RECEIVED: 17/12/2025

- SI No. 391/2021 – EU Conservation of Wild Birds (Cork Harbour Special Protection Area 004030) Regulations 2021.

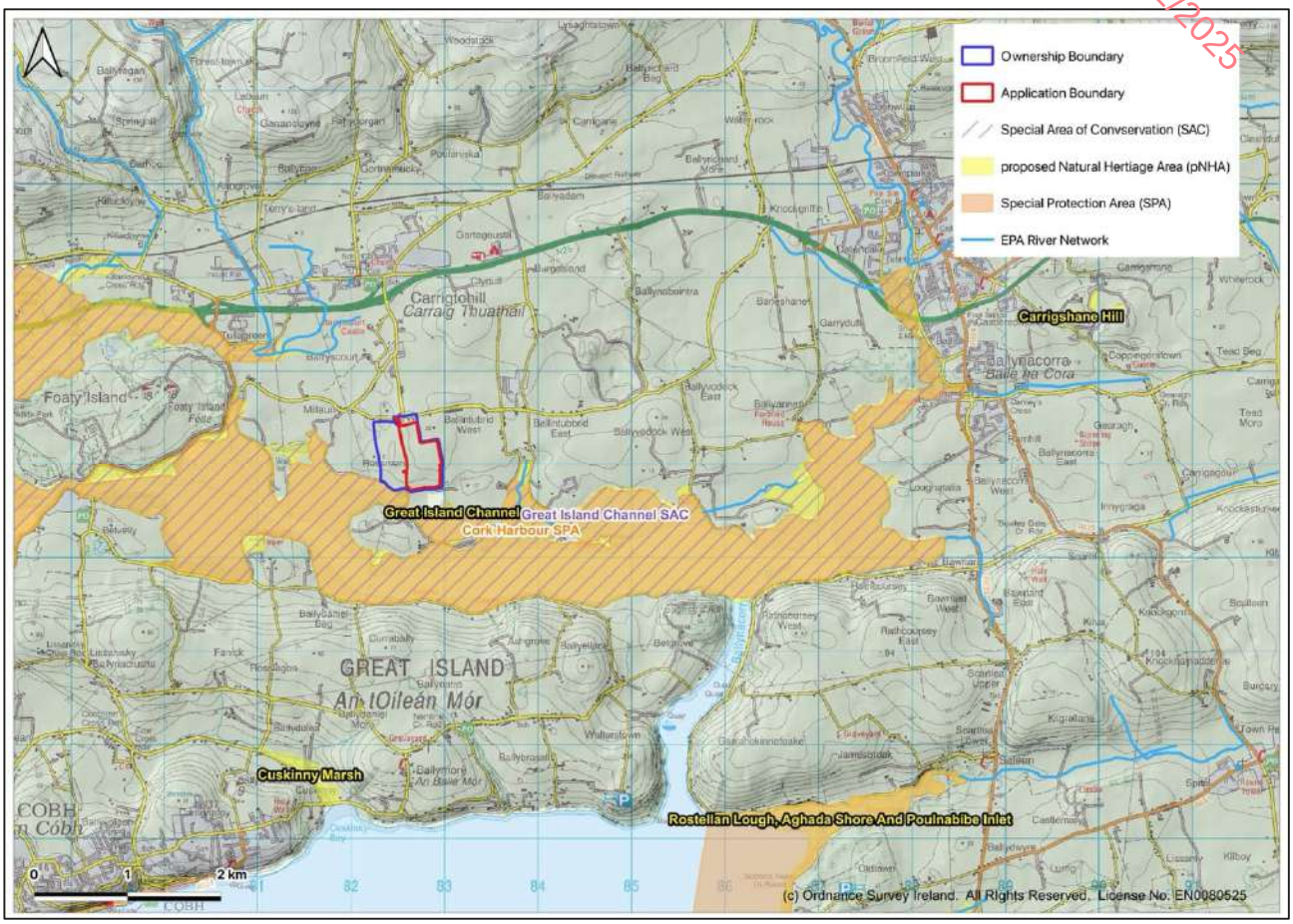


Figure 7-2: Conservation Objective Sites and Designated Areas Relevant to The Application Site

Great Island Channel Special Area of Conservation

7.64 The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest. Geologically, Cork Harbour consists of two large areas of open water in a limestone basin, separated from each other and the open sea by ridges of Old Red Sandstone. Within this system, Great Island Channel forms the eastern stretch of the river basin and compared to the rest of Cork Harbour is relatively undisturbed. Within the Great Island Channel site is the estuary of the Owennacurra and Dungourney Rivers. These rivers, which flow through Midleton, provide the main source of freshwater to the North Channel.

RECEIVED: 17/12/2025

7.65 The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- Tidal mudflats and sandflats.
- Atlantic salt meadows.

7.66 While the main land use within the site is aquaculture (oyster farming), the greatest threats to its conservation significance come from road works, infilling, sewage outflows and possible marina developments.

Cork Harbour Special Protection Area

7.67 Cork Harbour SPA is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas, Owenboy and Owennacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas River Estuary, inner Lough Mahon, Monkstown Creek, Lough Beg, the Owenboy River Estuary, Whitegate Bay, Ringabella Creek and the Rostellan and Poulnabibe inlets.

7.68 Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl. Of particular note is that the site supports internationally important populations of Black-tailed Godwit (1,896) and Redshank. There are also 19 nationally important species supported in the SPA. Several of the species which occur are listed on Annex I of the EU Birds Directive.

Water Framework Directive Mapping, Status & Risk Assessments

WFD Surface Water Status

7.69 Overall, the application site lies within the Hydrometric Area 19 and catchment named the ‘Lee, Cork Harbour and Youghal Bay Catchment’ (HA 19). EPA (2024) provides the most recent information relating to the overall area.

7.70 On a more local scale, the quarry and proposed lateral extension are in the southern portion of WFD sub-catchment 19_2. Streams within the sub-catchment are referred to on the EPA WFD database as the Tibbotstown_SC_010, each of which discharge to the Great Island Channel within Cork Harbour.

RECEIVED: 17/12/2025

7.71 The Tibbotstown sub-catchment is mapped and reported by the EPA under WFD criteria as follows:

- WFD Risk 2nd cycle = 'Review'
- WFD Risk 3rd cycle = 'Review'
- WFD Status (2016 to 2021) = Good
- WFD Status (2013 to 2018) = Moderate
- WFD Status (2010 to 2015) = Unassigned

7.72 The EPA *WFD Cycle 2 Catchment Lee, Cork Harbour and Youghal Bay Sub-catchment Tibbotstown_SC_010* (2019) (**Appendix 7.8**) reported issues relating to urban runoff (diffuse sources runoff) and urban wastewater (agglomeration PE > 10,000). EPA Envision mapping does not present any river pressures to the Tibbotstown_SC_010.

7.73 The EPA WFD 3rd Cycle Report (2024) (**Appendix 7.8**) reports that the catchment relating to the site has improved to Goos Status, thereby achieving its WFD Objectives. No 'Significant Issues' are reported. No 'Significant Pressures' are reported. The catchment is not listed as a 'Priority Area for Action' and there are no 'Programme of Measures' associated with the catchment lands of freshwater river systems associated with the quarry.

Groundwater Status & Risk

7.74 The application site lies within the Midleton GWB Groundwater Body (IE_SW_G_058). It is characterised by the EPA under WFD criteria as follows:

- WFD Status:
- 3rd Cycle (2016 to 2021) = 'Good'
- 2nd Cycle (2013 – 2018) = 'Good'
- WFD Risk:
- 3rd Cycle (2016 to 2021) = 'Review'
- 2nd Cycle (2013 – 2018) = 'Review'

7.75 The Midleton GWB is a large linear area spanning from west of Carrigtwohill, through Midleton, through Castlemartyr and as far as the coast to the south of Youghal. The 3rd Cycle Report (EPA, 2024) does not provide reasons for the 'Review' mapping result for WFD Risk. Neither does EPA (2024) report the GWB as being a Priority Area for Action.

RECEIVED: 17/12/2025

Surveillance monitoring was undertaken by the EPA at Whitegate PWS (Dower Spring), located approximately 2 km east-southeast of Castlemartyr, to determine WFD status between 2019 and 2021. The water was described as being of good chemical quality, with nutrient concentrations trending upward, albeit well below threshold values.

7.76 The Midleton groundwater body report is included as **Appendix 7.9**.

Transitional Waterbody Status & Risk

7.77 The application site is proximate to the North Channel Great Island Transitional Waterbody (IE_SW_060_0300), which is characterised by the EPA under WFD criteria as follows:

- WFD Status:
- 3rd Cycle (2016 to 2021) = 'Moderate'
- 2nd Cycle (2013 – 2018) = 'Moderate'
- WFD Risk:
- 3rd Cycle (2016 to 2021) = 'At Risk'
- 2nd Cycle (2013 – 2018) = 'Review'

7.78 The North Channel Great Island is assigned 'Moderate' status due to failing to achieve good chemical surface water status. This is with respect to the parameter Tributyltin (TBT), a toxic organotin compound historically used as a biocide in marine antifouling paints and wood preservation to prevent the growth of organisms like barnacles and algae on ship hulls and other structures. The quarry is not associated with the Status or Risk reported by the EPA.

Coastal Waterbody Status & Risk

7.79 Cork Harbour (IE_SW_060_0000) receives water from the North Channel Great Island Transitional Waterbody (IE_SW_060_0300). Great Island separates the North Chanel from Cork Harbour. EPA WFD mapping for Cork Harbour is, as follows:

- WFD Status:
- 3rd Cycle (2016 to 2021) = 'Moderate'
- 2nd Cycle (2013 – 2018) = 'Moderate'
- WFD Risk:
- 3rd Cycle (2016 to 2021) = 'At Risk'
- 2nd Cycle (2013 – 2018) = 'Review'

RECEIVED: 17/12/2025

Good Status Objective Target for Cork Harbour is 2022 – 2027. Pressures reported by EPA (2024) are Nutrients and Organics and the associated Significant Issues are Urban and Urban Wastewater.

WFD Assessment

7.80 A standalone WFD Assessment Compliance report for the proposed development accompanies the application documentation. It is appended here as **Appendix 7.10**.

Rainfall & Recharge & Site Water Balance

7.81 Long-term 30-year (1991 - 2020) monthly gridded rainfall data was sourced from Met Éireann (Walsh, 2012) and is presented in Table 7-2. It is shown that the 30-year Met Éireann Annual Average Rainfall is 1,074 mm/yr.

Table 7-2: Long-term Mean Monthly Rainfall Data (mm) (Met Éireann)

J	F	M	A	M	J	J	A	S	O	N	D	Annual
111	84	80	74	71	72	75	85	79	115	112	118	1,074

7.82 Average annual potential evapotranspiration rate at the closest station, Roches Point, is provided by Met Éireann as 578 mm/yr across the period 2022-2024.

7.83 Actual evapotranspiration (AE) is estimated by multiplying PE by 0.95, to allow for the reduction in evapotranspiration during periods when a soil moisture deficit is present (Water Framework Directive 2004). Actual evapotranspiration is therefore 549 mm/yr (0.95 PE * 578 mm/yr Met Éireann PE).

7.84 The Effective Rainfall (ER) for the site, using Met Éireann AAR data, is determined as follows:

$$ER = AAR – AE$$

$$= 1,074 \text{ mm/yr} – 549 \text{ mm/yr}$$

$$= 525 \text{ mm/yr}$$

$$= 0.53 \text{ m/yr}$$

RECEIVED: 17/12/2025

7.85 For comparative purposes, the GSI maps (https://dcenr.maps.arcgis.com/) show Effective Rainfall to be 626 mm/yr, which is 101 mm/yr greater than the 525 mm/yr calculated using Met Éireann data.

7.86 Other parameter values assigned by the GSI that are used as inputs to the site Water Balance are presented in Table 7-3.

7.87 The GSI assigns a Groundwater Recharge Coefficient across the greenfield application site of 60%. When this recharge coefficient is applied to ER of 626 mm/yr the resultant potential recharge rate to the bedrock aquifer is 375 mm/yr.

7.88 The GSI has not assigned a recharge 'cap' to the bedrock type at the quarry.

Table 7-3: GSI Groundwater Recharge and Water Balance Inputs

Parameter	GSI Value
Effective Rainfall (mm/yr)	625.7
Recharge Coefficient (%)	60
Groundwater Recharge pre-cap (mm/yr)	375
Recharge Cap Apply	No
Average Groundwater Recharge Range (mm/yr)	351 – 400
Hydrogeological Setting Description	Moderate permeability subsoil overlain by well-drained soil
Vulnerability Category	High (H)
Quaternary Sediment Description)	Till derived chiefly from Devonian Sandstones (TDSs)
Bedrock Aquifer Category & Description	Rkd: Regionally important aquifer – karstified (diffuse)
Hydrostratigraphic Rock Unit Group Name	Dinantian Pure Unbedded Limestones

7.89 With reference to Table 7-3, the GSI data can be interpreted, as follows:

- Of the c.1.1 m/yr Met Éireann average annual rainfall, 0.6 m/yr is reported as 'Effective'. This means that c.0.5 m/yr is lost to the atmosphere by evapotranspiration or evaporation.
- The GSI applies a 60% Recharge Coefficient to the Effective Rainfall infiltrating through the soil cover and sandstone till subsoil (TDSs).
- The underlying Dinantian Pure Unbedded Limestone does not significantly restrict this recharge from reaching the bedrock aquifer. Hence no 'Cap' is applied by the GSI and the mapped amount of Groundwater Recharge is reported to be 375 mm/yr of the 1.1 m/yr Met Eireann Rainfall.

RECEIVED: 17/12/2025

- By mathematical balance it follows that 40%, approximately, of Effective Rainfall generates surface runoff or shallow subsurface flows. This value is equivalent to 250 mm/yr.

7.90 These values for rainfall, effective rainfall, groundwater recharge (and by balance, runoff) are important for the Site's Water Balance and conceptualisation of the way that water moves through the site. In particular, these values can be used to rationalise the metered flow readings against the licensed Section 4 discharge volume.

7.91 For the application site area of c. 22.3 ha and a value of 375 mm/yr from the GSI for groundwater recharge, it follows that 22.3 ha (223,000 m^2) x 375 mm/yr (0.375 m/yr) = 83,625 m^3/yr = c. 229 m^3/d.

7.92 Returning to Met Eireann and GSI data for the application site, when added together the sum total of rainfall runoff requiring management plus groundwater recharge percolating downwards is 382 m^3/d.

7.93 This rate will be analysed in more detail further in this chapter with respect to current and predicted quarry discharge values.

Tidal Range

7.94 Rossmore Bay is a sheltered bay with a flat gradient where thick deposits of estuarine mud accumulate. The water level in the Bay is subject to tidal variation.

7.95 Reference to the OPW tidal hydrometric gauge at Ringaskiddy shows that the tidal range in terms of median annual maxima fluctuates between -2.4 mOD and +2.4 mOD, relative to Malin Head datum.

7.96 The spring tide range is approximately -2.0 mOD to +2.2 mOD.

7.97 Information supplied to the Planning Authorities, as part of the 2021 application, demonstrated that the quarry was not liable to coastal flooding and this conclusion remains valid.

Hydrology

7.98 Detail for hydrology is shown in the sub-sections that follow. The hydrological component of the assessment requires understanding of natural surface water drainage patterns in the area and consideration of the surface water catchments contributing flow to the various

watercourses in the area, which has been defined by the EPA in their WFD compliance works.

RECEIVED: 17/12/2025

Synopsis of Regional & Local Hydrology

7.99 As stated, the site is in Water Framework Directive (WFD) Catchment 19: Lee, Cork Harbour and Youghal Bay. Within this catchment, the site is within sub-catchment 19_2: Tibbotstown_SC_010, which is drained by short watercourses that discharge to the Great Island Channel within Cork Harbour.

7.100 The small body of coastal water to the immediate south of the landmass upon which the site is located is known as the 'North Channel' and is connected to 'Passage East' and 'Passage West' at its eastern and western ends, respectively. These tidal channels wrap around the Great Island, which has Cobh on its southern perimeter, and connects with the 'Main Channel' south of Cobh (Figure 7-3).

RECEIVED: 17/12/2025

Figure 7-3 – Regional Hydrology

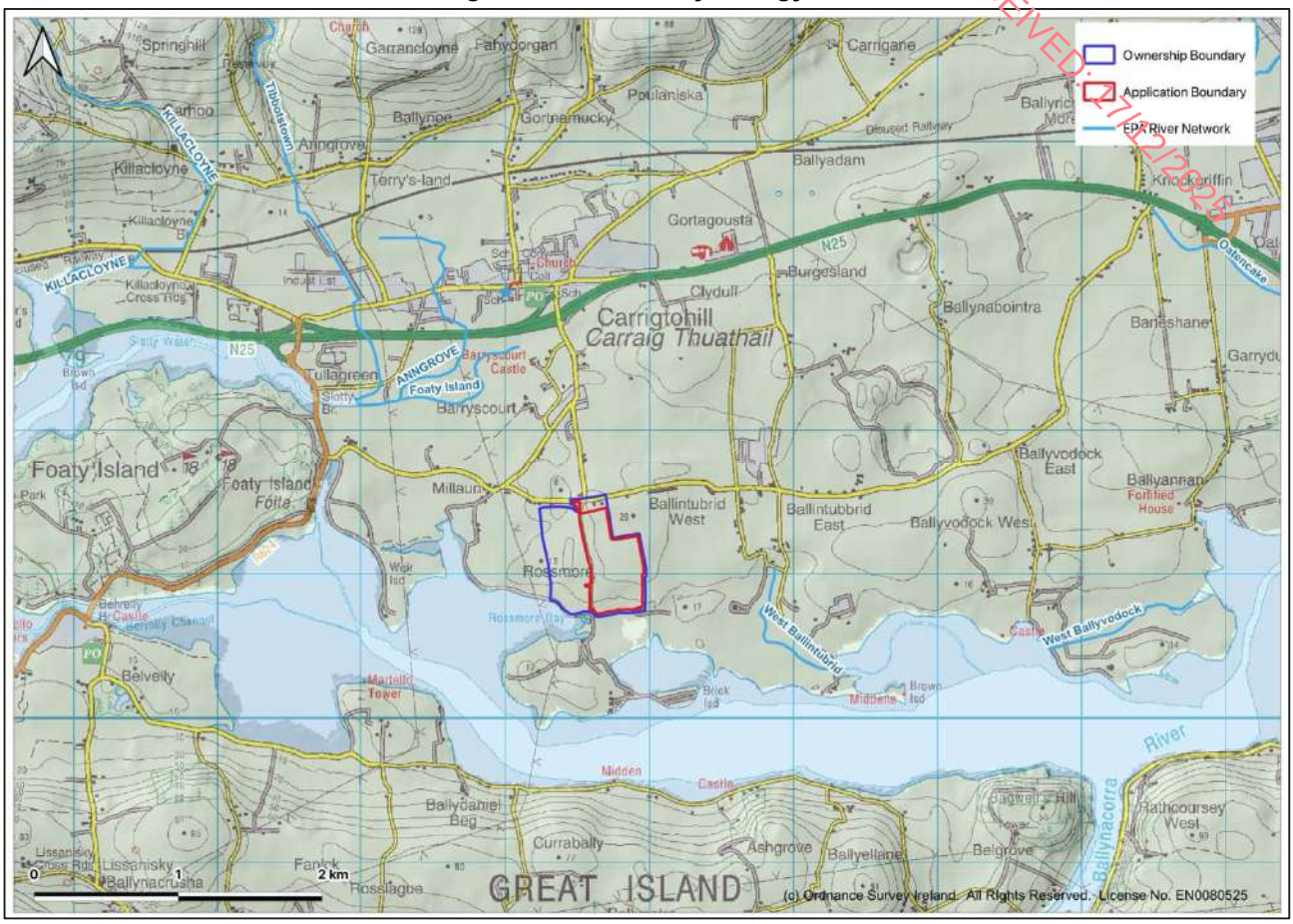


7.101 More locally the site lies within an area bound to the west, south and east by watercourses. At the western end of this land mass is a short tidal channel called Slatty Water which wraps around the northern periphery of Fota Island. Small first streams named the Tibbotstown Stream, Foaty Island Stream and Anngrove Stream outfall to the Slatty Water (Figure 7-4). The Owennacurra River flows southwards through Midleton, 5 km east of the site, before outfalling to coastal waters.

7.102 There are no streams or rivers in the vicinity of Rossmore and the site is not within a catchment that drains to a surface watercourse. There are no drainage ditches present within fields surrounding the application site.

RECEIVED: 17/12/2025

Figure 7-4 – Local Hydrology



Surface Water Catchment

7.103 The application site lies within the catchment to the coastal waters to the south, this being the Great Island Channel, an east-west trending stretch of sea that is fed by the Owennacurra River at its eastern end. The Great Island coastal channel is accommodated on the lowest point of the east-west limestone valley, as described in EIAR Chapter: Land, Soils & Geology (LSG).

7.104 It is important to note at this point that the general site area north of the site is devoid of any mapped natural surface water features or land drainage networks. Given the hummocky nature of the area it is possible that the surface topography would dictate that surface waters generated on the site pre-quarrying drain southwards towards the Great Island Channel.

7.105 As can be seen in Figure 7-5, there is a very small surface water catchment area which is topographically upgradient of the proposed extension area. This has an estimated area of 28,372 m^2.

RECEIVED: 17/12/2025

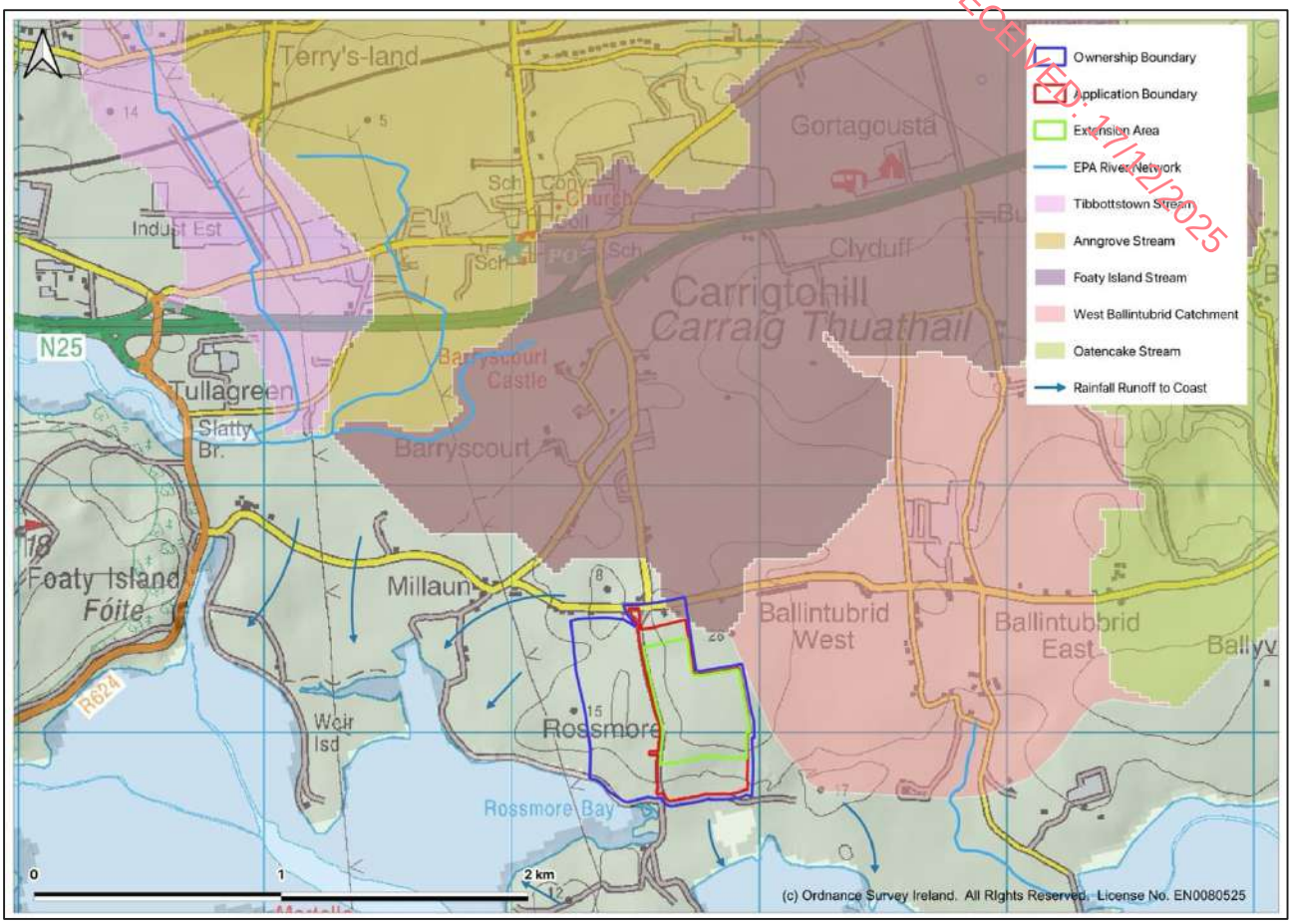


Figure 7-5 – Surface Water Catchment (source: https://gis.epa.ie/EPAMaps/)

Surface Water Biological Water Quality Data

7.106 There are no EPA biological monitoring stations located in the vicinity of the site, downstream of the site or within the wider Tibbotstown_SC_010 sub-catchment. The nearest Q-rating stations are on the Owennacurra River as it flows southwards through Midleton, 3 km east of the site. This has no relevance to this study and is therefore not included.

Surface Water Abstractions

7.107 There are no known public water supply or group water schemes in the vicinity of the site, or the catchment area in which it is located, that source their water from surface watercourses.

RECEIVED: 17/12/2025

7.108 The nearest public water supply is located at Midleton, which serves approximately 8,000 people and sources its water from the Owennacurra River, approximately 1.5 km north of Midleton town. The quarry cannot be connected in any way to that PWS because groundwater will flow from the north to south, towards the coast. Given that the site is downgradient of the abstraction, there is no potential for impact connectivity.

Surface Water Discharges

7.109 Carrigtwohill WWTP is located at the mouth (end) of the Tibbotstown Stream, where it discharges treated effluent to Lough Mahon (Harper's Island) via a 1.5 km long marine outfall. This is regulated by a discharge license issued by the EPA in 2007 (D0044-01). Lough Mahon (Harper's Island) is designated as 'sensitive' under the Urban Treatment Regulations 2001 (as amended), where phosphorus is listed as the limiting nutrient. The plant was subject to a major upgrade (completed in 2015) to cater for increased population equivalent (30,000 PE) and to improve discharge quality. The quarry is almost 2 km to the southeast of that discharge and potential for in combination effects are assessed to be nil.

Flood Risk

Surface Water Mapped Flood Risk

7.110 Historical 6" and 25" maps were reviewed and do not show any indicators of potential flooding on the application site, nor are there any records of historical flood events in the site locality.

7.111 The National Indicative Fluvial and CFRAN Indicative flood maps suggest that the application site is not at risk of flooding. The nearest **mapped** flood risk zone in the area is associated with coastal flooding on the floor of the existing Breedon quarry. As stated, this was satisfactorily addressed in the application documents of 2021 by presenting the elevations of Berm top levels in the context of predicted coastal flood events. Again in 2025, the site walkover and surveying completed by Envirologic confirms that there is a consistent raised perimeter berm in the southwest corner of the existing quarry and its elevation prevents a route for coastal waters to enter that site.

7.112 No CFRAM modelling outputs are reported on the lateral extension proposed.

RECEIVED: 17/12/2025

Groundwater Mapped Flood Risk

7.113 Neither the application site or the existing operational quarry or any surrounding areas feature on the polygons of the GSI's Groundwater Flood Probability Maps.

7.114 The historic Groundwater Flood Map (GSI) shows maximum observed peak flood extents for groundwater. It was generated using satellite images (Copernicus Programme Sentinel-1), field data, aerial photos, as well as flood records from the past. The GSI map shows that the nearest historical groundwater flood event in relation to the site is 250 m to the north of the existing quarry. It is assumed that this groundwater flooding affected low-lying land or an enclosed topographical depression. However, as stated, neither the application site or the operational quarry or any surrounding areas feature on the polygons of the GSI's Groundwater Flood Probability Maps.

7.115 The GSI Data & Maps report Synthetic Aperture Radar (SAR) Seasonal Flood Map and these show observed peak flood extents which took place each year between Autumn 2015 and Summer 2021. The maps were made using Synthetic Aperture Radar (SAR) images from the Copernicus Programme Sentinel-1 satellites. SAR systems emit radar pulses and record the return signal at the satellite. Flat surfaces such as water return a low signal. Based on this low signal, SAR imagery can be classified into non-flooded and flooded (i.e. flat) pixels. Flood extents were created using Python 2.7 algorithms developed by Geological Survey Ireland and then refined using a series of post processing filters. The flood maps show the extents of observed flood events. A lack of flooding in any part of the map only implies that a flood was not observed. It does not imply that a flood cannot occur in that location at present or in the future. The SAR maps indicate groundwater flooding 750 m to the northeast in 2015-2016. This polygon state the area is delineated with 'low confidence', which can mean further validation is required. However, as stated, neither the application site or the operational quarry or any surrounding areas feature on the polygons of the GSI's Groundwater Flood Probability Maps or the Synthetic Aperture Radar (SAR) Seasonal Flood Map.

OPW Historical Flood Event Database

7.116 Consultation of the OPW flood hazard mapping tool shows no flooding events have been recorded at the application site. The nearest mapped flood events on the OPW database are as follows:

1. 750 m to the northeast - flooding at Ballintubber on 3rd December 2015. This flooding event continued for an extended period of time, with pumps still in use on

RECEIVED 17/12/2025

22nd January 2016. The residents dug a sump and deployed a sump to provide relief. No houses were flooded internally. A proposal for minor flood relief works were submitted by Cork County Council to the OPW. No additional details available.

2. 2,900 km northeast – flooding at Ballyadam. This is highlighted as a turlough on the GSI karst database. There is no actual record of flooding at this location. It is understood that part of this turlough was filled in under IDA development works.

3. 4,500 m to the northeast – recurring flooding at Water Rock, Midleton. Flooding at Water Rock House reported in 1993 and 1995. Source of flooding is a sinking stream which re-emerges 620 m to the south of Water Rock House as the Oatencake Stream, which flows southeast and outfalls to the Owenacurra River. Mitigation measures were proposed at that time.

4. Significant flooding also occurred in Midleton during October 2023. The application site is 5.5 km southwest of Midleton and in a different surface catchment to the Owenacurra River, the catchment of which extends north of Midleton.

7.117 Overall, it is concluded that there are no historical flood sites associated with the application site or the existing quarry.

Carrigtwohill Flood Risk Assessment Study (Conroy, 2012)

7.118 Conroy (2012) included many of the Boreholes of the Breedon quarry and the proposed lateral extension to the east. At that time the quarry was named as ‘Lagan Asphalt Rossmore’.

7.119 Conroy (2012) considered all quarries in the area and his comprehensive analysis and body of work reported did not assign the Rossmore area as having any potential to contribute to Risk of Flooding to Carrigtwohill.

7.120 In Conroy (2012) the quarry areas of Rossmore are shown on Figure 9 ‘Hydrogeological Conceptual Model (Plan View) as areas of ‘Diffuse Groundwater Flow to Sea’.

Hydrogeology

7.121 In these assessments hydrogeology is considered to include all aspects from the topsoil, subsoil, bedrock, aquifer classification and GSI mapped groundwater flow regime. There is a certain overlap with the information presented in the Lands, Soils & Geology Chapter of this EIAR (Chapter 6) and readers are therefore referred to it. In this Water Chapter, the

RECEIVED: 17/12/2025

characteristics of the subsurface components are described in terms of their significance in how rainfall travels through soil, subsoil and bedrock and recharges the groundwater aquifer. Information from both Chapter 6 and this Chapter 7 were used to complete the Impact Assessment.

Groundwater Body

7.122 The GSI maps the site as being underlain by the Midleton Groundwater Body (GWB) (GSI, 2004) which covers an area of approximately 136 km^2. As previously stated, a copy of the GWB Sheet is presented as **Appendix 7.9.**

7.123 Relevant items included in the Midleton GWB Description Report (GSI, 2004) are described as follows:

- The Midleton GWB occupies the floor of an elongated east-west trending valley extending from Carrigtwohill in the west to south of Youghal in the east. The GWB is generally flat to gently undulating.
- The GWB is bounded to the north and south by the contact with the low permeability sandstones and mudstones of the Ballinhassig and Knockadoon GWBs respectively. It is bounded to the east by the coast and to the west by Lough Mahon and Cork City.
- The Midleton GWB is composed mainly of diffusely karstified, highly permeable pure limestones with a narrow underlying layer of less permeable impure limestone around the margins. To the north and south of the body are ridges of low permeability sandstones.
- There is significant karstification across the GWB which has resulted in enhanced permeability within the pure limestones. Karst features such as cave systems, sinking streams, springs, swallow holes and other collapse features are common in this GWB.
- Most groundwater flow occurs in an upper zone of a few metres thick in which groundwater moves quickly through weathered and karstified material, resulting in a rapid response to recharge. Deeper groundwater flow occurs through interconnected, conduits and cave systems, with a slower and more dispersed flow component in smaller fractures and joints.
- Groundwater in the Midleton GWB is unconfined. The water table is generally less than 10 metres below the surface with an average annual fluctuation up to six metres.
- Groundwater gradients are very flat in the permeable limestones (0.001-0.002). The highly permeable aquifer can support regional scale flow systems.
- Groundwater flow paths can be up to several kilometres long but may be significantly shorter in areas where the water table is very close to the surface. Overall groundwater

RECEIVED: 17/12/2025

flow is to the rivers draining the valley and ultimately to the sea in the east and to Lough Mahon and the surface water channels to the west and southwest of the body.

- Aquifer recharge is both point and diffuse. Swallow holes, collapse features and sinking streams provide the means for point recharge to the karstified aquifer. Diffuse recharge occurs over the entire GWB via rainfall percolating through the subsoil.
- The lack of surface drainage in much of this GWB indicates that potential recharge readily percolates into the groundwater system.
- Subsoil depths in this GWB can be highly variable, resulting in groundwater vulnerability classifications ranging from Moderate to Extreme.
- The limestones in this GWB are frequently overlain by sand and gravel deposits which are in hydraulic continuity with the underlying bedrock. These deposits provide a permeable pathway for recharge to the karstic aquifer and where saturated provide additional storage for the underlying bedrock aquifer. At Carrigtwohill, the deposits are large enough, with sufficient saturated thickness, to be a locally important gravel aquifer (Lg).
- There is a high degree of interaction between surface water and groundwater in this GWB. Swallow holes and caves receive surface water, and groundwater is discharged to surface as springs or as baseflow to rivers crossing the groundwater body.

Soils & Quaternary Geology

7.124 The cover of soils and subsoils are of relevance to groundwater because they are one means of determining the nature of groundwater recharge and vulnerability. Soil and subsoil types in the application area and wider surrounds are described in Chapter 6. Soils (topsoil) currently on the majority of the application site are mapped by Teagasc as being deep and well-drained with an alkaline basic hydrochemical signature. This is the predominant soil type in the wider locality. Soils become slightly shallower towards the southern end of the site, where the settlement pond is positioned.

7.125 The predominant subsoil surrounding the site is mapped as being till derived from Devonian sandstones. Subsoils thin out towards the southern end of the site such that bedrock is at or close to surface, this being where the settlement pond is positioned.

7.126 Areas of gravels derived from Devonian sandstones and alluvium are more common to the northwest of the site, associated with surface water systems near Carrigtwohill.

RECEIVED: 17/12/2025

Bedrock Geology

7.127 As described in Chapter 6 the site is positioned broadly along the central axis of the east-west Cork Syncline, upon which limestone is exposed at surface. The southern end of this valley floor gives way to tidal waters.

7.128 Bedrock geology is of relevance to groundwater because the nature of its formation and exposure to subsequent processes affects its ability to accept and transmit groundwater. Two bedrock formations have been mapped by the GSI as underlying the quaternary deposits and these have been discussed in greater detail in the Land, Soils and Geology section (Chapter 6) and the Apex (2024) Geophysical Survey for the site.

7.129 Bedrock in the southern half of the application area are mapped as the Little Island Formation, described as a massive and crinoidal fine limestone. This is characterised as a Dinantian Pure Bedded Limestone. Historical drilling records on the active quarry demonstrate that this limestone unit extends to at least -75 mOD.

7.130 In the northern half of the application area the Little Island Formation is overlain by the Clashavodig Formation, described as an oolitic, peloidal, cherty fine limestone. This is characterised as a Dinantian Pure Unbedded Limestone.

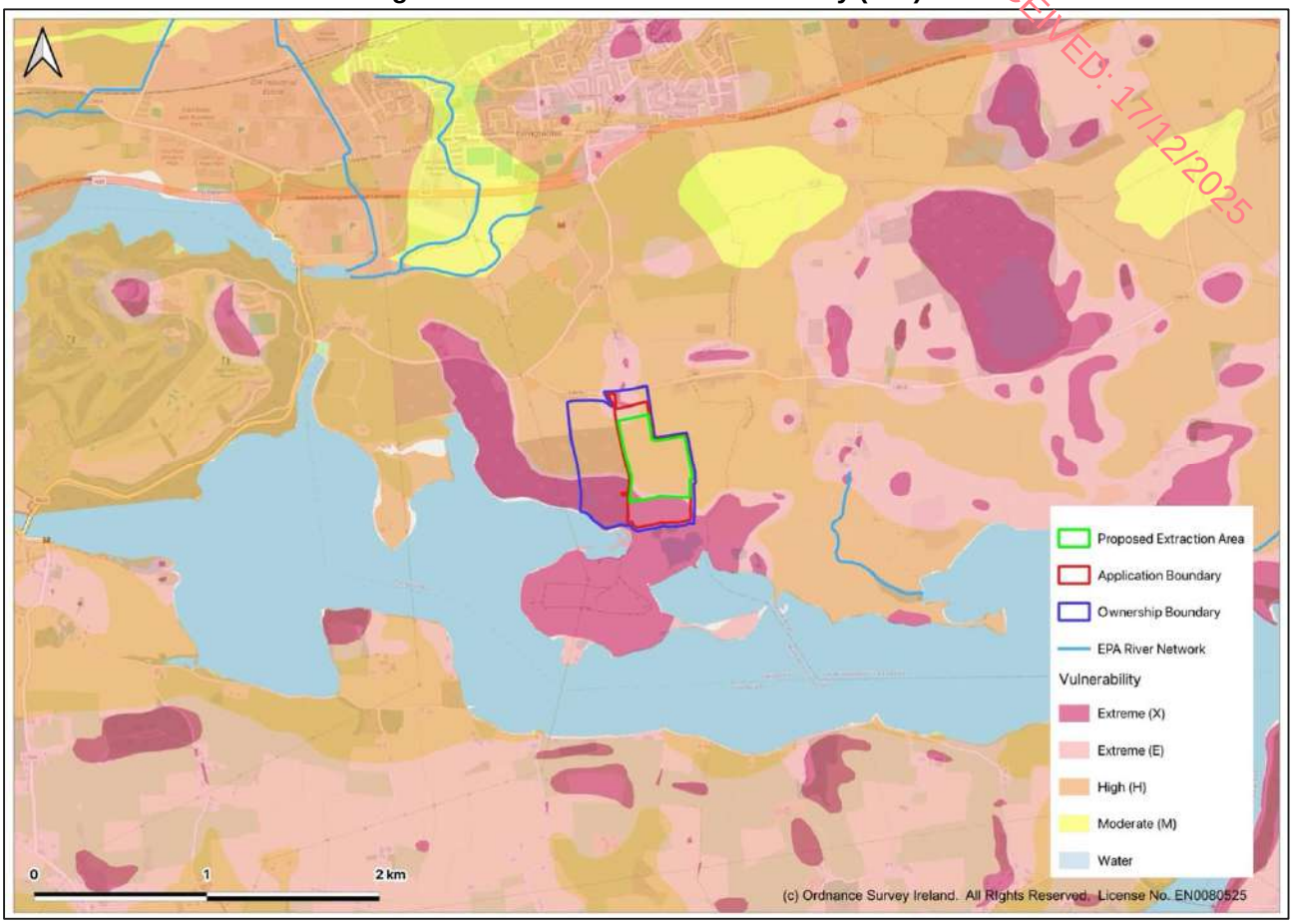
Groundwater Vulnerability

7.131 Figure 7-6 shows that groundwater vulnerability across the proposed excavation is mapped by the GSI as High (H). This vulnerability classification of High (H) is given where moderate permeability subsoil is present to a minimum depth of 3 m, and is expected for an existing quarry site.

7.132 The southern end of the application site, where the settlement pond is positioned, is classified as Extreme (E) vulnerability. This class is applied where rock is at or near surface.

RECEIVED: 17/12/2025

Figure 7-6 - Groundwater Vulnerability (GSI)



Aquifer Classification

7.133 The Aquifer and karst mapped by the GSI for the study area are shown in Figure 7-7.

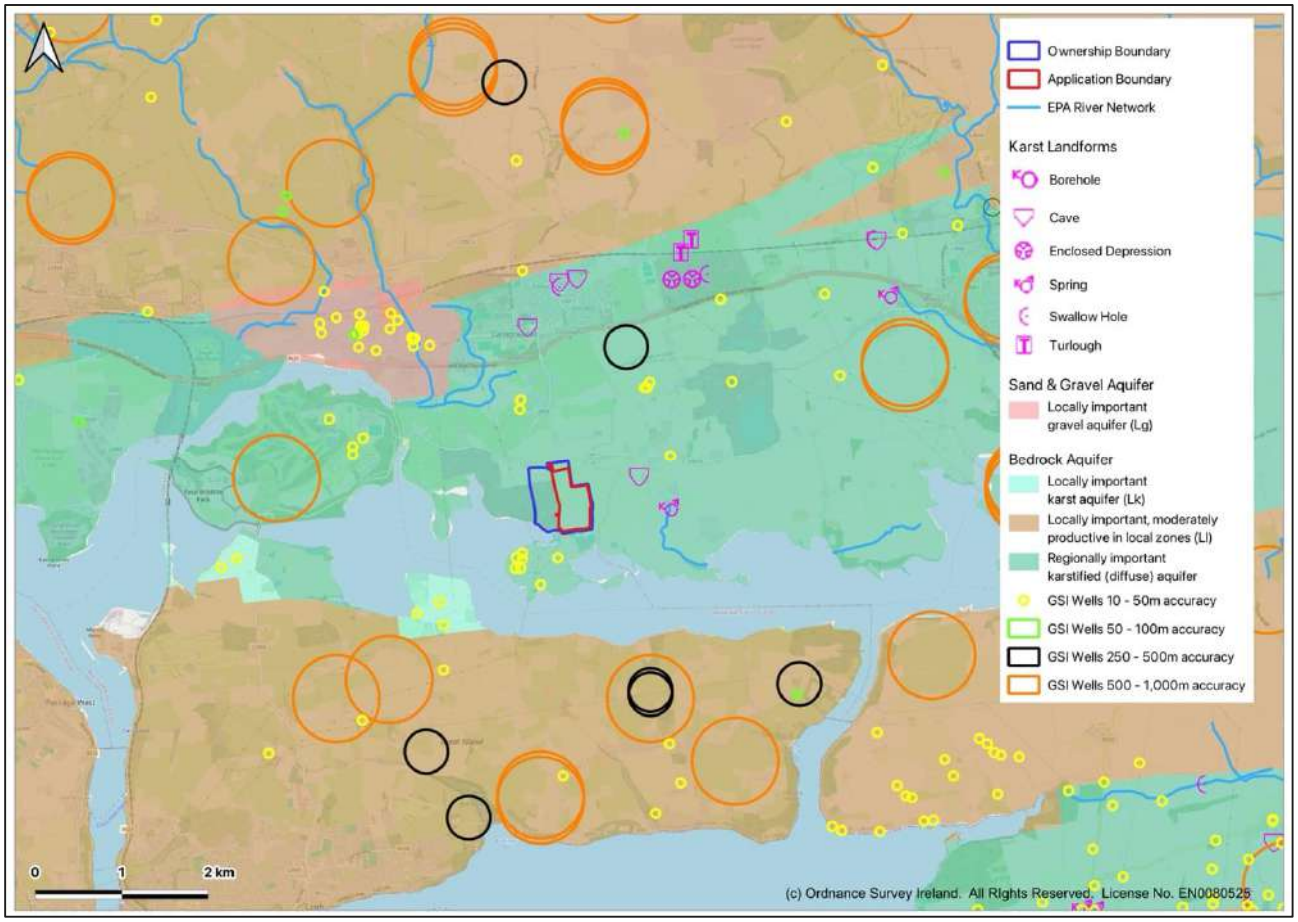
7.134 'Karstification' is the process whereby limestone is slowly dissolved away by percolating waters. It most often occurs in the upper bedrock layers and along certain fractures, fissures and joints, at the expense of others. Karstification frequently results in the uneven distribution of permeability through the rock, and the development of distinctive karst landforms at the surface (e.g. swallow holes, caves, dry valleys), some of which provide direct access for recharge/surface water to enter the aquifer.

7.135 Both of the limestone bedrock formations mapped as underlying the application site are relatively pure and therefore have the potential to dissolve over long periods, developing karst features at the bedrock surface and conduits along conductive fractures within the bedrock formation. The occurrence of the limestone knolls demonstrates the localised nature of karstification in the area, with the intervening lower lying areas a result of relatively

RECEIVED: 17/12/2025

greater karstification rates, and the knolls less susceptible to dissolution, presumably due to localised differences in limestone composition. The site is located on the southern side of one of these knolls.

Figure 7-7 - Bedrock Aquifer Classification and Karst Features (GSI)



7.136 The GSI describes the bedrock in the area as a **Regionally Important Karstified Aquifer, dominated by diffuse flow (Rkd)**. This aquifer type associated with the site is mapped by the GSI as covering an area of 136 km^2 (Figure 7-7). Regionally Important bedrock aquifers are mapped as such by the EPA when they are deemed capable of supplying regionally important abstractions (e.g. large public water supplies), or 'excellent' yields (>400 m^3/d). However, Diffuse Flow karst Aquifers, such as that mapped as underlying this site, generally are expected to have lower groundwater flow than in Karst Conduit Aquifers, which is not the mapping for this area.

7.137 A karst conduit landscape can be characterised by largely underground drainage, with most flow occurring through the more permeable, solutionally enlarged, interconnected

RECEIVED: 17/12/2025

fissure/conduit zones, which may be several kilometres long. Groundwater velocities through fissures/conduits will be higher and aquifer storage is frequently low. In Conduit systems, groundwater often discharges as large springs (>2,000 m^3/d), which range from regular and dependable to highly variable ('flashy'). The degree of karstification ranges from slight to intense. GSI recognises two types of karst aquifer: those dominated by diffuse flow (Rkd) and those dominated by conduit flow (Rkc).

7.138 The gravels laid down on approach to the coastal outfalls of the Tibbotstown Stream to the west (Carrigtwohill) are of sufficient area and have sufficient water-storage capacities to be classified as locally important gravel aquifers.

Mapped Karst

7.139 Figure 7-7 also illustrates the location of karst features mapped by the GSI in the locality of the site, with the nearest feature located c. 600 m to the east. This feature is a cave, referenced by the GSI as the 'goat hole'. A spring is mapped 500 m southeast of this cave, though there is no proven connectivity between the two features. This cave and spring may coincide with contacts between impure and pure limestone formations. Wright (undated) suspects that the swallow hole is the outlet of the Carrigtwohill Stream Sink, 5.5 due northwest of it. This spring rising forms the surface rising of the West Ballintubrid Stream.

7.140 Three other caves are mapped within a housing estate on the eastern urban extents of Carrigtwohill and 2 km north of the application site. A swallow hole is also mapped in close proximity to these caves and is referred to as the Carrigtwohill Stream Sink. These align with the contact between the elevated Old Red Sandstones and the lower-lying Pure Unbedded Limestones. This suggests that acidic rainfall-runoff flowing southwards of the raised ground caused the most dissolution where it flowed onto the purer limestones below.

7.141 Approximately 2.5 km northeast of the site are a cluster of five localised karst features mapped on the 'interconnector' site on the northern side of the N25. This cluster includes:

- A swallow hole. This was indicated on historical 6" OS maps. There is no evidence that this feature still remains at surface.
- Two enclosed depressions, 150 and 380 m west of the swallow hole. There is no evidence that these features still remain at surface.

RECEIVED: 17/12/2025

- Two turloughs. These features were highlighted in the publication 'Caves of East Cork' (Wright, undated). There is no evidence today as to these features being present at surface.

Mapped Wells & Groundwater Users

7.142 Wells mapped on the GSI database were also presented in Figure 7-7. Wells on the southern side of the Great Island Channel are not considered relevant to this assessment.

7.143 The nearest groundwater well mapped by the GSI is located approximately 300 m south of the application site. This is one of seven monitoring wells which were installed in 1998 to monitor long-term remediation of the now closed Rossmore landfill. These seven boreholes have a depth range of 4.0 - 30.3 m and logged bedrock head at depths of 2.4 - 24.3 m.

7.144 Other boreholes within 2 km of the site are shown in Figure 7-7:

- 0.7 km north, depth = 8.0 m;
- 0.8 km north, depth = 81.7 m, depth to bedrock (DTB) = 4.5 m;
- 0.9 km northwest, depth = 12.2 m, yield = 21.8 m^3/d, yield class = Poor;
- 1.0 km east, depth = 1 m, DTB = 1 m;
- 1.3 km northeast (TW1), depth = 61 m, DTB = 6 m, yield = 47 m^3/d, yield class = Moderate;
- 1.3 km northeast (TW2), depth = 122 m, DTB = 7 m;
- 1.3 km northeast (TW3), depth = 42.5 m, DTB = 12 m, yield = 852 m^3/d, yield class = Excellent;
- 1.5 km northeast, depth = 36.6 m, DTB = 12.0 m;
- 1.8 km north, depth = 36.6 m, DTB = 3.0 m, yield = 32.7 m^3/d, yield class = Poor.

7.145 The available information shows that well depth and yield data is variable.

7.146 With the exception a well marked on 25" OSI historical maps on Brick Island, 600 m due south of the application site, there are no additional wells, springs or other hydrological features mapped in the area of interest on historic OS maps.

RECEIVED: 17/12/2025

Third Party Wells

7.147 There are an estimated 30 dwellings located within a 500 m radius of the site, with all of these being sited along a public road to the north. Cork County Council supplies all dwellings in the area with a mains water supply and very few private wells exist. The closest private well is a farm well located 540 m to the northwest of the application boundary.

7.148 There are no dwellings, and hence no wells in the downstream direction of groundwater flow, which is north to south. It is unclear if there is a groundwater supply well in use at the shellfish facility due south of the application site.

Public Water Supply (PWS) & Groundwater Source Protection Zones

7.149 The nearest source protection area serving a National Federation of Group Water Schemes (NFGWS) groundwater abstraction is 2.3 km to the south of the site, at Walterstown GWS. The scheme is located on Great Island and is therefore hydrologically separated from the application site by the Great Island Channel.

7.150 The nearest source protection area serving a public Irish Water groundwater abstraction is 7 km to the southeast, in relation to the Cloyne Aghada PWS.

7.151 The proposed development is significantly remote from all mapped Source Protection Areas. Therefore, no potential for impact exists with respect to Public or Group Water Scheme supplies.

Other Abstractions

7.152 The nearest off-site groundwater abstraction is the Kilsaran dewatering abstraction directly to the west of the existing Breedon quarry. The Kilsaran quarry sump is dewatered using submersible pumps. Dewatering is managed under discharge license WP(W)10/18, included as **Appendix 7.2**. Discharge license WP(W)10/18 does not state an ELV applicable to flow rate.

7.153 Pumping of the Kilsaran quarry sump is to a surface water feature, referred to in their license as ‘Pond 3’ in Cork Harbour North Channel. This is classed as a discharge to groundwater (Midleton IE_SW_G-058).

RECEIVED: 12/12/2025

Groundwater Flow Direction

7.154 Groundwater flow direction is determined on the basis of topography, surface water drainage and the proximity of the coast, all of which will influence the groundwater flow regime. Given the lack of surface water features in the locality of the site it is assumed that the vast majority of rainfall will infiltrate through the ground surface.

7.155 Based on topographical patterns regional groundwater flow direction will be from north to south, from the raised Old Red Sandstone plateau, towards the coastline.

7.156 At a more local scale groundwater flow direction is more likely to be from northeast to southwest. Under non-pumping conditions any groundwater flowing through the bedrock aquifer below the site eventually discharges into the North Channel.

7.157 The dominant mechanism for rainfall discharge in this GWB is likely to be via groundwater rather than surface water pathways.

Water Management System (WMS)

Existing Site WMS

Overview

7.158 The existing site has an established and operational Water Management System designed and constructed to treat and discharge the WP(W)08/18(R) licensed volume of 12,000 m^3/d. Refer to Figure 7-8 for Water Management System components.

7.159 The Water Management Systems operate to ensure compliance with the Conditions of the Section 4 Licence and monitoring results will be presented and discussed later.

7.160 Based upon recorded flows into the settlement lagoon to date the existing Water Management Systems has proven capacity to accommodate the proposed development's waters arising.

7.161 The components of the site's water management systems are designed to safeguard receiving waters, groundwater flow paths and downstream European Sites.

7.162 For the purposes of describing the on-site water management system the site has been divided into several areas. In essence these can be considered as site-scale sub-catchments, and they have been delineated as follows (Figure 7-8):

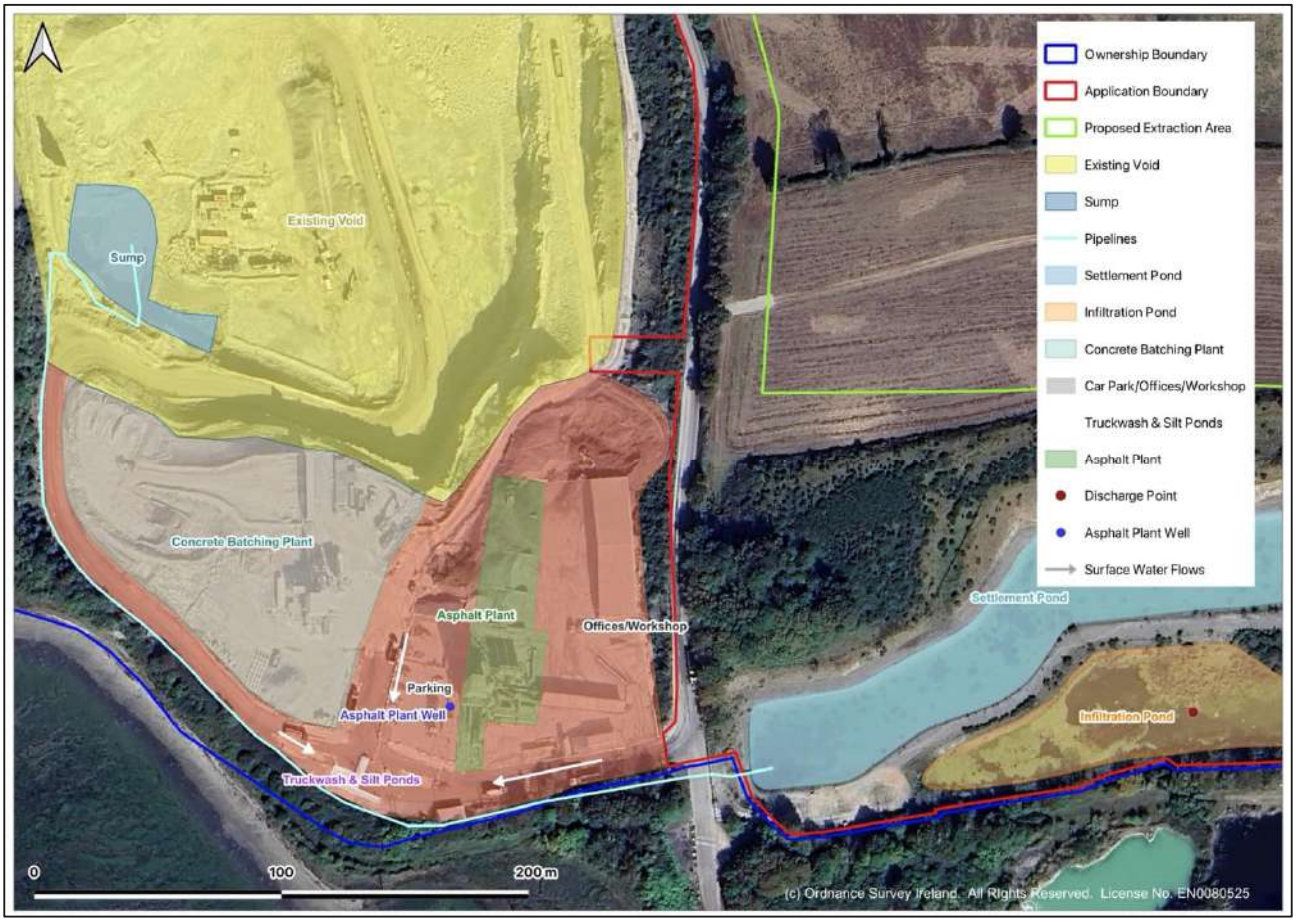
a) Existing Quarry Void (as permitted) = 126,000 m^2 (12.6 ha)

RECEIVED: 17/12/2025

b) Sump = 1,750 m^2 (0.175 ha)
c) Entrance compound (office, car park, refuelling, sheds, asphalt plant) = 31,025 – 11,193 = 19,832 m^2 (1.98 ha)
d) Concrete batching plant = 11,193 m^2 (1.12 ha)
e) Settlement Pond = 14,519 m^2 (1.45 ha)
f) Infiltration Pond = 5,234 m^2 (0.52 ha)
g) Proposed Excavation Area = 125,000 m^2 (12.5 ha)

7.163 Surface water flow patterns within the current surface water management system are also shown in Figure 7-8.

Figure 7-8: Current Quarry Surface Water Management System



Existing Quarry Void

7.164 The area of the site where bedrock extraction is ongoing is a topographically enclosed depression.

RECEIVED: 17/12/2025

7.165 Ground levels around the existing extraction area are approximately 7-20 mOD along the eastern perimeter, 3 mOD along the southern perimeter, 0 mOD along the western perimeter, and between 8 and 16 mOD along the northern perimeter.

7.166 The existing quarry currently extends to a depth of -35 mOD.

7.167 The floor is accessed from its southwestern corner via a haulage ramp which connects the primary internal site access road at upper level to the processing area in the northern part of the quarry floor (see Plate 7-2:).

7.168 Crushing and screening takes place on the current quarry floor using semi-mobile plant.

Plate 7-2: View North from Batching Plant to Existing Quarry Void



7.169 Rainwater landing directly within the existing void generates rainfall-runoff. In addition there may be some rainfall-runoff draining into the void from surrounding areas. Within the existing quarry the contribution of rainfall-runoff from upgradient lands is considered negligible.

7.170 There are no major springs or groundwater ingress points within the existing site. Observations of the walls of limestone around the perimeter of the existing void showed dry rock at the time of the site walkover in July 2025.

RECEIVED: 17/12/2025

Sump

7.171 A portion of the southwestern corner of the existing void is saturated and referred to as the quarry sump. Rainfall-runoff flows across the bedrock floor by gravity to this sump (see Figure 7.1). Settled water from the truck wash and yard runoff from the concrete batching plant area also drains to the sump, via gravity (piped).

7.172 The existing sump occupies an area of approximately 1,750 m^2 (0.175 ha) though this can enlarge and contract slightly depending on water levels, which are controlled by pumping.

7.173 During the site walkover in July 2025 works had commenced on excavating a sump to manage water from the quarry floor at -35m OD.

7.174 The floor of the sump is currently at approximately -38m OD.

7.175 Sump waters are pumped to the settlement lagoon via a 150 mm rising main.

7.176 The maximum pumping rate of the sump pump is 180 m^3/h (4,320 m^3/d), though due to wear and tear this may be more in the order of 150 m^3/h (3,600 m^3/d). The head on the pump since March 2025 is of the order of 40 m.

7.177 Prior to March 2025 the maximum pumping rate of the sump pump was 220 m^3/h (5,280 m^3/d), though due to wear and tear this was likely to be more in the order of 190 m^3/h (4,560 m^3/d). The head on the pump before March 2025 was of the order of 25 m.

Plate 7-3: Quarry Sump Pump



RECEIVED: 17/12/2025

Settlement Lagoon

7.178 From the floor sump, attenuated water is pumped to the settlement lagoon (see Figure 7.1 and Plate 7-4) on the eastern side of the local road, opposite the quarry entrance.

7.179 There is a flowmeter on the discharge as it enters the settlement lagoon.

7.180 Water enters the western side of the settlement lagoon via a 300 mm HDPE pipe.

7.181 The inlet is a bell-mouth structure which is fed by a 300 mm pipe, flaring to 600 mm at the top. Pond water level is equal to the top of the bell mouth (surveyed as 5.0 mOD on 30th July 2025).

7.182 The settlement pond is made impermeable via two layers of 2 mm of HDPE geomembrane. These liners are sandwiched between protective 6-20 mm stone layers (300 mm below and 150 mm above).



Plate 7-4: Settlement Lagoon

7.183 The settlement lagoon is located within a fenced enclosure. Topographical survey drawings provided by Breedon show the settlement lagoon has the following specifications:

- Pond base elevation (top of earthworks) = 3.62 – 3.72 mOD;
- Pond base elevation (top of lower liner) = 3.78 – 3.88 mOD;
- Pond base elevation (top of upper liner) = 3.94 – 4.03 mOD;
- Pond water elevation = x mOD (as surveyed on 30/07/25);
- Maximum pond depth = 1.00 m;

RECEIVED: 17/12/2025

- Settlement lagoon area = 14,300 m^2;
- Settlement lagoon volume = 14,300 m^3.

7.184 The outlet of the settlement lagoon is at it's western end. Treated waters overflow by gravity into the infiltration pond via a culvert.

Settlement Lagoon Hydrocarbon Interceptor

7.185 A scum board was installed around the perimeter of the bell-mouth inlet to the settlement lagoon (see Plate 7-4). This serves as a final polishing mechanism for treated waters and prevents hydrocarbons from spilling over into the main lagoon. Captured hydrocarbons are entrapped in a 1,500 mm cylindrical concrete ring chamber surrounding the inlet structure.

Infiltration Pond

7.186 From the settlement lagoon water overflows via an underground pipe to an Infiltration Pond (see Figure 7-1), located directly south of the settlement lagoon.

7.187 The Infiltration Pond is the licensed area for discharge to groundwater. Although it predates the nomenclature, it is essentially a Nature Based Solution.

7.188 As per design calculations submitted in 2015 the infiltration pond has an area of approximately 4,942 m^2 and is unlined. Cross sections suggest that it is separated from the legacy ponds to the south by in-situ bedrock.

7.189 Water level in the infiltration pond was surveyed as 3.64 mOD on 30th July 2025.

Discharge Point

7.190 The final discharge point is considered to be a discharge to ground, which takes place in the infiltration pond. In terms of discharge license compliance this is referred to as 'GW01'.

Wheelwash/Truck Washdown

7.191 The wheelwash takes the form of a rumble strip to remove heavy debris and jets which are activated by a motion sensor.

7.192 Clean water supply to the wheelwash is sourced from a supply well next to the asphalt plant.

RECEIVED: 17/12/2025

Truckwash/Yard Silt Ponds

7.193 Along with yard runoff excess wash water from the truck wash flows by gravity towards a grated gully from which it is directed to a network of cascading silt ponds (Plate 7-5).

7.194 Treated water from these silt ponds outfalls to the quarry sump via a gravity pipe.

Plate 7-5: Silt pond system serving truck washdown and wheelwash



Hydrocarbon Interceptor

7.195 Class 1 interceptors are in place to treat runoff from areas where the potential exists for hydrocarbon pollution.

7.196 One interceptor treats runoff from the southeastern hardstanding areas which includes fuel storage, asphalt plant, refuelling points, yard runoff, entrance access road and car park. This interceptor is positioned on the gravity pipeline between the truck wash silt ponds and the sump.

7.197 A second interceptor treats runoff from the southwestern yard area, which is predominantly the concrete batching plant hardstanding.

7.198 The interceptors are maintained and emptied on an annual basis by a licensed third party contractor (ENVA).

RECEIVED: 17/12/2025

Hydrocarbon Storage & Refuelling

7.199 The only hydrocarbons that may be stored within the quarry extension area that will have the potential to cause water pollution are small quantities of lubricating oils, hydraulic oils, waste oils, used oil filters and oily rags. All of these will be stored in the following manner:

- lubricating oils and hydraulic oils will be stored on spill trays are kept within a lockable storage container;
- a bunded tank will be provided for waste oils;
- dedicated storage bins will be provided for used oil filters and oily rags.
- There are no bulk fuels stored at the existing quarry site, and there will be no fuel storage within the proposed extension area.
- All fuels required to serve mobile plant and machinery are brought to site on an as required basis by local fuel suppliers. A number of spill kits are provided at the existing quarry and additional spill kits will be stationed within the quarry extension area also. The existing water management system for the quarry includes a hydrocarbon interceptor.

Domestic Wastewater

7.200 Toilets are provided for employees at the portacabin office at the existing quarry. Waste water from the toilets is treated on site in a Biofilter Sewage Treatment System installed in 2004 by FM Environmental. The Biofilter system is a well-established sewage treatment system designed for where access to a mainline foul sewer is not available or where a septic tank is unacceptable. The Biofilter unit is self-contained in a GRP structure and consists of a combined Primary Settlement Tank/Final Settlement Tank, suitably sized and baffled to promote good flow balancing, settlement of solids and a sludge holding capacity. A biological filter matrix provided biological oxidation of organic material.

7.201 The wastewater treatment unit is positioned adjacent to the office area (see Plate 7-6). Treated domestic effluent is subsequently disposed of to a percolation area. The percolation area is located west of the truck washdown area, to the south of the internal access road.

7.202 The proposed development will not result in an increase of on-site staff. The wastewater treatment services shall remain fit for purpose.

7.203 The wastewater treatment plant is maintained and desludged on an annual basis by a licensed third party contractor.

RECEIVED: 17/12/2025



Plate 7-6: 0Domestic wastewater treatment system

Process Water Supply

7.204 An off-take from the existing sump rising main supplies water required for dust suppression; dust cannons are strategically positioned around the site. Resultant runoff drains back to the existing sump by gravity.

7.205 Water required for the concrete batching plant, wheelwash, truckwash and some sprinklers is sourced from BBH22-2, positioned north of the application site. Water is stored in 75 m^3 overground tanks.

7.206 Water required for the asphalt plant, toilets and car park sprinkler system is sourced from a well situated on the eastern edge of the staff car park in the existing quarry.

7.207 Water demand is estimated as follows:

- Truckwash = 3 m^3/d;
- Wheelwash = 5 m^3/d;
- Dust suppression = in the order of 5 m^3/d (seasonal, mostly sourced from existing quarry sump);
- Concrete batching plant = c. 10 m^3/d;
- Asphalt plant = c. 2 m^3/d;
- Toilet and canteen facilities = 0.5 m^3/d;
- Additional waters used on site = ≤0.5 m^3/d.

RECEIVED: 17/12/2025

7.208 Given the nature of site topography any excess water from the above processes shall drain by gravity back to the existing quarry sump.

7.209 Drinking water for staff is sourced from imported bottled water.

Application Site Proposed WMS

Overview

7.210 The application site is in greenfield condition and slopes from north to south.

7.211 It is proposed to extract bedrock in 15 m benches to a lowest elevation of -35 mOD, equivalent to a maximum of 4 benches. At this level, the extension area will remain 15m above the permitted level of the existing quarry.

7.212 As extraction proceeds below current ground level rainfall-runoff generated on the proposed extraction area shall be collected in a new sump.

7.213 Rainfall-runoff generated within the proposed extraction area shall be pumped from the new sump to the settlement lagoon, directly to the south. This rising main shall be connected to the pipeline currently carrying water from the active sump. A flowmeter with datalogger shall be fitted to this rising main.

7.214 Rainfall-runoff from upgradient greenfield areas shall be collected in new perimeter drains and diverted southwards around the proposed extraction area towards the coast.

7.215 The only demand for water on the proposed extension area shall be that required for dust suppression - water demand for dust suppression in the proposed extension area shall be sourced from the extension's sump. Excess water from dust suppression in the proposed extension area shall drain by gravity back towards the extension's sump. Water demand for dust suppression is at its highest during summer months.

7.216 Rock shall be crushed and graded on the application area using mobile crushing and screening units. Crushed/screened material shall be loaded into haulage trucks before being weighed and then transported across to the existing site via a proposed tunnel beneath the local road.

7.217 The existing site wheelwash will be utilised for the extension area, and water for this is sourced from BH22-2.

RECEIVED: 17/12/2025

Site Investigations

Exposed Faces

7.218 Chapter 6 (Land, Soils & Geology) describes the bedrock as exposed in the existing quarry as a sequence of massive carbonate mudbank limestones composed of strong, high purity limestones of the Little Island Formation. In the existing quarry the sequence dips ~70° to the south, although the bedding dips could vary from north to south due to the synclinal nature of the Little Island Formation.

7.219 Hydro-G & Envirologic examined the rock face walls of the quarry (see Plate 7-7). The limestone is tight with only two small cracks observed with any evidence of water ingress. Those two points were associated with corners in the rock under access road corners.

7.220 It is Hydro-G's experience that when a quarry is already operational, the walls and the number or size of the pumps dewatering the sump tell the story of current groundwater ingress.

7.221 The evidence at the site presents a story of small-scale dewatering experience. There is small scale of dewatering infrastructure at the site: the area dedicated to the floor sump is relatively small, there is one small pump pontoon indicating that the pump is not that big, one duty pump provides adequate service and only one discharge pipe is required to convey water from the sump to the lagoons across the road. Those pieces of information suggest that little groundwater presents for management at the site at the current level of approximately 30 m below sea level.

RECEIVED: 17/12/2025

Plate 7-7: Views of exposed bedrock within existing quarry

(a) View from sump area towards the eastern face of existing void	
(b) View towards northern face of main void	

Geophysical Surveying

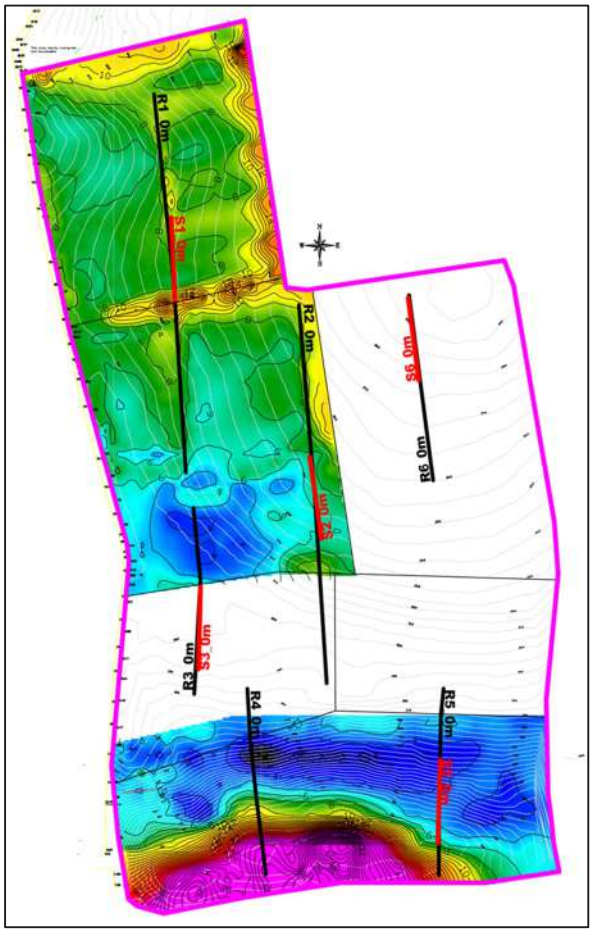
2009 Geophysics Survey

7.222 Apex Geophysics carried out a geophysical survey across the application area in September 2009 and this is Appended to the Apex (2024) report accompanying Chapter 6. The output plan map from the 2009 survey is shown below as Plate 7-8.

RECEIVED: 17/12/2025

7.223 The key finding is that the centre of the application site, which corresponds with the southern end of the proposed extraction area, has low resistivity. The report infers that this low resistivity is indicative of bedrock close to surface.

Plate 7-8: 0Geophysics interpretation map in plan (Apex, 2009)



2024 Geophysics Survey

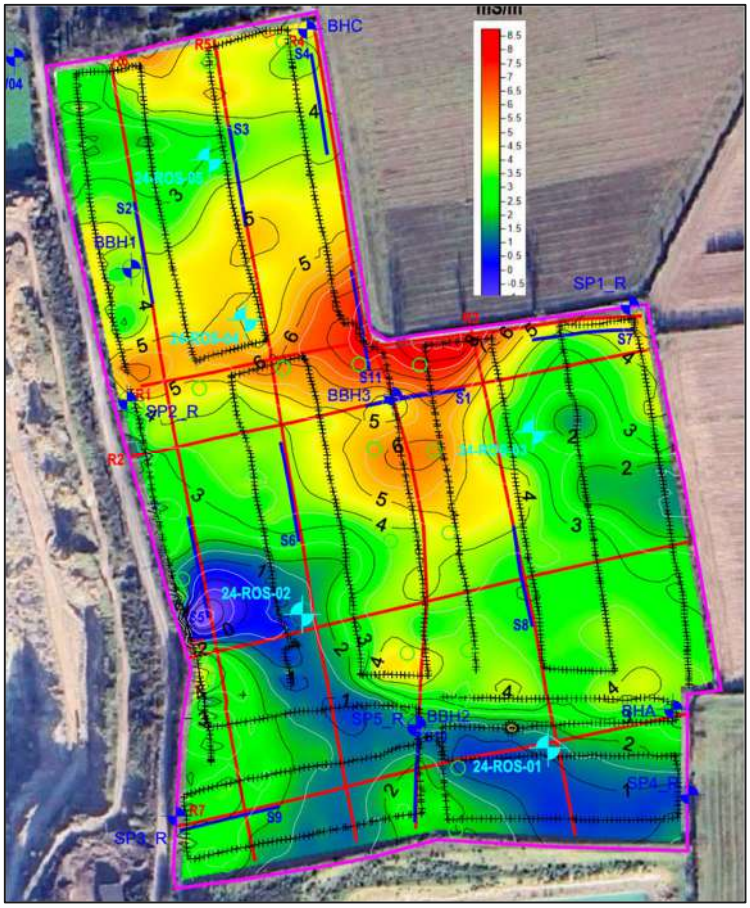
7.224 The previous geophysics map was updated by Apex Geophysics in June 2024 using supplementary drilling information (see Plate 7-9). Both geophysics reports are included in the Geological Assessment appended to Chapter 6 of this EIAR. Key findings from the 2024 survey are summarised as follows:

- Overburden across the site was interpreted as clay, clayey sand and gravel, and silty/clean sand and gravel. Overburden is thickest in the northern and southern portions (5 – 10 m), thinning somewhat to 1 – 5 m in the more central area.
- Competent bedrock is clean limestone which is generally strong to very strong.

RECEIVED: 17/12/2025

- The rock appears to be more susceptible to weathering, fracturing and infill in the north of the site and this change appears to coincide with the transition from the Little Island Formation in the south to the Clashavodig Formation in the north.
- Some weathering is noted at bedrock head. This has an average thickness of 3 m (range = 1 – 15 m).
- Deeper weathering and clay infill has been logged and this is possibly associated with karstic solution weathering. This tended to more prevalent towards the centre of the application boundary, in close proximity to BBH3.
- An area of low resistivity is mapped at the southern end of the site.

Plate 7-9: Geophysics interpretation map in plan (Apex, 2024)



Well Drilling

7.225 As outlined in the Land, Soils & Geology chapter throughout the course of historic investigations to inform previous applications a comprehensive number of wells have been drilled on the existing site.

RECEIVED: 17/12/2025

7.226 These previous site investigations comprised almost 30 boreholes, numerous trial pits, soakaway tests and rotary core drilling. Therefore, the geology and potential for the existing site to interact with the water environment has been characterised in detail previously.

7.227 During the course of this assessment additional boreholes were drilled. A borehole location map is included as Figure 7-9.

7.228 Additional details related to hydrogeology such as water strike depths and estimated yields encountered during drilling are included as Table 7.4.

7.229 Borehole logs are included as **Appendix 7.11**.

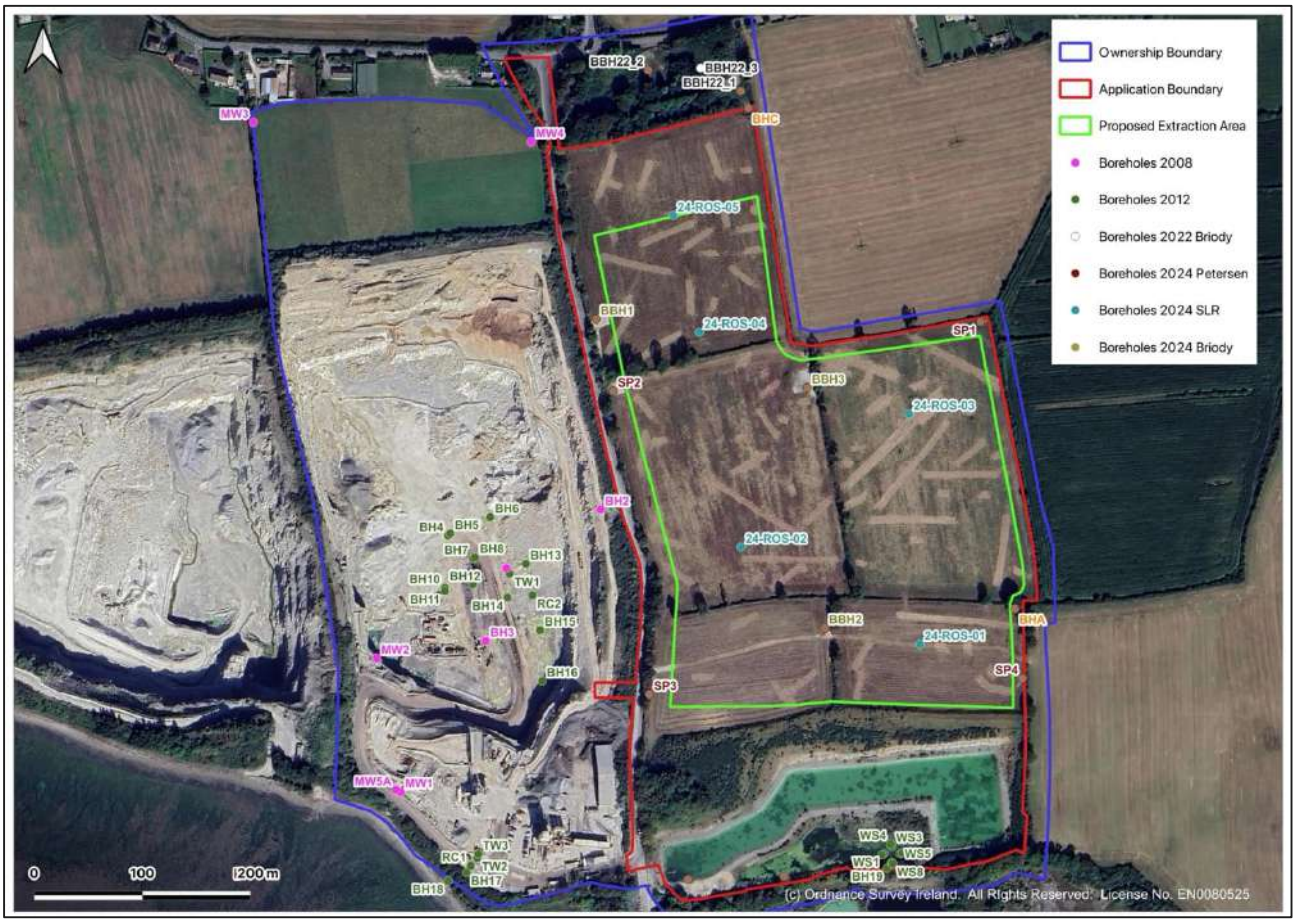


Figure 7-9: Boreholes drilled on application site and existing quarry

RECEIVED: 10/12/2025

Table 7.4: Summary Details of Wells on Application Site and Immediate Surrounds

Year & (Contractor)	Ref.	Ground Elevation (m OD)	Top of Outer Casing (mOD)	Top of Inner Casing (mOD)	Drilled Depth (m bgl)	Install Depth (m bgl)	Base Elevation (m OD)	Screen interval (m bgl)	Water Strikes (m bgl)	Estimated yield (m^3/d)	GW Level 27/06/25 (mbtoc)	GW Level 27/06/25 (mOD)	GW Level 09/09/25 (mbtoc)	GW Level 09/09/25 (mOD)
2005	BHA	22.62			51.82	None	-29.20	no screen	51.82	218			26.10	-2.65
	BHC	27.52	27.78		79.25	none	-51.73	no screen	64.49	109			>24.62	<3.16
2022 (Briody)	BBH22_1	27.34	27.64	n/a	108		-80.66	no screen	None		27.09	0.55	28.10	-0.46
	BBH22_2 (Container)	24.62		n/a	112		-87.38	no screen	99		26.91	-1.52	27.96	-2.57
	BBH22_3	c. 28		n/a	100		c. -72	no screen	72					
2024 (Petersen)	SP1	29.57	30.22	30.18	79	79	-49.43	40 – 79	51	Medium	31.78	-1.56	32.23	-2.01
	SP2	20.84	21.44	21.34	85	85	-64.16	31 – 85	60	Fast	37.24	-15.80	38.07	-16.63
	SP3	19.03	19.62	19.44	75	24	-55.97	21 – 75	27.5	Medium	22.62	-3.00	22.68	-3.05
	SP4	19.43	19.95	19.91	75	49	-55.57	16 – 75	37.5	Medium	20.33	-0.376	20.62	-0.671
	SP5	backfilled			57	0			32 / 49	Medium / Fast				
2024 (Irish Drilling)	24-ROS-01	c. 22			95		c. -73		n/a	n/a				
	24-ROS-02	c. 23			95		c. -72		n/a	n/a				

RECEIVED: 17/12/2025

	24-ROS-03	c. 29			100		c. -71		n/a	n/a				
	24-ROS-04	c. 26			95		c. -69		n/a	n/a				
	24-ROS-05	c. 25			71		c. -46		n/a	n/a				
2024 (Briody)	BBH1	20.98	21.46	21.32	75		-54.03		53	55	37.14	-15.68	38.32	-16.86
	BBH2	21.07	21.58		80		-58.93		52 & 71	270 & 270 = 540	24.14	-2.56	24.16	-2.57
	BBH3	26.40	26.75		45		-18.60		unconfirmed	>30				<-3.25

RECEIVED: 17/12/2025

2005 Drilling

7.230 In the course of historic investigations for a previous application, wells BHA, BHB and BHC were drilled within the application site.

7.231 BHA was drilled close to the south-eastern corner where overburden depth of 3.0 m was recorded. The borehole was terminated at 52 m bgl (-29 mOD) upon encountering a water bearing zone yielding approximately 218 m^3/d.

7.232 BHB was drilled adjacent to the settlement lagoon inlet and is no longer present.

7.233 BHC is located upgradient of the proposed extraction area. Overburden depth of 3.35 m was recorded. Shallow layers (1 – 2 m) of broken rock were encountered at 10 and 27 m below ground level (bgl). Limestone was noted as getting harder to drill at 52 m bgl (-24.5 mOD). A discrete fracture yielding 109 m^3/d was noted at 69 m bgl (-41.5 mOD).

7.234 With respect to the current application, across these three wells only one relatively minor groundwater strike (218 m^3/d) was encountered above the proposed floor of the quarry extension (-35 mOD).

2022 Briody Drilling

7.235 Hydro-G commissioned Briody Well Drilling Ltd. to drill three trial wells to the immediate north of the application area. Well depths were in the range 100 – 112 mOD.

7.236 BBH22_1 encountered 5 m of overburden and continued through dark limestone. Mild weathering was noted at 42 m bgl and 60 m bgl. Groundwater ingress was considered negligible.

7.237 BBH22_2 encountered a broadly similarly profile in that 5 m of overburden was underlain by predominantly dark limestone. A weathered zone at 34 m bgl (-9 mOD) yielded a small amount of water (c. 12 m^3/d). No other significant groundwater

RECEIVED: 17/12/2025

ingress was recorded until 99 m bgl (-74 mOD) where a water bearing sandy/clay-filled cavity was encountered.

7.238 BBH22_3 was drilled in close proximity to the above two wells. A similar lithology log was recorded. A zone of water-bearing weathered bedrock was encountered at 72 m bgl (-44 mOD), with yield increasing gradually as drilling progressed to 100 m.

7.239 With respect to the current application, no significant groundwater strikes were encountered in these wells above the proposed floor of the quarry extension (-35 mOD).

2024 Petersen Drilling

7.240 As part of further investigations to support the current assessment, Petersen Drilling Services (Petersen) was commissioned to drill five boreholes with piezometers installed to test bedrock competency and hydraulic conveyance across the application area. These are referred to as Monitoring Wells (MWs) because they are specifically designed to seal out subsoil influences and a datalogger is installed to evaluate groundwater responses in bedrock.

7.241 The Petersen MWs were drilled and completed using Rotary Symmetrix technique with reference to industry guidelines (Guidance on the design and installation of groundwater quality monitoring points, EA, 2006). The drilling diameter was 120 mm within the bedrock. Installation consisted of 50 mm diameter ID HDPE standpipe with factory slotted casing targeting the base of the MWs, which was the target base below the proposed elevation of the final floor of the application area. The annulus around the slotted casing was composed of 10 mm gravel to create a gravel pack; bentonite clay was used as a seal above the gravel pack. Temporary ODEX casing (140 mm) withstanding subsoil was used during the drilling process and was removed upon completion after the HDPE standpipe was installed. Raised lockable headworks set within a concrete plinth, which extended to 0.5 m below ground, completed the installation.

RECEIVED: 17/11/2025

7.242 SP1 was drilled in along the eastern boundary of the application site. Top of bedrock was logged at 3.7 m bgl. Drilling was consistent and logged as medium strong dark grey limestone to 79 m bgl (-49 mOD).

7.243 SP2 returned strong to very strong limestone to its target depth of 85 m (-58 mOD). Discrete groundwater ingress was noted at 60 m bgl (-39 mOD).

7.244 SP3 was drilled to 75 m and returned clay infill zones at 12.5 m (6.5 mOD) and 21.5 m (-2.5 mOD). Due to unstable wall conditions at 24 m bgl the monitoring well install could only be completed to 24 m bgl (-5 mOD).

7.245 The log for SP4 returned very strong limestone from 18 – 75 m. Due to unstable wall conditions between 12.5 – 16 m bgl (3.4 - 7 mOD) the monitoring well install could only be completed to 49 m bgl.

7.246 SP5 was drilled close to the current location of BBH2. Difficult conditions were encountered during the drilling of SP5. Clay-filled cavities yielding groundwater were logged from 49 m. Presence of cavities meant that there was significant loss of air from 54 – 57 m. A blockage and wall collapse at 14.5 m and 20 m, respectively, meant that the monitoring well install could not be completed. The borehole was therefore backfilled with arisings and sealed off at surface with bentonite.

7.247 In summary:

- at SP1 and SP2 no discrete groundwater inflows were noted within the bedrock proposed for excavation to the proposed floor elevation of -35 mOD, within the proposed lateral extension area;
- clay infill was noted in SP3 but at elevations above the dipped groundwater elevation (-3.05 mOD); the clay infill was therefore dry and not considered to be a groundwater pathway.
- Unstable conditions were noted in SP4 but at elevations above the dipped groundwater elevation (-0.7 mOD); this weathered zone was therefore dry and not considered to be a groundwater pathway.
- Water-bearing clay-filled cavities were logged in SP5 from 49 m (-28 mOD). Due to unstable conditions it was decided to install a production well specification

RECEIVED: 27/12/2025

borehole at this location to further investigation sub-surface conditions and aquifer properties. This follow-on well is labelled BBH2 and described in the '2024 Briody Well Drilling' sub-section below.

2024 Briody Well Drilling

7.248 For the specific purpose of this hydrogeological assessment, Hydro-G engaged Briody Well Drilling Ltd. in 2024 to drill three boreholes across the application area. This was to facilitate response testing, by pumping, and groundwater sampling for laboratory analysis and thereby obtain a better understanding of aquifer properties.

7.249 A well diameter of 200 mm was selected to facilitate casings to protect pumps. Results of pumping response were employed to calculate likely future volumes of groundwater that might be encountered during the lifetime of the application's excavations. Furthermore, the pumping test data and response data were employed in the determinations of potential for impact on local groundwater sources of supply and the groundwater resource in general.

7.250 In general, construction involved opening with a 225 mm diameter drill bit and inserting 200 mm diameter OD steel casing to seal off the subsoil – bedrock interface. Drilling progressed below the steel casing using a 200 mm hammer to create an open hole in the bedrock. Each well was developed by airlifting for 3-4 hours at the end of the drilling so as to enable rough estimations of well yields. The open rock portions of the boreholes were left unlined. Raised lockable steel headworks completed the installation.

7.251 BBH1 was drilled adjacent to the western boundary in the northern portion of the proposed extraction area. At borehole BBH1 (referenced TW1 in the field notes) the driller developed a clay cavity containing some calcite at 53 m bgl (-32 mOD); the borehole was subsequently terminated at 75 m bgl (-54 mOD). The total estimated airlift yield from BBH1 was 55 m^3/d.

7.252 BBH2 was drilled close to the southern boundary. Its location was selected to follow up on SP5 which had previously collapsed. Borehole BBH2 (referenced TW2 in the

RECEIVED: 17/11/2025

field notes) developed cavities at 52 m bgl (-31 mOD; c. 270 m^3/d) and 71 m bgl (-50 mOD; c. 270 m^3/d), and was subsequently terminated at 75 m bgl (-59 mOD). The total estimated airlift yield from BBH2 was 540 m^3/d but could be up to 1,000 m^3/d.

7.253 Borehole BBH3 was drilled in the centre of the site. It's location was to validate the geophysics results for this part of the site. Rock was encountered at 12 m below surface. BBH3 logged clay infill from 25 m bgl (1.4 mOD) to 45 m bgl (-19 mOD). The borehole was terminated at 45 m bgl because air rotary compression drilling cannot progress in 20m depth of CLAY infill. No rock chippings and no resistance to the hammer precludes progression with this type of drill rig. The CLAY was moist only. There was no groundwater. Given that the objective of the drilling was to evaluate groundwater response, this clay infill area was abandoned. It was decided that SP1 and SP3 and the SLR / Irish Drilling BHs provided enough information in this region of the site.

7.254 With respect to groundwater potential only a single, relatively minor water strike of 2.5 m^3/hr was encountered at BBH1. The highest yielding well was drilled at the southern end of the site (BBH2) and confirmed a significant water-bearing cavity. This corresponded with the Petersen monitoring well drilling.

7.255 Given that at least one of the three Briody 2024 wells would be potentially capable of supporting continued abstraction pumping it was decided to proceed and perform pumping tests on BBH1 and BBH2.

2024 Irish Drilling (SLR)

7.256 As authors of the Land, Soils & Geology (LSG) Chapter of this EIAR, SLR engaged Irish Drilling to core drill five boreholes across the application site and retrieve cores from same. Trial Pitting was also completed under SLR supervision for the purposes of completing their EIA of the LSG environment.

7.257 With respect to the coring completed, five coreholes referenced 24-ROS-01 to 24-ROS-05 were drilled in 2024 to depths of 71 – 100 m below ground level (bgl). Logs

RECEIVED: 17/11/2025

are presented within the Geological Assessment which is appended to the LSG Chapter of this EIAR. More detail is presented in the LSG Chapter. Here only a summary is presented.

7.258 Due to the nature of core hole drilling, necessitating the use of added water to enable coring by cutting the bedrock, geologists do not record water strikes in cored holes. Neither are core holes completed with casing because they are generally such a small diameter hole, installations are not technically feasible.

7.259 Borehole 24-ROS-01 was cored in the southeastern portion of the application site. It returned strong massive to bedded limestone. Two weathered zones were reported at 28 and 60 m bgl.

7.260 Boreholes 24-ROS-02 and 24-ROS-03 were more centralised with respect to the application area. The 24-ROS-02 log notes a 3 m thick transition zone at bedrock head. The primary bedrock was again strong massive to bedded limestone in both cored holes. Weathered, brown limestone was recorded between 44 – 63 m bgl in 24-ROS-02. No weathering at all was observed in the cores recovered from 24-ROS-03.

7.261 Boreholes 24-ROS-04 and 24-ROS-05 were drilled in the northern portion of the application area. Both of these boreholes also returned strong, massive to bedded limestone belonging to the Little Island Formation. Borehole 24_ROS-04 encountered clay infill between 75 – 87 m bgl. Borehole 24-ROS-05 showed slightly more variability in lithology with clay infill observed at intervals 18 – 20 mbgl and 46 – 65 m bgl.

7.262 In summary, some weathered limestone was noted at intervals in 24-ROS-01 and 24-ROS-02, though none was observed in 24-ROS-03. No clay infill was recorded in any of these core logs.

7.263 Clay infill was noted in 24-ROS-04 but at a depth (-49 mOD), which is significantly below the proposed -35 mOD of the proposed extension's final floor.

Clay infill was noted in 24-ROS-05 at elevations of 5 – 7 mOD and -21 to -40 mOD. The former deposit is above groundwater level and therefore dry. The latter deposit

RECEIVED: 17/12/2025

is within the range of bedrock proposed for excavation. However, excavation through CLAY bands is also a feature of the adjacent operational quarry.

Aquifer Testing

2015 Existing Quarry

7.264 Pumping tests have been performed at Rossmore in the past to determine the hydraulic characteristics of the rock within the quarry and more accurately predict the expected groundwater inflows to the proposed quarry. Results of the 2012 – 2015 investigations and modelling were presented in detail in the Water Chapter of the 2015 EIS. The following key points are noted from the 2015 EIS's reporting of pumping tests in the southern portion of the existing quarry site:

- The effect of a recharge boundary (presumed to be the sea or the settlement lagoon) is evident early in the drawdown data where the rate of drawdown exactly halved after 9 minutes, approximately, of pumping. This happened consistently in several tests conducted at different tidal stages.
- The radius of drawdown at the time the boundary is encountered is approximately 80 m which is the distance to the settlement lagoon.
- In general, the drawdown is approximately symmetrical around the pumping well with no major deviations however some wells show more or less drawdown than would be expected for a homogeneous isotropic aquifer. The fact that the water table is also under the influence of pumping at the Kilsaran quarry would influence this analysis.
- The mean of all determinations of hydraulic conductivity were 2.4 m/d (2.8×10^{-5} m/s). This value is the most representative hydraulic conductivity for the quarry as a whole and was used in the calculations of maximum potential of groundwater inflows.
- The dewatering abstraction at the Kilsaran quarry was stated in the 2015 EIS as being 48 l/s. The Kilsaran quarry is located in the same limestone formation as the Lagan quarry and shows the same fracture pattern, therefore the hydraulic conductivity is likely to be similar to that estimated from the pumping tests.

RECEIVED: 17/11/2025

- The assessment of 'Worst Case' impacts considered the possibility that the adjacent Kilsaran quarry could at some point cease to operate. This could have significant implications for the ongoing operation of the Breedon site in terms of dewatering requirements and the discharge of water to the proposed treatment system.
- In the event that the adjacent Kilsaran quarry were to close and flood groundwater level in the Kilsaran quarry would be controlled by the dewatering activities in the Lagan (now Breedon) quarry. Under this conceptual model it could be necessary for Lagan (now Breedon) to dewater the Kilsaran quarry to a level of close to -20mOD in order to dewater the Lagan quarry to the proposed level. Any excavation below -20mOD in the Kilsaran quarry would not be affected and would remain a flooded sump. Under this worst case scenario the actual maximum discharge rate required to dewater the Lagan quarry to -20 mOD could be 95 l/s (c. 8,000 m^3/d), from a combination of the 48 l/s required to dewater the existing Kilsaran quarry to -20 mOD plus the estimated 47 l/s from the Lagan quarry.
- If conditions existed with 50% of the discharge water recycled into dewatering zone of influence, it could be required to treat and discharge up to 143 l/s (c. 12,000 m^3/d) following a closure of the Kilsaran quarry.
- A water management system was therefore specified and installed with the capacity to manage up to 12,000 m^3/d, if required, under the worst case scenario.

2024 Monitoring Well Hydraulic Response Testing

7.265 Response to pumping tests were performed on monitoring wells SP1 – SP4 by Envirologic in March 2024, these being within the greenfield extension application area to the east of the working quarry.

7.266 Response Test data analysis is presented in detail in **Appendix 7.11**. Summary results are presented in Table 7-5, below, and relate to all BHs and MWs tested.

RECEIVED: 17/12/2025

Table 7-5: Bedrock Permeability Summary Results

Test Well	K, m/s
SP1	2.5×10^{-8}
SP2	5.0×10^{-7}
SP3	4.8×10^{-6}
SP4	6.0×10^{-7}
BBH1	1.3×10^{-7}
BBH2	9.3×10^{-5}

7.267 The data show that there is variability in the permeability of strata targeted by the screens in each MW and the different types of lithology in the BBHs. In summary, the data suggests the following:

- Bedrock hydraulic permeabilities are very low at SP1 and SP4, both on the eastern boundary of the application site. These boreholes returned logs showing similarly competent limestone bedrock, with no clay infill recorded and little to no groundwater encountered during drilling.
- Bedrock hydraulic permeability at SP2 on the western boundary of the application boundary is low to moderate. The log of SP2 is similar to that of the nearby BBH1, with both of these wells showed largely competent limestone and only very small water-bearing clay filled cavities at 53 m bgl (-32 mOD) and 60 m bgl (-39 mOD) at BBH1 and SP2, respectively.
- In the south of the application site, SP3 returned relatively high bedrock permeability, similar to that calculated for BBH2. These values coincide with significant clay infill zones, which upon development were relatively high yielding in terms of groundwater. The average bedrock permeability applicable to limestone away from these clay infill areas is 3.1×10^{-7} m/s.

2024 Production Well Hydraulic Response Analysis

7.268 Hydro-G commissioned Hickey Pumps Ltd. to perform step tests and constant rate discharge pumping tests on wells BBH1 and BBH2 in October 2024 (noting that BBH3 was dry). Summary results were shown in Table 7-5, above.

RECEIVED: 17/11/2025

7.269 The data returned borehole permeability values of 1 x 10^{-7} m/s and 9 x 10^{-5} m/s for BBH1 and BBH2, respectively. In terms of practical operation, bedrock hydraulic conductivity values of the order of 10^{-8} m/s are equivalent to a heavy CLAY and represents impermeable bedrock. In contrast, hydraulic conductivity values of the order of 10^{-5} m/s are similar to those obtained when testing more permeable materials such as SAND/GRAVEL. The 10^{-5} m/s results for BBH2 are representative of the karst water bearing zone and not the bedrock at the site.

7.270 With respect to BBH2's permeability, it concurs with the average K values calculated in the 2015 for bedrock in the existing operational quarry. The drawdown data for BBH2 suggests that there is a hydraulic boundary preventing any drawdown impacts extending any further from the borehole as pumping progresses. However, given that the operational exiting quarry's 10^{-5} m/s results have not resulted in unmanageable water, it is reasonable to conclude the same for the proposed lateral extension to the east's application area. The 10^{-7} m/s low permeability at BBH1 is representative of competent limestone bedrock. The hydraulic conductivity value calculated at BBH1 corresponds with the low airlift yield during drilling (55 m^3/d) and confirms that the weathered zones encountered during drilling are not significant groundwater flow pathways.

7.271 As stated, the Petersen MWs were designed to enable testing of the bedrock and the results returned for that are 10^{-7} m/s, which is relatively low permeability.

Groundwater Regime

Groundwater Levels 9th September 2025

7.272 The data shows that groundwater levels across the majority of the application site are relatively consistent, with the majority being in the range -3.0 to -0.5 mOD.

7.273 However, on the western boundary of the application site at SP2 and BBH1, which is the eastern boundary of the operational quarry, groundwater elevations are -16.63 and -16.86 mOD, respectively. This suggests that wells SP2 and BBH1 are representative of the operational quarry (-29 mOD) and that the existing water

RECEIVED: 7/11/2025

management practices in place at the operational quarry already benefit the proposed lateral extension area. The 2015 EIAR predicted this radius of influence of 300 m from the existing quarry void. From a Conceptual Model Understanding perspective, site data confirms earlier assessments and aids rationalisation of the existing WMSs functionality for the proposed lateral extension.



Figure 7-10: Groundwater levels beneath the application site on 9th September 2025

Long Term Groundwater Levels

7.274 A brief comparison with groundwater levels on the application site relative to those in the existing quarry show that:

- 2015:
- Existing Breedon sump = -2.66 mOD. [note adj. Kilsaran sump = -20 mOD]
- BHA = 1.00 mOD & BHC = 3.49 mOD

RECEIVED: 17/12/2025

- 2025:
- Existing Breedon sump = -29.2 mOD.
- BHA = -2.65 mOD & BHC = -0.46 mOD

7.275 The above listed levels demonstrate that the 10 year drop in on-site long term monitoring BH water levels on the application site is 3.65 m (BHA) and 3.95 m (BHC). These are BHs that are on the farthest eastern boundary of the application area and farthest long term MWs relative to the operational quarry. Considering the sump level has dropped from 2.66 mOD to 29.2 mOD (26.5 m) over the same ten year period, this decline in site BHs is considered to be very low. It infers low bedrock permeability and little direct connectivity between groundwater levels in the existing quarry and the proposed extension.

7.276 Groundwater level dataloggers were installed in selected wells so as to continuously record water levels. This data is presented in The water elevation data returned from the dataloggers, as presented in presented in Graph 7-1. **Error**! Not a valid bookmark self-reference. overleaf, is used to evaluate groundwater flow directions, which is discussed after the graph.

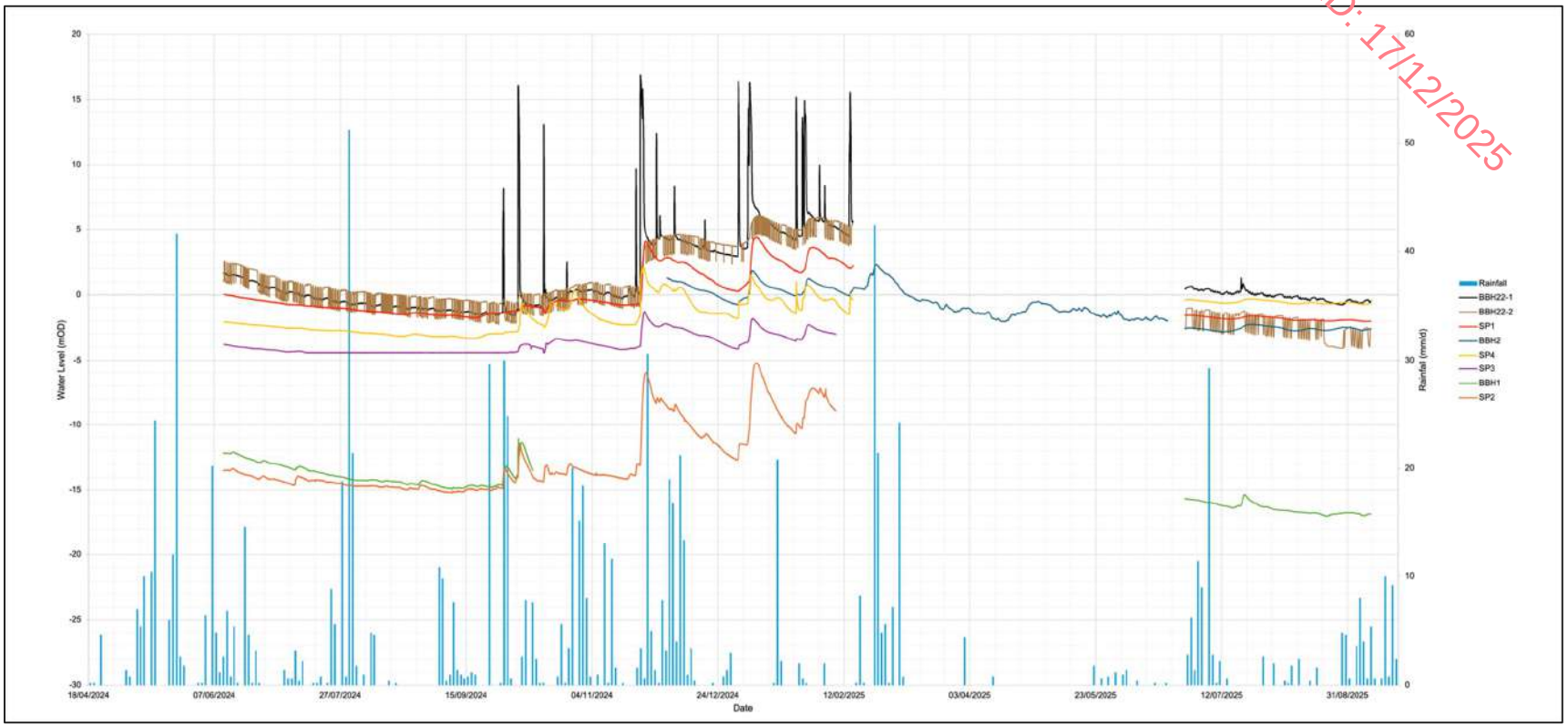
RECEIVED: 17/12/2025

7.277 Graph 7-1 [Note the gap in the record in the summer of 2025 was error in the programming of the dataloggers. However, the winter periods and response to winter recharge is the most significant data requirement for hydrogeologists.

7.278 In general, groundwater levels rise following rainfall events. Seasonality is clear with groundwater levels rising in all wells during November 2024 and gradually falling towards September 2025 following a spring and summer of relatively low rainfall.

7.279 The water elevation data returned from the dataloggers, as presented in presented in Graph 7-1. **Error! Not a valid bookmark self-reference.** overleaf, is used to evaluate groundwater flow directions, which is discussed after the graph.

RECEIVED: 17/12/2025



Graph 7-1: Groundwater levels across the application site 2024 – 2025

RECEIVED: 17/12/2025

7.280 With reference to **Graph 7-1**, above,

a) BBH22-2 is the pumping well serving processes in the operational quarry and is also north of the application site. This well has a much lower fluctuation in water level incurred by pumping. This well is completed to EPA Advice Note 14 and is therefore grouted. Hence the smaller response.

b) BBH1 and SP2, positioned along the western boundary of the proposed application area and they share equal groundwater levels, with a minimum elevation of -15 mOD that rises to -5 mOD following rainfall.

c) Groundwater level monitoring in the existing active quarry has revealed groundwater level fluctuations across various ranges. For example, the groundwater level range in BBH22-1, north of the application site, is up to 15 m and this is because it is in a different bedrock and different purpose BH (2022 Water Supply Investigation, 2022). This BH is not sealed by cement grouting and rainwater can ingress the annulus of the bored hole.

Groundwater Flow Direction

7.281 According to the OPW hydrometric gauge at Ringaskiddy the coastal water level south of the application site at midday on 9th September 2025 was 1.00 mOD relative to Malin Head datum. This is higher than groundwater levels within the application site. This infers that the existing quarry invokes drawdown across the application site – this is the safe operation of a quarry in line with the Construction regulations. This information and predictions accompanied previous applications for consent, which were granted and therefore approved.

7.282 Water levels in the infiltration pond (3.6 mOD) are also higher than groundwater levels within the application site. This suggests that water levels in the infiltration pond are perched relative to surrounding groundwater and tidal levels. The information also demonstrates that groundwater within the application area is separated from the coastal influence.

RECEIVED: 17/11/2025

7.283 Groundwater elevations across the application are in the range 0 and -3 mOD. The lower elevations tend to be those close to the existing quarry though this pattern is not entirely consistent.

7.284 The groundwater gradient steepens sharply on the western side of the application site where groundwater levels fall to -16 mOD. As previously stated, this information demonstrates the connectivity of the overall site and the functionality of the operational quarry to benefit the application area.

7.285 The information confirms groundwater flowing through the application site for natural discharge south/southwest towards Rossmore Bay, towards the existing quarry sump, after which is pumped to Rossmore Bay following settlement in the site's permitted settlement lagoons. The natural order is retained.

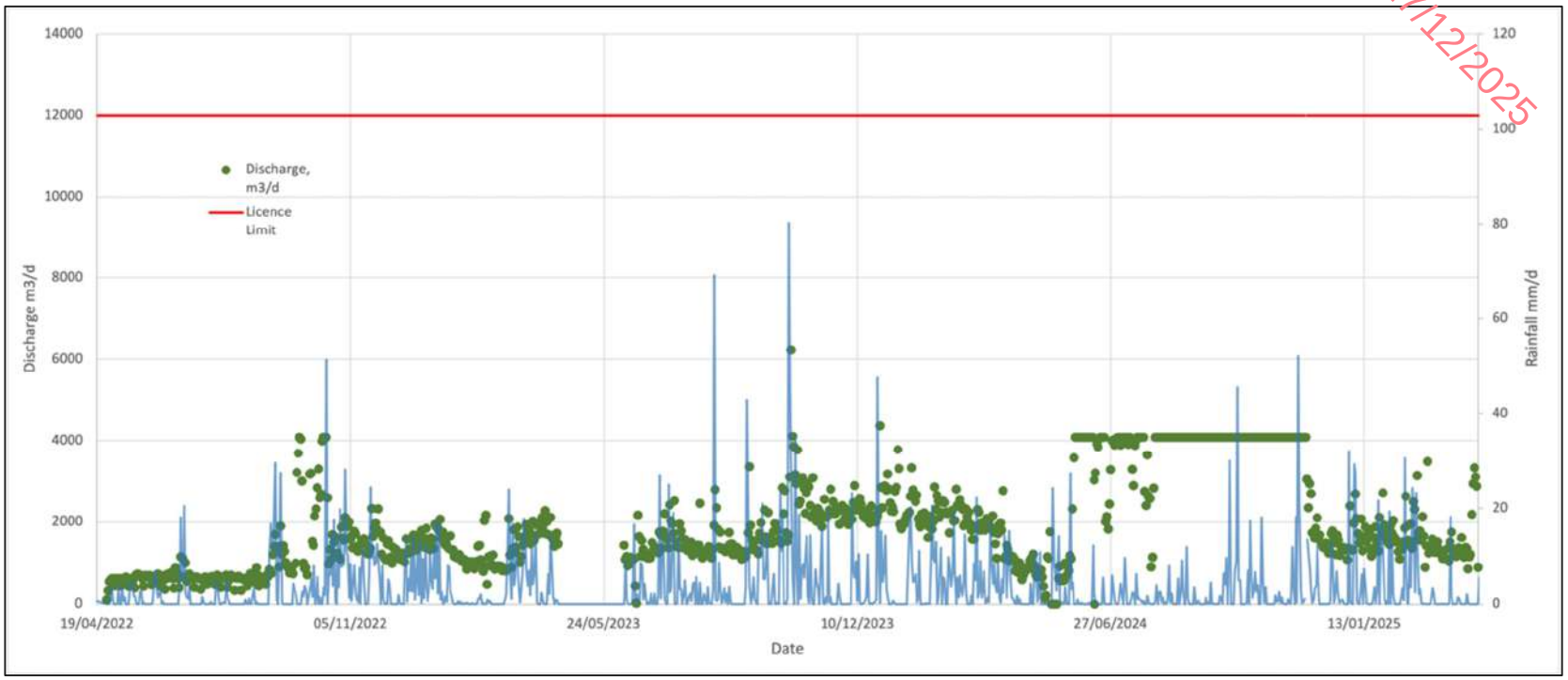
7.286 There are some minor deflections to the natural order but these do not have negative consequences. In the central and northern parts of the proposed extension groundwater flow direction is from east to west towards the current quarry excavation. In the southern part of the proposed extension groundwater flow direction is more southwards towards the coast.

Discharge Flow Rates

7.287 There is a flowmeter on the discharge pipe conveying waters from the floor sump to the settlement lagoon and infiltration system to the south of the application. Therefore, the record of waters arising in the existing quarry is available. This information was used to assess water balance in the context of regional groundwater flow and the quarry's interception component.

RECEIVED: 17/12/2025

Graph 7-2: Daily Discharge Flow Rates



RECEIVED: 17/11/2025

7.288 Daily discharges for the preceding 3 years have been plotted against the discharge license flow ELV in Graph 7-2. The flow data between May and November 2024 is a flat line value and this is interpreted as erroneous data and is disregarded because of a malfunction in the functioning of the Flow Meter, as confirmed by the operator.

7.289 The data shows that the license ELV is always complied with and a large headroom capacity is available. **The daily average calculated from the full dataset is of the order of 1,300 m^3/d.**

7.290 The maximum discharge to date is **6,000 m^3/d** but this is associated with a temporary cessation of pumping, while moving water management infrastructure to a lower permitted bench to facilitate progression to permitted depth. After cessation of pumping to facilitate moving the sump, there is a higher pumping rate immediately afterwards. However, the rate is well within the licence ELV for volume. That work also corresponded with the highest daily rainfall intensity across the monitoring period. With the exception of that event, the maximum daily discharge is c. 4,000 m^3/d, which correlates with the maximum capacity of the sump pump currently in place.

7.291 The data in Graph 7-2 appears to show that the minimum daily discharge is in the range 800 – 1,100 m^3/d. This likely represents a baseflow during periods of low or no rainfall and represents the input from groundwater and saline ingress, in addition to excess process waters which drain to the sump. Considering the coastal setting, these baseflow values are very low. For example, baseflow springs in drought at other Hydro-G quarries are in the order of 2,500 m^3/d. The geological setting is therefore considered to be competent at the Breedon Rossmore site.

7.292 It can be safely assumed with a high level of confidence that there is currently a hydraulic headroom of 8,000 m^3/d available to accommodate all waters that could arise from the proposed quarry extension to the east: the headroom has been calculated using the actual maximum flows observed and the permitted Section 4 license's ELV for volume (12,000 m^3/d).

RECEIVED: 17/11/2025

7.293 The large Factors of Safety (FOS) built into historical designs and assessments at the site now provide available headroom as built infrastructure, and accompanying permits, which means that there is a licensed water management system in place that is appropriate for managing any waters generated in the proposed extension area in combination with the existing quarry.

Water Quality

7.294 Envirologic and Hydro-G collected groundwater samples and discharge samples on three occasions, in Spring 2024, Autumn 2024 and Spring 2025.

7.295 Data are also available from TMS Environment Ltd., who sample for the site as per Condition 2.6 of the 2019 issued Cork County Council Discharge Licence WP(W) 08/18(R) in which some parameters are specified for quarterly analysis and some are specified for annual analysis.

7.296 Laboratory Certificates of Analysis for all Envirologic/Hydro-G water sampling are included as **Appendix 7.13**.

Groundwater Quality

7.297 Groundwater sampling was carried out to quantify baseline groundwater quality at the application site. The results for groundwater reported in the laboratory Certificates of Analysis of **Appendix 7.13** are Tabulated for ease of reference in Table 7.6.

7.298 The first round of groundwater sampling was conducted by Envirologic in March 2024; samples were delivered to Eurofins, Cork for analysis. A second round of groundwater sampling was conducted by Hydro-G in October 2024 and again in April 2025. Samples were delivered to Fitz Scientific and BHP, Limerick for analysis. Samples were filled into the appropriate sample containers that contained the appropriate fixation substance per parameter, stored in cooler boxes and delivered on the sampling day to the stated laboratories.

RECEIVED: 27/11/2025

7.299 Groundwater samples were retrieved from wells using a Grundfos MP1 pump following stabilisation of field physiochemical parameters: temperature, dissolved oxygen, pH, conductivity and oxidation-reduction potential (ORP), which were measured using a calibrated InSitu multiparameter sonde.

7.300 The following locations were selected for baseline monitoring in March 2024:

- BBH22-2 (Container Well) = baseline of upgradient groundwater;
- SP3 = baseline of downgradient groundwater (SW of proposed extraction area);
- SP4 = baseline of downgradient groundwater (SEof proposed extraction area).

7.301 The following locations were selected for baseline monitoring in October 2024:

- BBH22-2 (Container Well) = baseline of upgradient groundwater;
- BBH1 = western boundary of application area;
- BBH2 = close to southern boundary of application area.

7.302 The following locations were selected for baseline monitoring in March 2025:

- BBH22-2 (Container Well) = baseline of upgradient groundwater;
- Note: BBH1 would not yield a sample.
- DISCHARGE = representing downgradient groundwater and rainfall

7.303 With reference to the Summary results for groundwater quality presented as Table 7.6, over, key findings with respect to baseline groundwater quality results are as follows:

- pH is within the 6.5 to 9 pH range specified by both the Groundwater Regulations and the Drinking Water Regulations.
- To the immediate north of and within the northern part of the application area, Electrical Conductivity (EC) and Chloride (Cl) are at usual inland values for groundwater. However, in the immediate south of the application area, EC and Cl values reflect proximity to the coast. This is the same pattern as at the operational adjacent quarry: EC measured in 2021 BHs at the operational quarry were elevated in the south of the area but remained at least an order of magnitude lower than the EC signal of the coastal waters, which were >40,000 uS/cm EC.

RECEIVED: 27/12/2025

Therefore, the elevated values in the south are the natural environmental signal and are not unexpected.

- Ammonia N Concentrations are always compliant with the Groundwater Regulations and they are significantly lower than specified in the Drinking Water Regulations. This ammonia signal is most likely because of the land use for tillage and not animal grazing.
- Nitrate concentrations are high and exceed drinking water standards more often than not. This could be linked to the continuous ploughing of tillage land which is known to turnover to deeper depths, and redistribute, surface applied nitrate fertiliser to subsoils where leaching to groundwater occurs. However, the coastal setting and the influence of Chloride is also bound to play a part in the chemical transformations in these soils.
- Nitrite concentrations are always low and conform with all standards.
- Orthophosphate concentration was elevated on one sampling event at SP3. This was possibly sediment bound because there are other markers in the Certificates of Analysis, such as turbidity, which was elevated on this occasion.
- Aluminium concentration was elevated on one sampling event at BBH1. This is a common phenomenon in recently drilled bedrock BHs are with continued development it can clear. It can be associated with the rock as a naturally occurring element. There are no other exceedences and therefore this is not regarded as an environmental factor.
- Iron and manganese concentrations were relatively low which is indicative of unconfined groundwater. All metal concentrations are low and within Statutory requirements.
- BOD concentrations were low in all samples, which suggests no contaminant load in the water.
- Within the application area, all chemical parameters relating to hydrocarbons, Xylenes, Benzenes, PAHs, BTEX compounds and Benzo(a)pyrene, *etc.,* are reported by the laboratories to be less than the low limits of detection (<LOD).

RECEIVED: 17/12/2025

Table 7-6: Summary Groundwater Results

Parameter	Units	BBH22-2			SP3	SP4	BBH1	BBH2	Groundwater Regulation Threshold Values (2010, as amended 2016)	Surface Water Regulation Threshold Values (2009, as amended 2019)	*European Union Drinking Water Regulations (2023)
		14/03/24	18/10/24	01/04/25	14/03/24	14/03/24	18/10/24	17/10/24			
Field Temperature	°C	11.6			12.3	13.1					
Lab pH	pH Units	6.6	7.2	7.1	7.0	6.8	7.5	7.3		≥6.0 - ≤9.0	≥6.5 - ≤9.5
Lab Electrical Conductivity	uS/cm	773	660	750	1,930	704	555	1,772			2,500
Dissolved Oxygen (Field)	mg/l	7.04			8.36	8.86					
Ammonia (as N)	mg/l	<0.05	0.05	<0.05	<0.01	<0.05	0.03	0.03		0.065 - 0.140	0.5
Chloride (as Cl^-)	mg/l	56.2	40	35	466	53.4	37	405	24 - 187.5		250
Laboratory Nitrate (as NO_3N)	mg/l	5.52	12	11.3	11.16	20.68	7	15			
Calculated Nitrate as NO_3	mg/l	24.4	53.1	50	49.4	91.5	31	66.4	37.5		50
Nitrite (as N)	mg/l	<0.01	<0.01	0.03		0.014	<0.01		0.11		0.152
Total Nitrogen	mg/l	5.0			16.1	26.3					
Orthophosphate (as P)	mg/l	<0.05	<0.01	<0.01	0.445	<0.05	<0.01	<0.01		0.035 - 0.075	
Total P	mg/l	<0.02			0.83	0.16					
Sulphate (as SO_4^{2-})	mg/l	32.2		17	82.5	31.8			187.5		250
Total Suspended Solids	mg/l		<5	<25			<5	<5			
Alkalinity (as $CaCO_3$)	mg/l	320			337	214					
Aluminium (Total as Al)	µg/l		<8	<0.05			182	21	150		200
Arsenic (dissolved)	µg/l	0.217	<1	<0.1	<0.2	<0.2	<1	<1	7.5		0.01
Barium	µg/l		7	<10			4	14			
Cadmium (dissolved)	µg/l	0.120	<1	<5	<0.1	<0.1	<1	<1			
Calcium (dissolved)	mg/l	188		139	217	143					
Chromium (dissolved)	µg/l	<1	<2	<5	<1	<1	<2	<2	37.5		0.025
Copper (dissolved)	mg/l	<0.003	1	<0.025	<0.003	<0.003	<0.001	2			2
Iron (dissolved)	µg/l	60.9	<8	<50	10.3	14.9	74	15			200

RECEIVED: 17/12/2025

Lead (dissolved)	µg/l	<0.51	<1	<25	<0.51	<0.51	<1	<1	75		5
Magnesium (dissolved)	mg/l	7			23.9	9.51					
Manganese (dissolved)	µg/l	4	<1		3.05	4.94	4	1			50
Mercury (dissolved)	µg/l	<0.03	<0.28	<0.25	<0.03	<0.03	<0.28	<0.28			
Nickel (dissolved)	µg/l	<0.5	<1	<10	2.42	1.26	2	2			20
Potassium (dissolved)	mg/l	10.5	1.8	<5	6.14	13.7	0.7	5.7			
Sodium (dissolved)	mg/l	31.4	17.6	14	296	37.4	16.5	20.1			200
Zinc (dissolved)	µg/l	3.12	10	48	<1	<1	2	27	75		
Total Organic Carbon	mg/l	<1	0.4	<2	<1	<1	0.3	0.4			
Dissolved Organic Carbon	mg/l		<1				<1	<1			
Benzene	µg/l		<1	<2			<1	<1			10
Benzo(a)pyrene	µg/l		<0.0025				<0.0025	<0.0025			
BTEX	µg/l		<1				<1	<1			
Toluene	µg/l		<1	<1			<1	<1			
Ethyl Benzene	µg/l		<1	<1			<1	<1			
m & p-Xylene	µg/l		<1	<1			<1	<1			
o-Xylene	µg/l		<1	<1			<1	<1			
Napthalene	µg/l		<1	<0.1			<1	<1			
Phenols	µg/l		<0.1				<0.1	<0.1			
Xylene Total	µg/l		<1				<1				
COD	mg/l	<8		<15	64	8					
BOD	mg/l	<1		0.4	<1	<1					
Hardness	mg/l						286	416			
TPH Band	mg/l										
($>C_{10}$-C_{21})	µg/l	<0.1			<0.1	<0.1					
($>C_{21}$-C_{40})	µg/l	<0.1			<0.1	<0.1					
($>C_{6}$-C_{10})	µg/l	<0.1		<10	<0.1	<0.1					
Total ($>C_{6}$-C_{40})	µg/l	<10	<1	<0.01	<10	<10	<1	<1	7.5		

RECEIVED: 17/12/2025

Discharge Quality

7.304 Sampled discharge is reflective of waters collected in the sump of the active quarry.

7.305 Hydro-G sampled discharge waters on two occasions, in October 2024 and April 2025 (see results in Table 7-8.) . Discharge waters were retrieved as a grab sample at the point of entry into the infiltration pond. Laboratory Certificates of Analysis discharge quality are also included in **Appendix 7.13**.

7.306 For the purposes of Discharge licence Compliance, TMS sample discharge waters on a quarterly basis. Results of this sampling regime for the last 2 years are presented in Table 7-8 (Q1 2023 – present). The long term record for Discharge Quality, as reported by TMS, is that the discharge is compliant with the Licence ELVs on all occasions.

7.307 Key findings with respect to results from Hydro-G discharge sampling are as follows:

- All parameters are compliant with the ELVs of the discharge licence;
- pH was recorded as 8.1 – 8.2 *(alkaline) which is reflective of limestone bedrock);
- Conductivity is high, which is expected in this coastal setting.
- Laboratory results for Suspended solids values are 10mg/l SS, which is significantly lower than the 35mg/l SS ELV of the Licence. This demonstrates two things: a very effective settlement lagoon system and capacity to treat more water arising from the proposed extension;
- Concentrations of all heavy metals are low.
- Most parameters record <LOD of the Laboratory. This is true for Phenols, Heavy Metals, Napthalene and Benzopyrene.

Table 7-7: Summary Discharge Results (Hydro-G sampling)

Parameter	Units	18/10/24	01/04/25	Cork Co. Co. ELVs
Lab pH	pH Units	8.1	8.2	6 – 9
Lab Electrical Conductivity	uS/cm	8980	7760	

RECEIVED: 17/12/2025

Total Ammonia (as N)	mg/L	<0.05	0.30	
Ionised Ammonium (as NH_4)	mg/L	<0.064	0.36	
Chloride (as Cl^-)	mg/L	2576	18	
Total Hardness (as $CaCO_3$)	mg/L	1102	112	
Nitrate (as NO_3)	mg/L	22	32	
Nitrite (as NO_2)	mg/L	0.065	0.32	
Orthophosphate (as P)	mg/L	<0.01	<0.01	
Total Suspended Solids	mg/L	10	<10	35
TPH (>C_6-C_{40})	mg/L		<0.01	
Mineral Oils (>C_{10}-C_{40})	mg/L		<0.01	
Heavy Metals	mg/L			1
Aluminium (Total as Al)	mg/L	0.057	<0.05	
Barium (Total as Ba)	mg/L	0.040	0.022	1
Cadmium (Total as Ca)	mg/L	<0.005	<0.005	1
Chromium (Total as Cr)	mg/L	<0.005	<0.005	1
Copper (Total as Cu)	mg/L	<0.025	<0.025	1
Iron (Total as Fe)	mg/L	<0.05	<0.05	
Manganese (Total as Mn)	mg/L	<0.01	<0.01	
Lead (Total as Pb)	mg/L	<0.025	<0.025	1
Nickel (Total as Ni)	mg/L	<0.01	<0.01	1
Potassium (Total as K)	mg/L	54	44	
Sodium (Total as Na)	mg/L	1286	1015	
Zinc (Total as Zn)	mg/L	<0.025	<0.025	1
Total of 17 PAHs	mg/L	<0.002	<0.002	
TPH	mg/L	<0.01		
Total Phenols	mg/L	<0.001		1
Benzene	mg/L	<0.001	<0.001	
Toluene	mg/L	<0.001	<0.001	
Ethyl Benzene	mg/L	<0.001	<0.001	
m & p-Xylene	mg/L	<0.001	<0.001	
o-Xylene	mg/L	<0.001	<0.001	
Napthalene	mg/L		<0.0001	0.05
Benzopyrene	mg/L		<0.0001	0.05
COD	mg/L		<15	
BOD	mg/L		1.4	

RECEIVED: 17/12/2025

Table 7-8: Quarterly Discharge Results (TMS sampling)

Parameter	Units	Discharge										Cork Co. Co. ELVs
		10/01/23	11/04/23	12/07/23	09/01/24	04/04/24	09/07/24	03/10/24	08/01/25	07/04/25	03/07/25	
Temperature	°C	10.2	11.5	19.4	3.7	7.8	9.7	8.4	3.6	14.2	13.2	25
Field pH	pH Units	6.3	7.71	7.6	8.2	8.1	8.1	8.2	8.2	8.3	8.0	6 – 9
Conductivity		4000		7237								
Total Suspended Solids	mg/L	8.9	<3	31	21.2	24.9	17	<3	24	13	13	35
Total Heavy Metals	µg/L											1,000
Barium (Total as Ba)	µg/L	25	26.1	43	31	25	52	52	29	22	50	
Cadmium (Total as Ca)	µg/L	<0.6	<0.6	<0.03	0.11	0.04	0.15	<0.03	<0.03	<0.03	<0.03	
Chromium (Total as Cr)	µg/L	<2	<2	11	10	9.0	13	2.3	11	8.3	2.7	
Copper (Total as Cu)	µg/L	<9	<9	1.9	2.6	1.2	4.3	1.2	14	2.8	1.0	
Mercury	µg/L	0.02	<10	<0.01	0.02	0.03	0.03	<0.01	<0.01	<0.01	<0.01	
Nickel (Total as Ni)	µg/L	4	4	1..2	1.9	1.0	3.9	4.9	1.8	1.8	2.1	
Lead (Total as Pb)	µg/L	<6	<6	0.11	1.1	0.48	1.8	0.18	0.23	<0.09	<0.09	
Zinc (Total as Zn)	µg/L	<18	<18	<1.3	2.6	<1.3	9.7	5.2	4.0	<1.3	<1.3	
Other												
Total Phenols	µg/L	<10	0.73	<100	<100	<100	<100	<100	310	410	<100	1000
Chromium VI	µg/L				<7.0				21			150
Benzopyrene	µg/L				<0.01				<0.05			50
Napthalene	µg/L				<0.05				<0.01			50

RECEIVED: 17/12/2025

Site Metrics

Rainfall-Runoff Water Balance

7.308 Upon commencement of extraction in the application area, a topographically enclosed void shall be created. Once bedrock has been exposed, rainfall landing within this void will generate runoff.

7.309 Resultant rainfall-runoff shall be diverted towards the lowest part of the excavation, to be referred to as the 'extension's sump' (so as to avoid confusion with the active sump in the existing quarry). This will continue as quarry development progresses.

7.310 Some local groundwater intercepted by exposed bedrock faces will also be collected in the extension's sump though permeability values suggest that groundwater inflows to the void from the wider surrounding area will be relatively low.

7.311 In general, whilst some excess rainwater can be accommodated on the floors of quarries following periods of particularly intense, or prolonged heavy, rainfall the majority of rainfall-runoff is removed from the quarry floor in order to maintain a safe and dry working environment.

7.312 The primary water management measure in the extension area will be pumping of sump waters arising at the extension area, to the existing, as built, settlement lagoon. Extension's sump waters will also be used for dust suppression, with water recycling back to the sump naturally by gravity flow over the quarry floor.

7.313 The sump will provide attenuation storage and will store water before sending it to the existing settlement lagoon for treatment. The attenuation storage area on the extension quarry floor has been designed to accommodate the volume of water associated with a 1 in 100-year storm event.

7.314 Development works shall alter the recharge pattern somewhat on the application site. The recharge coefficient shall be reduced from the current 60%, applicable to moderate permeability subsoil overlain by well-drained soil, to 85%, which is applicable to exposed bedrock. However, the settlement lagoons and infiltration area will retain the ultimate recharge pattern for delivery of the rainfall recharge to the same

RECEIVED: 17/12/2025

ultimate receptor as pre-development, which is the coast to the south of the application area.

7.315 In terms of rainfall-recharge patterns all other areas outside the proposed extraction area will be in line with current greenfield runoff rates.

7.316 The water balance derived from rainfall landing on the permitted operational extraction area (c.12.6 ha) and proposed extension areas (c.12.5 ha) of the site are presented as Table 7-9.

Table 7-9: Bedrock Rainfall derived water balance for extraction areas

Parameter	Unit	Permitted Active Quarry Area	Proposed Extension	Combined Quarry Areas	Upgradient Catchment
Extraction Area	ha	12.6	12.5	25.1	2.84
Area	m^2	126,000	125,000	251,000	28,372
Effective rainfall	m/yr	0.626	0.626	0.626	0.626
Rainfall volume	m^3/yr	78,876	78,250	157,126	17,761
Rainfall volume	m^3/d	216	214	430	49
Recharge coefficient	%	0.85	0.85	0.85	0.6
Recharge reaching bedrock head	m^3/yr	67,045	66,513	133,557	10,657
Surface runoff (rainfall rejected at surface)	m^3/yr	11,831	11,738	23,569	7,104
Surface runoff (rainfall rejected at surface)	m^3/d	32	32	65	19
Recharge cap	m/yr	No cap			
Recharge to bedrock aquifer	m^3/yr	67,045	66,513	133,557	10,657
Recharge to bedrock aquifer	m^3/d	184	182	366	29
Shallow subsurface flow (recharge rejected at bedrock head)	m^3/yr	0	0	0	0
Shallow subsurface flow (recharge rejected at bedrock head)	m^3/d	0	0	0	0
Surface runoff plus shallow subsurface flow	m^3/yr	11,831	11,738	23,569	7,104
	m^3/d	32	32	65	19
	l/s	0.375	0.372	0.747	0.225
Destination		Infiltration Pond > Coastal Waters		Total = 65 + 19 = 84 m3/d or 0.97 l/s	

7.317 Based on the final determinations of information presented in Table 7-9, the combined total of runoff and shallow subsurface flow from the existing quarry and proposed

RECEIVED: 17/11/2025

extension that needs to be managed is 23,569 m^3/yr from the combined total quarried area plus 7,104 m^3/yr from the upgradient catchment, equivalent to 84 m^3/d (0.97 l/s). The value of 84 m^3/d will be added to calculated groundwater that might be encountered.

7.318 Any groundwater encountered in the extension area will be also flow by gravity to the proposed extension's sump. The purpose is to maintain a safe and dry working environment. The potential volume of groundwater encountered is determined using site-specific data describing hydraulic properties of the bedrock, which is analysed and discussed later in this chapter.

7.319 This preliminary water balance, presented above is a 'first run' exercise to provide an initial estimation of scale of water to be managed in the future.

7.320 Acknowledgement of calculation limitations facilitates the development of robust conceptual models and water management plans.

Extreme Rainfall Events

7.321 An assessment is required to ensure the lowest part of the extension void will be capable of temporarily storing stormwater that drains to it during intense rainfall events. Stormwater volumes draining to the extension's sump are based on the contributing area of the proposed extension which will have a maximum bare rock area of 125,000 m^2. This is a valid design parameter because the quarried area of the proposed extension area is a self contained rainfall runoff unit.

7.322 From mapping and site walkover, the upgradient surface water catchment to the proposed quarry extension is 28,372 m^2. Using the Met Éireann Depth Duration Return Period data table for extreme rainfall at the site, calculations presented in Table 7-10 show that the 1 in 100-year rainfall contribution to the sump over a 24-hour period is 20,227 m^3. This includes a climate change growth factor of 20%.

RECEIVED: 17/12/2025

Table 7-10: Potential Rainfall-Runoff Inflows to the Quarry Sump: Extreme Rainfall Events

Considered Catchment m^2	Rate	1 in 1 year	1 in 10 year	1 in 50 year	1 in 100 year
125,000 m^2 + 28,372 m^2 = 153,372 m^2	24-hour event				
	mm	42.9	70.8	96.6	109.9
	m	0.043	0.071	0.097	0.11
	Rainfall-runoff to extension's sump, m^3/d	6,580	10,859	14,816	16,856
	(m^3) Required with +20% Climate Change	7,896	13,030	17,779	20,227
	6-hour event				
	mm	23.9	39.9	54.7	62.4
	m	0.024	0.040	0.055	0.062
	Rainfall-runoff to extension's sump, m^3/d	3,666	6,119	8,389	9,570
	(m3) Required with +20% Climate Change	4,399	7,343	10,067	11,484

7.323 Therefore, in order to store the Q_{100} rainfall event of 20,227 m^3, a value which has a climate change factor incorporated, the following minimum void dimensions are required:

- Radius = 60 m, for a depth = 2 m (22,619 m^3)

7.324 There will be adequate area available on the working floor of the proposed quarry extension area for the attenuation of stormwaters. The required calculated area can be provided in any variation in dimensions and configuration as working of bedrock progresses.

Greenfield Runoff Rate

7.325 It has been shown that the majority of the bedrock to be quarried has a low permeability, so it can be reasonably concluded that during extreme storm events the contribution from groundwater seepages will be low relative to the overall contribution from precipitation as runoff. It is therefore necessary to attenuate stormwater generated on site, such that it leaves the site at a rate less than or equal to greenfield

RECEIVED: 4/11/2025

runoff rates. This is an important feature of the quarry in that it provides large attenuation capacity storage, which will provide significant protection from flooding to downgradient receptors. An allowance needs to be made to allow a certain amount of precipitation to leave the site at a controlled rate.

7.326 Pre-development greenfield runoff rate is given by:

$$QBAR_{rural} = 0.00108\ (AREA)^{0.89} \times (SAAR)^{1.17} \times (SOIL)^{2.17}$$

Where:

$QBAR_{rural}$ = mean annual flood flow from a rural catchment (m^3/s)

AREA = exposed quarry floor upon completion (km^2) = 125,000 m^2, 0.125 km^2

SAAR = standard annual average rainfall depth (mm) = 1,074 mm

SOIL = soil index, a composite index determined from soil survey maps that accompany the Flood Studies Update

= 0.4, representing SOIL 3, applicable to moderately permeable subsoil

7.327 It is recommended that flood risk assessment based on the methodology in Volume 2 of the Greater Dublin Strategic Drainage Strategy (2005) is not applied to an area of less than 50 hectares. It suggests that the runoff from smaller areas is then linearly interpreted. A theoretical catchment area of 0.5 km^2 (50 ha) was used for initial calculations. The Q_{BAR} rate applicable to the theoretical catchment area of 0.5 km^2 is:

$$QBAR_{rural} = 0.00108\ (0.5)^{0.89} \times (1{,}074)^{1.17} \times (0.4)^{2.17}$$

$QBAR_{rural}$ = 0.281 m^3/s (281 l/s) for the 50 ha catchment

7.328 The linear interpolation of Q_{BAR} from a catchment of size 50 ha down to extension site area (12.5 ha) is shown in Table 7-11. The limiting discharge rates for the 75- and 100-year return period storm events are presented in Table 7-11 using growth factors of 1.87 and 1.96, respectively, in accordance with relevant TII guidance (TII, 2015). The climate change growth factor is accounted for in the sump attenuation calculations

RECEIVED: 17/12/2025

and not the allowable Greenfield Runoff Rate. It would be counterproductive to allow a growth factor to the allowable runoff rate.

Table 7-11: Linear Interpolation of QBAR for On-Site Hardstanding

Item	Area, ha	Q_{BAR} (m^3/s)	Q_{75} (m^3/s)	Q_{100} (m^3/s)
Unit	1	0.0056	0.0105	0.0110
50 ha as calculated	50	0.281	0.525	0.550
Final quarry extension area	12.5	0.070	0.131	0.138

7.329 The applicant does not intend to vary the discharge rate in response to the return period greenfield runoff rate. The discharge rate will instead be fixed. The maximum potential pumping rate from the sump to the settlement lagoon can be limited to a rate less than the pre-development greenfield runoff rates during extreme rainfall events for the excavation area (0.070 m^3/s = 6,048 m^3/d = 70 l/s).

Attenuation

7.330 In its most restrictive approach, attenuation storage is calculated when outflow is limited to Q_{BAR}. The quarry floor will be capable of storing the balance of the stormwater during intense rainfall events.

7.331 Table 7-12 presents the return period rainfall depths for a range of durations, as provided by Met Éireann. A 20% increase in design rainfall depths was adopted to account for climate change.

7.332 The attenuation storage requirements, for storms when the outflow is restricted to Q_{BAR}, *i.e.,* 70 l/s, are shown in Table 7-12.

Table 7-12: Design Rainfall Rates and Attenuation Storage using Outflow of 70 l/s

Duration, D, hrs	R, mm	R x 1.2, mm	I, m^3	O, m^3	I – O, m^3

RECEIVED: 17/12/2025

0.25	17.1	20.52	2,565	63	2,502
0.5	22.7	27.24	3,405	126	3,279
1	30.1	36.12	4,515	252	4,263
2	39.9	47.88	5,985	504	5,481
4	52.9	63.48	7,935	1,008	6,927
6	62.4	74.88	9,360	1,512	7,848
12	82.8	99.36	12,420	3,024	9,396
18	97.7	117.24	14,655	4,536	10,119
24	109.9	131.88	16,485	6,048	10,437
48	125.2	150.24	18,780	12,096	6,684
72	138	165.6	20,700	18,144	2,556
96	149.4	179.28	22,410	24,192	-1,782

7.333 Information presented in Table 7-12 shows that the stormwater generated during a 1 in 100-year event of 24 hours duration is I = 16,485 m^3. Restricting the outflow to greenfield runoff rate, Q_{BAR}, results in a permissible outflow of O = 6,048 m^3. The balance, i.e., (I-O) = 10,437 m^3, is withheld *via* attenuation, and released at greenfield runoff rate or less. As quarrying progresses, an enclosed quarry void with a minimum available volume of 10,437 m^3 shall be maintained. A quarry floor volume in excess of that has already been specified in earlier calculations.

7.334 It is best practice to accommodate and attenuate the extreme storm event rainfall-runoff on the floor and treat in the final settlement lagoons at the overflow rate appropriate to the settlement of solids and the licenced discharge rate. This will be how storms will be managed across both the existing active quarry and the proposed extension area.

Envisaged Dewatering Volumes

7.335 In order to assess the feasibility of the proposed development works, in terms capacity within the existing Section 4 Discharge Licence and of availability of both assimilative capacity and hydraulic capacity of receiving waters, calculations are presented below to predict likely dewatering rates following completion of proposed development works. The availability of actual discharge flow data will be used to validate the methodologies.

RECEIVED: 17/11/2025

7.336 Groundwater seepage into an open quarry void has the potential to initiate a hydraulic response in the surrounding bedrock that can be conceptualised as radial flow towards a pumping well. Where the surrounding bedrock has low hydraulic conductivity, inflow rates and water management can be handled using sumps on the quarry floor. The aquifer testing completed suggests generally low permeability and potentially low water volumes requiring water management in the future at this site.

7.337 Projected dewatering rates are estimated for the proposed development using recommended formulae and site-specific data collected from drilling investigations.

7.338 The methodology to determine the potential radial effect and the possible quantity of groundwater requiring management at the site in the future is now presented in calculation steps, as follows:

1. Determine the Radius of Influence.
2. Estimate the potential volume of groundwater inflows to the sump using empirical formulae.
3. Alternatively evaluate volumes that might occur by applying the concept of recharge.
4. Conclude on the total dewatering volumes that might arise in the future.

Radius of Influence

7.339 The principles for estimating groundwater flows are typically based on radial inflows, so a preliminary step is required to convert the proposed extraction area to its circular equivalent having the same area.

7.340 The proposed final rock extraction area will have a footprint of c. 12.5 ha or 125,000 m^2, approximately. This area has an equivalent radius of 200 m.

7.341 The proposed extraction area will extend to a depth of -35 m OD. Based on resting groundwater levels in September 2025 of approximately 0 m OD, the final future requirement might be to draw water level down by -35 m.

7.342 It is convention to calculate, for the worst case possible future scenario, the radius of influence of site dewatering.

RECEIVED: 17/12/2025

7.343 The Radius of Influence can be estimated using Sichardt's Empirical equation as follows:

$$R_0 = C(H - h_w)\sqrt{K}$$

Where:

R_0 = radius of influence (excluding radius of theoretical well = final quarry footprint = 200 m radius)

C = constant = 3000

$H - h_w$ = proposed final drawdown to sump

= 0 mOD – (-35 m OD = proposed final floor level) = 35 m

K = bedrock permeability = 3.14 x 10^{-7} m/s = 0.027 m/d

7.344 Application of Sichardt's Empirical equation suggests that the Radii of Influence (R_0) of keeping the final floor of the proposed extension area dry and safe for working are as follows:

- R_0 = 96 m from edge of the proposed excavation area
- R_0 = 296 m from centre of final excavation area

7.345 The potential radius of influence upon completion of works at the application site is illustrated in Figure 7-11.

RECEIVED: 17/12/2025



Figure 7-11: Calculated radius of influence of proposed quarry extension

7.346 With reference to Figure 7-11 and the calculated R_o, it can be confidently concluded that there are no domestic groundwater receptors (boreholes) that will be at risk of impact from groundwater drawdown as a result of the proposed development to extract bedrock to -35 mOD in the proposed extension area.

7.347 To date, all long-term data suggests that there is an existing 3m to 3.5m drawdown in monitoring BHs within the Breedon ownership boundary, *e.g.* BHA & BHC on the eastern perimeter of the application area.

7.348 As a result of the proposed extension, the existing radius of influence is expected to extend to c. 100m to the east of the application area. As shown in Figure 7-11 there are no domestic wells in this area and hence, no impact expected.

RECEIVED: 17/12/2025

Groundwater Inflows to Sump

7.349 When the floor of an open quarry is excavated, there is potential for groundwater to enter the quarry. There are commonly two components to the inflow as follows:

1. diffuse inflow widely distributed through the general rock mass, and
2. focused flow where permeable fractures intersect the exposed quarry faces.

7.350 Using these theoretical principles, the analytical solution put forward by Marinelli & Niccoli (2000) is derived from the Dupuit-Forcheimer approximation to estimate radial groundwater inflows to open pit quarries. Their solution incorporates a time-dependent factor.

$$Q(t) = (4 \pi K b s_w) / (2.3 \log (2.25 K b t / r_p^2 S))$$

where:

K = hydraulic conductivity = 0.027 m/d

b = thickness of the fractured bedrock horizon (65 m)

S_w = design drawdown (0 m OD – (-)35 m OD) = 35 m

r_p = equivalent radius of the final quarried area (200 m)

S = specific storage (1×10^{-5} m^{-1}), literature value

t = time since 'instantaneous' placement of the open pit

7.351 The application of the Marinelli & Niccoli (2000) solution equation suggests potential future groundwater dewatering rates as follows:

- Dewatering Rate Q = 140 m^3/d after one month from the time that the site is brought to -35 mOD.
- Dewatering Rate Q = 107 m^3/d after six months from the time that the site is brought to -35 mOD.

7.352 As shown in **Table 7-9**, when direct surface overland flow generated on the final floor (32 m^3/d) and rainfall-runoff from topographically upgradient lands (19 m^3/d), both of

RECEIVED: 17/12/2025

which will drain to the final sump (51 m^3/d), are added to this groundwater inflow the maximum long-term dewatering rate becomes **158 m^3/d**.

7.353 The final predicted long tern average dewatering rate of 158 m^3/d is less than the available capacity remaining on the daily discharge permitted under the discharge licence. Details previously presented demonstrated that the current average discharge was 1,300 m^3/d and the maximum observed discharge from the operational quarry was a fraction of the 12,000 m^3/d permitted in the Section 4 Licence. Therefore, the current licence is fit for purpose and can service the proposed development.

7.354 Some caution should be applied to the calculated low volume of <200 m^3/d as they are based on the bedrock permeability of the majority of the site but there is a small southern portion of the application site that has higher permeability bedrock (SP3 and BBH2). Rotary percussive drilling site investigation in the southern area showed that a particular area in this zone had a similar characteristic as the southern part of the operational quarry and the characteristic of the discharge from the sump in that section of the operational quarry. However, the core drilling in this area did not suggest particular anomalies.

7.355 The work reported by Apex (2024) represents an interpretation of all site investigation results from all drilling (core drilling completed for the LSG Chapter and Rotary Percussion drilling for the installations serving the Water Chapter). Apex (2024)'s resistivity cross sections for the subsurface beneath the application area suggests that BBH3 is located southwest of the centre of the main low resistivity zone on Profiles R2 and R4 (and Profile R2 from 2009). The zone also extends to the northern end of R3 and along the eastern end of R1 (refer to Drawing AGP24052_03). BBH2 also is located north of the main resistivity anomaly. Resistivity cross sections R4 and R5 from 2009 (located to the south of the site – see Drawing AGP24052_01) suggests some low resistivity at the end and base of 2024 Profile R4 which could be associated with the coastal waters.

7.356 In taking an ultra conservative approach, by altering the model input value for the bedrock's hydraulic permeability (K) to a value of 4.9×10^{-5} m/s (average of K at SP3 and BBH2), and applying that K to a simulation for the total proposed sum of quarried

RECEIVED: 3/11/2025

area of 23,142 m^2 (equivalent radius = 86 m), the model output results predict groundwater ingress of **8,780 m^3/d.** This remains viable within the Licence ELVs and settlement function available in the as built settlement lagoons. However, applying the worst case (lowest K value) to the entire area of the proposed development is too conservative as to be considered a real future scenario. The scenario was presented here to demonstrate that even if the worst case applied to the entire site, progression is feasible within the scope of Environmental Protection because the Licence ELVs have already been tested with the current Groundwater Regulations, Surface Water Regulations and Birds and Habitats Regulations.

Groundwater Recharge concept

7.357 An alternative simulation approach can be completed for comparative purposes. The radial approach, presented above, may not be entirely appropriate to the uniqueness of Irish hydrogeological features in that it can overestimate inflows from lands downgradient of the site in terms of groundwater flow and underestimate inflows from lands hydraulically upgradient. Therefore, an alternative approach was applied, which estimates the rate or volume of water to be removed from the quarry by assuming it will be equivalent to the rate of groundwater flow through the site that will be intercepted by excavation below static groundwater level. Using this approach the predicted groundwater inflow to the quarry is 211 m^3/d (Table 7-13). This value is not substantially different from the calculated volume using the radial approach, which was **158 m^3/d.**

Table 7-13: Recharge volumes derived from aquifer properties

Area, m^2	Effective Rainfall, mm	Aquifer	Recharge rate, mm/yr	Recharge, m/yr	Recharge, m^3/yr	Recharge, m^3/d
125,000	625.7	Rk	531.9	0.532	66,500	182
28,372	625.7	Rk	375.4	0.375	10,640	29
					Total	**211**

RECEIVED: 17/12/2025

Future Total Dewatering Volumes

7.358 Based on preceding calculations relating to rainfall runoff, the amount of rainfall runoff to be managed within the proposed extraction area is equal to **51 m^3/d** (Table 7-9). It can be assumed that this is a volume that will always require management.

7.359 In addition to the rainfall runoff component, two distinct methods for estimating groundwater inflows to the site as extraction nears completion were applied. The results of which are summarised as follows:

1. Based on an empirical formula, which utilises permeability and final drawdown, the potential average daily amount of water to be managed is as follows:

   (a) Groundwater inflow based on drawdown and bedrock hydraulic conductivity = 107 m^3/d

   plus

   (b) Surface runoff from topographically upgradient lands and recharge rejected at bedrock head = 51 m^3/d

   Yields a Total = 158 m^3/d = 0.0018 m^3/s

Or

2. Based on rainfall and recharge coefficients:

   (a) Recharge to Rkd aquifer in the area upgradient of the site in terms of groundwater flow and within the proposed extension area = 211 m^3/d

   plus

   (b) Surface runoff from topographically upgradient lands and recharge rejected at bedrock head within site = 51 m^3/d

   Yields a Total = 262 m^3/d = 0.003 m^3/s

7.360 It is therefore concluded that the combined groundwater and rainfall-runoff contributions to the extension's sump will be **~300 m^3/d (c. 0.0035 m^3/s).** This is a

RECEIVED: 27/11/2025

low value for the total future discharge of a c.12.5 ha extraction area. However, the low value makes sense when one considers the values for the monitored discharge from the operational site and the lowered water levels in the MWs bounding the application area and the operational site. The low values reflect the density of the rock at this geographical location (as per the operational site and Kilsaran) and the fact that beneath the greenfield application area, there is little groundwater in a bedrock with very low hydraulic conductivity across most, but not all, of the site. There are very small zones in the south of the application site that have higher hydraulic conductivity but these are similar to those reported in 2015 for the operational site and since then the discharge from the operational site has averaged 1,300 m^3/d, which is not a value that represents significant sea water ingress.

7.361 The existing active area has a permitted area of 12.6 ha, which is almost identical to the area of the proposed extension. The average daily discharge rate of the existing active quarry is 1,300 m^3/d.

7.362 On the basis of mathematical balance, results from the operational site's discharge characteristic suggest that the average daily ingress from saline waters is therefore of the order of 1,000 m^3/d. This is a low value and represents very minor seepage in small, poorly connected pores, which is the nature of the aquifer: diffuse karst.

7.363 Given the similarity in footprint, the similar orientation, and the similar setback distance from the coast, along with the proposed extension floor (-35 mOD) being broadly level with the existing quarry sump elevation (-38 mOD) the average daily discharge from the current quarry of 1,300 m^3/d could be applied as a reasonable estimate of average daily flows likely to arise in the proposed extension's sump upon reaching final proposed quarry floor level.

7.364 The existing quarry excavation area is separated from the proposed extraction area by a 40 m setback. It is likely that given the groundwater flow direction towards the existing quarry void, and the radius of influence towards it, that some of the rainfall that infiltrates greenfield surface on the application area is already received in the working quarry – this is evident from minor seep ingresses observed in the eastern

RECEIVED: 17/12/2025

wall of the existing active quarry and the water level monitoring results for the long term wells.

7.365 Any rainfall percolating through the overburden cover on the proposed extension area will hit the underlying limestone bedrock, the majority of which has been shown to be relatively impermeable. It will likely then travel laterally across the top of the bedrock to find the easiest way out of the ground. The primary outlet may be through the 40 m setback, which runs parallel between the existing quarry and proposed extension area for a distance of 480 m.

7.366 The site's water management infrastructure has always been able to appropriately attenuate and treat all waters entering the site and it will continue to do so to the satisfaction of the Conditions of the Section 4 Discharge Licence.

7.367 The above values are intended to be representative of discharge rates that are only likely to be realised close to completion of rock extraction operations. Interim discharge rates will reflect progress of the phasing scheme. The phased development will initially involve the development of the upper quarry bench(es).

7.368 In terms of water volumes to be managed, arising from the proposed lateral extension area, the following values have been calculated using site investigation results:

- Minimum volume of water to be managed = 300 m3/d;
- Likely average volume of water to be managed = 1,300 m3/d;

7.369 Under the worst case scenario the current licensed water management system will still have the capacity to attenuate and treat the future waters arising over the application area because the operational site's discharge data suggests an average of 1,300 m^3/d. Therefore the combined total average discharge is significantly less than the permitted 12,000 m^3/d. As stated, the floors and associated sumps of the distinct quarry areas will be able to accommodate any extreme and prolonged extreme rainfall events.

7.370 The empirical formulae applied above to predict volumes of water to be managed in the extension area were initially calculated on an assumption that the bedrock

RECEIVED: 17/12/2025

formation underlying the site is homogenous, with a consistent bedrock permeability of 10^{-7} m/s throughout.

7.371 Those groundwater and surface water calculations were based on local topography, i.e. they limit the area contributing groundwater to the site as being the hilltop just north of the northern boundary of the application site.

7.372 Calculations were re-visited to accommodate the more permeable areas in the southwest corner of the site where significant clay-filled cavities are present, some of which are water-bearing. This has been confirmed using geophysics, drilling logs, aquifer testing and water quality testing. The permeability in this part of the site is 5 x 10^{-5} m/s. When the entire site is considered, *i.e.,* the operational and proposed quarry areas, and the worst case highest bedrock permeabilities applied to the entire area of the operational and proposed extension area, the maximum worst case volume of water to be managed has been calculated to be **8,780 m^3/d.**

7.373 It is therefore concluded, beyond any doubt whatsoever, that the site's existing infrastructure can accommodate, attenuate and treat the waters that will arise from the proposed extension to the east.

Settlement Lagoon Treatment Functionality

7.374 Given that the evaluations of this Water Assessment have determined that the site's existing discharge licence and associated water management systems can accommodate the proposed development's waters, it is nevertheless prudent to prove the functionality of the lagoon again mathematically.

7.375 Waters collecting in the extension's sump will be pumped to the existing settlement lagoon directly to the south. It will join the pipe carrying sump waters from the existing quarry sump, just before the settlement pond inlet.

7.376 The settlement lagoon was designed to remove fines down to a minimum size of 0.004 mm (fine silt), with a residence time of 24 hours. The settlement ponds and infiltration pond have been sized to treat the (i) groundwater inflows and rainfall-runoff from the existing quarry, plus (ii) waters that could arise from the dewatering impact of Breedon

RECEIVED: 17/11/2025

quarry, plus (iii) recycling of 50% of water entering the infiltration pond. To allow a sufficient safety margin in the event that this worst case scenario was to occur, the settlement and infiltration ponds were subsequently upsized to accommodate flows in excess of 100 l/s.

7.377 On a design basis, the overflow rate through the settlement lagoon should be equal to the settling velocity of the smallest particle the lagoon is designed to remove. The method for determining the size required for the settlement lagoons is based on Stoke's Law. The following equation is used to calculate the settlement velocity of particles:

$$V_s = g \,.\, (\rho_s - \rho_w)\, d^2 / 18\mu_w$$

Where:

g = acceleration due to gravity is 9.81 m/s^2

ρ_s = density of the particle requiring settlement = 2.6 g/cm^3 or 2,600 kg/m^3

ρ_w = density of fluid = 1.00 g/cm^3 or 1,000 kg/m^3

μ_w = dynamic viscosity of water = 1.307 x 10^{-3} kg/ms @ 10˚C

d = particle diameter = 0.0000040 m (*i.e.,* 0.004 mm)

7.378 The temperature of the fluid, in this case water, is dependent on the ambient temperature. In the calculations, 10°C is used as a conservative temperature. The simulated particle density adopted as 2.6 g/cm^3 is also considered conservative and it will produce an over specification system, which is good because it provides a reasonable factor of safety.

7.379 Using Stokes' Law, the settling velocity of particles of 0.040 mm, assumed spherical, in water is calculated for 10°C water temperature and particle density, as follows:

$$V_s = 0.00001067 \text{ m/s} = 1.067 \times 10^{-5} \text{ m/s}$$

RECEIVED: 17/11/2025

7.380 The minimum surface area of the settlement lagoons are then sized so as to facilitate the settling velocity for the design overflow rate of the permitted Section 4 Discharge Licence, as follows:

$$A = Q / V_s$$

Where:

A = minimum lagoon surface area, m^2

Q = maximum inflow rate = 12,000 m^3/d = 0.139 m^3/s

V_s = Settling velocity of the selected particle size = 0.00001067 m/s

A = 0.139 m^3/s / 0.00001067 m/s = 13,016 m^2

7.381 The as-built footprint of the settlement lagoon is Settlement lagoon area = 14,300 m^2, which is greater than the calculated 13,016 m^2 required to service the operational quarry and proposed extension. The results suggest that the as built settlement lagoons will settle solids of particle size 0.004 mm, and greater, for a maximum discharge volume of 12,000 m^3/d, as permitted by the Section 4 Discharge Licence. It can be concluded that the site's settlement lagoon has satisfied the design specifications to achieve the settlement of solids of diameters 0.004 mm and greater for the entire combined development.

Hydrogeological Understanding & Conceptual Site Model

7.382 A conceptual site model (CSM) is now presented using all the information collected in this Water assessment. The CSM incorporates results from the different strands of testing and to present a coherent understanding of the hydrological and hydrogeological regimes in an around the site as they are understood to date.

7.383 The proposed development comprises the extension of a c.12.5 ha extraction area to an existing extension area of c.12.6 ha limestone bedrock quarry close to the coastline. The existing quarry is permitted to -50 mOD, and has recently been deepened from -35 mOD. The proposed extension is to a maximum of -35 mOD.

RECEIVED: 17/12/2025

Waters from the proposed development shall be transferred to the existing settlement lagoon and infiltration pond.

7.384 The similarity in landscape position, bedrock type, footprint and vertical scale of the existing and proposed extraction areas has allowed validation of predicted metrics such as likely groundwater ingress.

7.385 The CSM is explained visually with reference to the site plan presented as

7.386

7.387 Figure 7-12 showing, in plan version, the Cross Section Lines A-A', B-B', C-C' and D-D'.

7.388 Graphical cross sections are shown in Figure 7-13,

RECEIVED: 17/12/2025

7.389 Figure 7-14, Figure 7-15 and Figure 7-16.

7.390 Following each Cross Section, relevant discussion is presented regarding how the site interacts with its setting.

RECEIVED: 17/12/2025

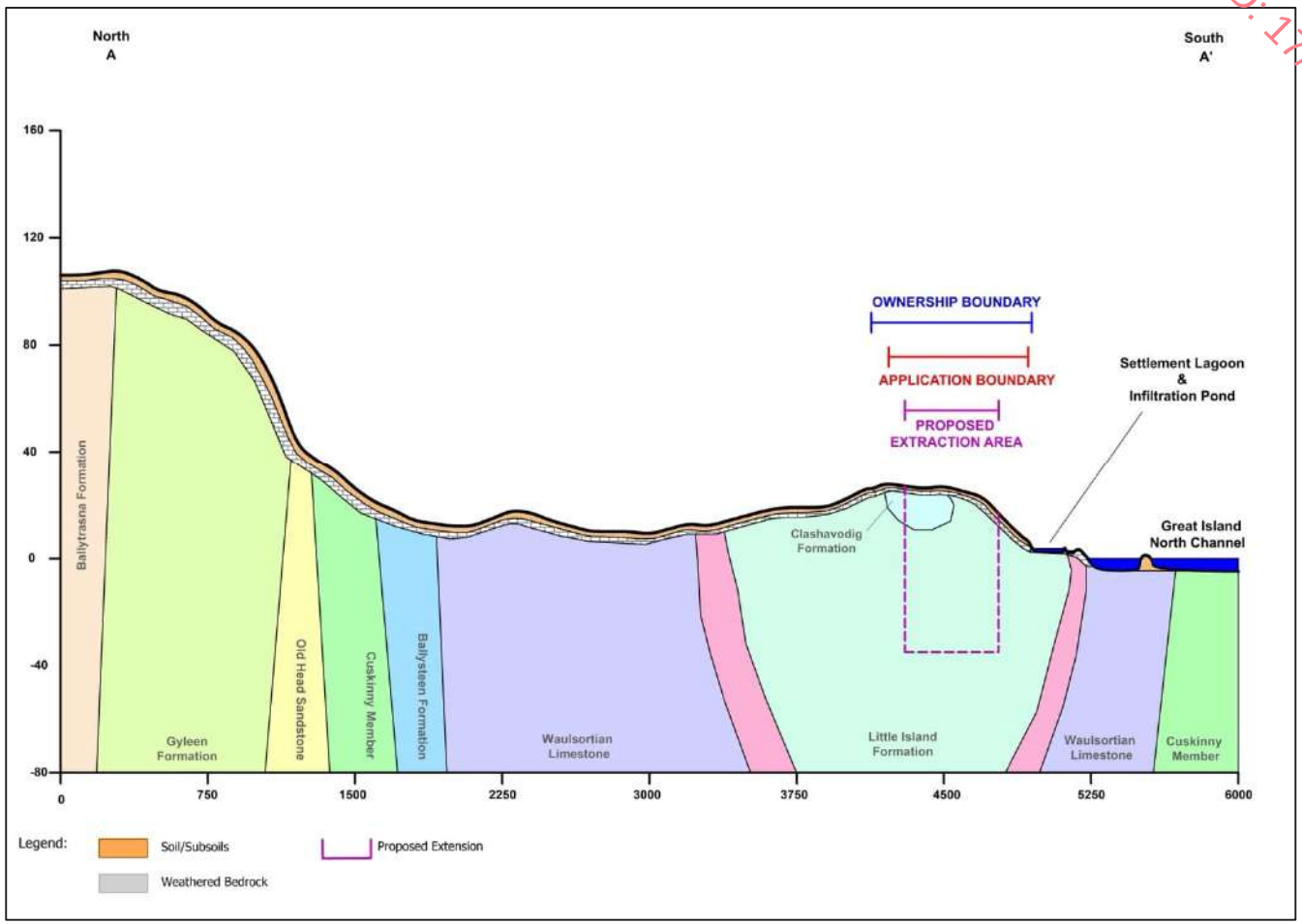


Figure 7-12: Locations of Cross Section Lines used for Graphical CSM Sections

7.391 A regional north to south Cross Section is presented as CS A-A' (Figure 7-13). The application site is in the approximate centre of what is known as the Cork syncline, what is essentially a deep limestone valley which runs along an east-west orientation. The southern end of this syncline is covered in tidal waters.

RECEIVED: 17/12/2025

Figure 7-13: Hydrogeological Conceptual Site Model Cross Section A-A'



RECEIVED: 17/11/2025

7.392 CS A-A' (Figure 7-13) shows that precipitation to the north of the N25 falls onto a raised plateau of land which is underlain by relatively hard and low permeability Devonian Old Red Sandstones (a locally important aquifer). This rainfall-runoff and rejected recharge flows southwards onto lower-lying limestones. These limestones are more permeable than the sandstones and much of the previously rejected rainfall now infiltrates through the surface, entering a Regionally important karst aquifer dominated by diffuse flow (Rkd). The lack of watercourses and drainage channels north of the site confirm that surface runoff in that area is minimal. Groundwater in the Rkd aquifer flows south-southwest towards the coastline where it discharges to the Great Island North Channel. This body of coastal is designated an SAC (Great Island Channel SAC) and SPA (Cork Harbour SPA). The application site is not within a surface water catchment to any surface watercourse or waterbody.

7.393 The hydrogeological regime of the existing quarry has been reviewed in detail using site investigation information collected to inform previous planning permissions and ongoing monitoring data collated in the interim. Water balances and hydrochemical analyses have shown that waters collecting in the sump of the existing quarry consist of direct rainfall-runoff, groundwater seepage through exposed faces and a small volume of saline water. Sump waters are pumped to a settlement lagoon for removal of sediment from which they overflow to an infiltration area. Hence there is no direct connectivity with the designated areas.

7.394 Previous site assessments estimated a bedrock permeability of 10^{-5} m/s. Using this parameter value, and incorporating several factors of safety, including consideration of activities at the adjacent third-party quarry (see Cross Section C-C'), a maximum discharge flow rate through the infiltration of 12,000 m^3/d was applied. Design specifications for the water management to the existing quarry were based on this flow. Cork County Council issued a discharge license which has a flow ELV of 12,000 m^3/d.

7.395 Actual discharge flow measurements show that the daily average discharge is in fact approximately 1,300 m^3/d. This was likely due to bedrock being less conducive to transmitting groundwater flows than initially predicted, in addition to a conservative approach having been utilised from the outset. Calculations suggest the groundwater

RECEIVED: 17/11/2025

and rainfall-runoff component of this value is c. 300 m^3/d, suggesting 1,000 m^3/d, approximately, of saline ingress being managed. The maximum discharge rate in response to heavy rainfall was 4,080 m^3/d, this being equivalent to the maximum capacity of the existing sump pump. The balance is attenuated in the sump.

7.396 The area surrounding the existing quarry predicted to be impacted by a reduction in groundwater levels was estimated to be a maximum lateral extent of 300 m. To date, ongoing monitoring has shown that the existing quarry is in compliance with all conditions set out under permissions.

7.397 A number of site investigation approaches were taken to characterise the bedrock and aquifer beneath the proposed extension area. This included geophysics, well drilling, permeability testing, yield tests, mapping groundwater elevations, recording long-term groundwater level patterns and hydrochemical testing. All wells were terminated at depths below the proposed quarry floor (see B-B' and C-C').

7.398 Geophysics showed that there is some variability in electrical resistivity beneath the site, this demonstrates that the quaternary and geological strata beneath the site are not homogenous. Monitoring wells were drilled to determine the reason for this variability.

7.399 Logs of boreholes drilled across the majority of the site returned competent limestone with some clay infill zones. No discrete groundwater inflows were encountered above the proposed quarry floor. Permeability testing returned relatively low values (10^{-7} m/s) which shows that, particularly in the central and northern parts of the site, the clay-filled cavities were not water-bearing. Low groundwater yields were confirmed by pumping and response testing on the four installed SP MWs and BBH1 (noting that BBH3 was non groundwater bearing). Groundwater quality across this area is indicative of freshwater.

7.400 In the southern part of the site clay infill encountered was more significant and this is also evidenced visually in photographs and detail reported by Apex (2024). The wall of rock between the built settlement lagoons and the proposed extension area show these clay infills but they are dry. Pumping of groundwater from newly installed large diameter well BBH2 yielded 888 m^3/d for a 24hr pumping period for hydraulic response

RECEIVED: 27/11/2025

analysis. Collected data was analysed to return a bedrock permeability value towards the southern end of the site of 10^{-5} m/s. Groundwater quality across this area is brackish, as it is in the southern area of the functioning operational quarry.

7.401 Groundwater levels on the application are broadly equivalent to the tidal range of coastal waters to the south (-2 to +2 mOD). Groundwater levels on the western boundary of the extension clearly show that the historical pumping of waters from the existing quarry sump invokes slight drawdown impacts on surrounding areas, though to a maximum lateral extent of 300 m to the north of the existing quarry.

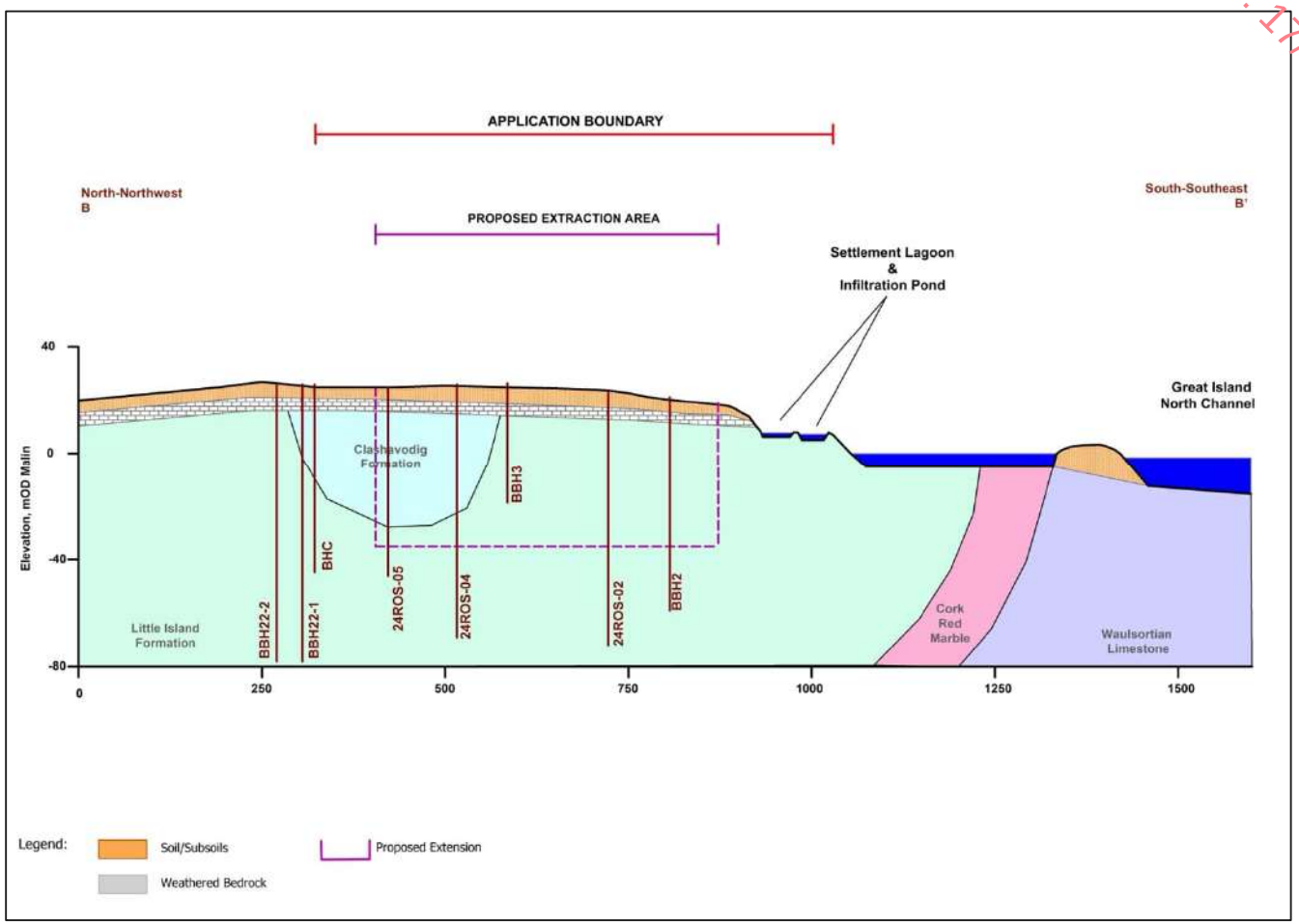
7.402 Long-term groundwater levels show that groundwater levels in the application are responsive to rainfall and that they exhibit seasonality. The predicted radius of influence has been calculated to extend a maximum of 100 m beyond the eastern boundary of the proposed extension. There are no third party groundwater abstractions within this area and hence there will be no impact on any private domestic wells.

7.403 The current average daily discharge of 1,300 m3/d from the operational quarry means that the surface water management system and discharge license has a headroom of over 10,000 m3/d. Calculations based on Site Investigation suggest a similar value of 1,300 m^3/d for the proposed extension area. With respect to the proposed development the predicted maximum discharge is estimated to be 8,780 m3/d. The large value is attributed to the selection of ultra conservative model input parameters based on hydraulic permeability of the southern area of the proposed extension. Nevertheless, the surface water management system have capacity to accommodate even the most conservative estimates. Any waters in excess of these rates can be attenuated on the quarry floor.

7.404 The rock encountered during drilling is limestone and only very small groundwater strikes / ingresses were encountered. The results are presented graphically in the Cross Sections below.

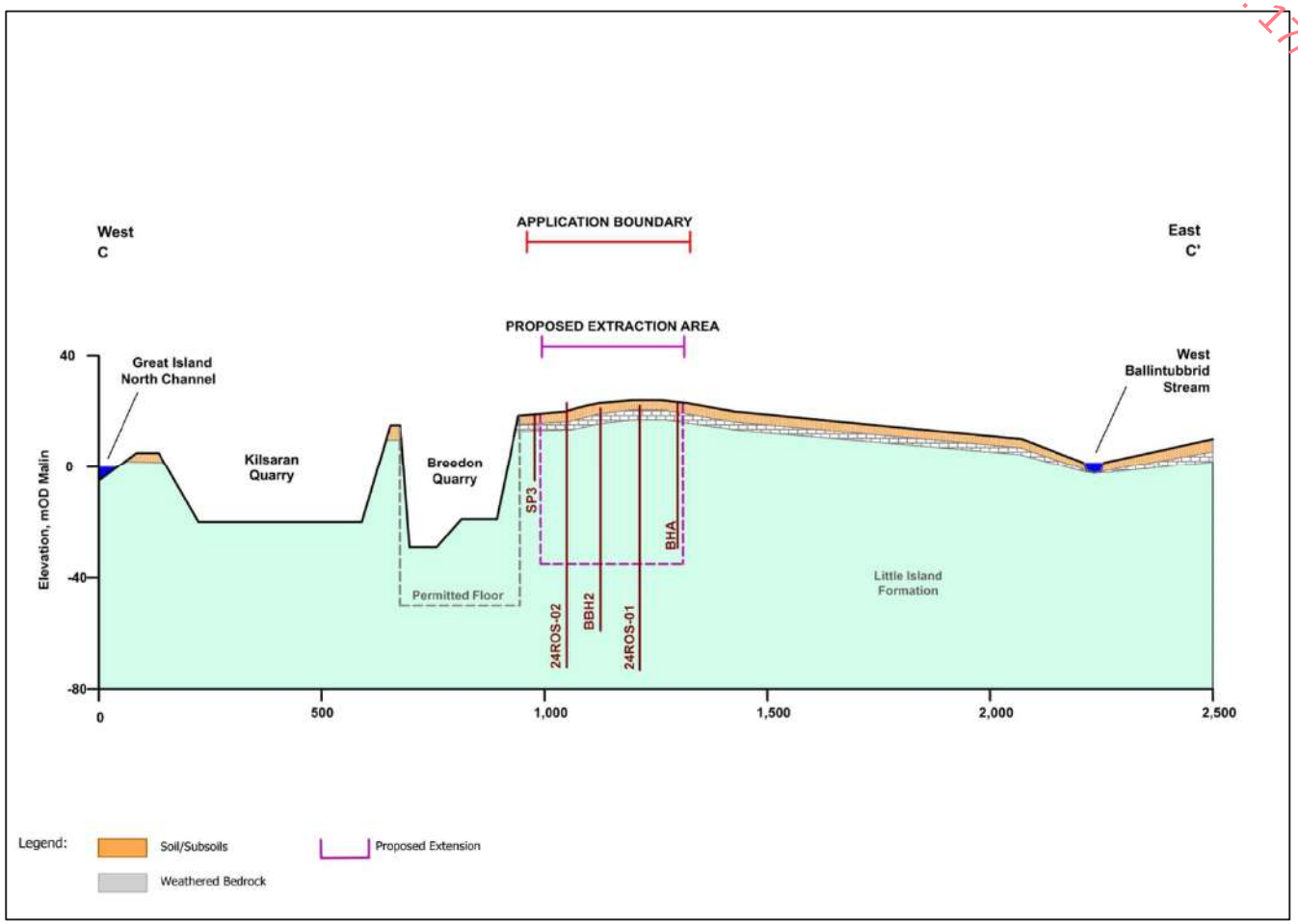
RECEIVED: 17/12/2025

Figure 7-14: Hydrogeological Conceptual Site Model Cross Section B-B'



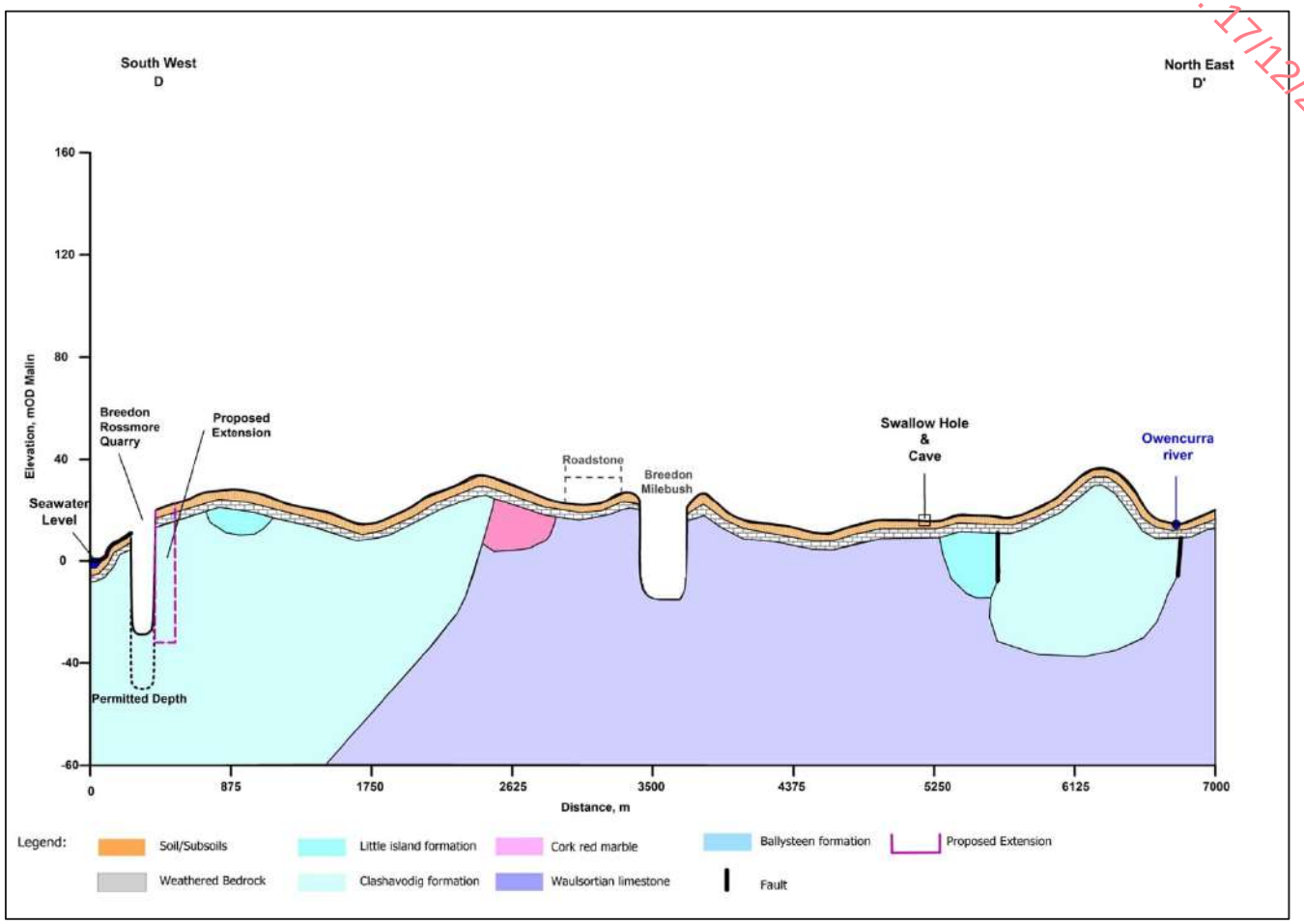
RECEIVED: 17/12/2025

Figure 7-15: Hydrogeological Conceptual Site Model Cross Section C-C'



RECEIVED: 17/12/2025

Figure 7-16: Hydrogeological Conceptual Site Model Cross Section D-D'



RECEIVED: 17/12/2025

Effects, Impact Assessment Methodology and Structure

7.405 This EIA and EIAR were completed in accordance with enacted EU and Irish legislation pertaining to Environmental Impact Assessment (Directive 2014/52/EU, meaning the EIA Directive and Irish EIA Regulations (2018, as amended 2020). As previously stated, the complete list of Guidance and Legislation employed in the completion of this work was presented in **Appendix 7.3**.

7.406 The Impact Assessment was completed with reference to Guidance relating to EIA and the preparation of EIA Reports, which includes the EU (2017), Department of Housing, Planning and Local Government (2018) and EPA (2022) on Guidelines on the information to be contained in Environmental Impact Assessment Reports.

7.407 Criteria for assessing importance of site attributes and their magnitude of importance were taken from the NRA Guidelines (NRA, 2008) and 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (IGI, 2013).

7.408 The tools and structure of the assessment of Effects and Potential Impacts were detailed in **Appendix 7.6**, in which Industry Standard Tables for rating of the Importance of Environmental Criteria, Significance of Effects, Impacts, Mitigation Measures, Residual Impacts and more are presented.

7.409 In addition to the application of Irish Guidelines as outlined in EPA (2022) and NRA (2008), and in the absence of Irish Guidance specifically focussed on quarries and hydrogeology, the work presented in this EIAR Section has also applied UK practical guidance as published by the UK Environment Agency (the public body equivalent of the Irish EPA). The UK Guidance provides a 'Hydrogeological impact appraisal for dewatering abstractions' (Boak, R. et. al. (2007) and the approach is outlined in **Appendix 7.7**.

RECEIVED: 17/12/2025

Development Phases Considered

7.410 The evaluation of Potential Effects and Impact Assessment completed usually considers phases as follows:

- Construction (enabling) Phase;
- Operational Phase; and
- Landscaping, Restoration, Decommissioning & Aftercare.

Description of Likely Effects

7.411 The procedure for determination of potential impacts on the receiving hydrological and hydrogeological environment was to identify potential receptors within the site boundary and surrounding environment and to use the information gathered during the field work and desk study to assess the degree to which these receptors will be impacted upon.

7.412 The application site lies adjacent to the existing quarry void, with a 40 m setback, and when considered as a cumulative site, will be of moderate size.

7.413 The site is therefore considered to be an attribute of High importance.

7.414 In line with best practice, the individual impacts will be considered with respect to the application site, plus the cumulative impacts with respect to the existing and application site.

7.415 Groundwater and designated transitional waters (i.e. Great Island Channel SAC, Cork Harbour SPA and Great Island Channel proposed NHA) are the primary potential receptors with respect to hydrology and hydrogeology.

Potential Impacts

7.416 The main anticipated impact associated with the proposed quarry extension, in relation to hydrology and hydrogeology, relates to the potential contamination of groundwater from quarrying activities and the subsequent risk posed to the underlying groundwater and to the Great Island Channel SAC, Cork Harbour SPA, resulting from the licensed discharge.

7.417 As mentioned previously, the waters collecting in the extension's sump shall be pumped to an existing settlement lagoon and then discharged to ground via an existing infiltration pond, with this activity already regulated under a Section 4 Licence. A number of different

RECEIVED: 17/12/2025

approaches have been utilised to calculate potential discharge volumes; even the most conservative estimates can be accommodated in the existing water management system for both volumetric and settlement treatment functionality.

7.418 A detailed assessment of all Potential Effects associated with all phases of the proposed development, are presented in Table 7-14; Duration, Frequency and Type of Effect are considered.

7.419 The direct impacts identified as likely to occur during the enabling (construction) stage are included in the assessment because the site proposed is in greenfield condition. Detailed assessments of the depth and nature of the overburden have been issued by Apex Geophysics (2009 and 2024).

7.420 The Importance of an Attribute was determined on the basis of criteria from NRA (2008) and IGI (2013), as outlined in more detail in **Appendix 7.6**.

7.421 With reference to hydrogeology, the aquifer associated with the site is deemed to be an attribute of 'High Importance' rating given it is mapped as a Regionally Important Aquifer. The are no overland flowing surface watercourses in proximity to the site and therefore there is no 'Importance' rating with respect to surface water hydrology.

7.422 Downstream 'Transitional Waters' have been considered and are presented.

7.423 Importance Criteria ratings with the Criteria for Estimating the Magnitude of Impact on a Hydrogeology Attribute is provided in the IGI (2013) Guidance (**Appendix 7.6,** Table A8.6.6). Incorporating this corresponds with the proposed development having a Potential Impact of 'Adverse', rather than 'Beneficial', and a Magnitude of Impact on the hydrogeology Attribute (Regionally Important Aquifer), can be concluded, as 'Small' based on the potential for removal of a 'small proportion of aquifer'; 'changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems'; and a 'potential low risk of pollution to groundwater from routine runoff'. The conclusion on the potential Magnitude of Impact on Hydrogeology is 'Small, Adverse'.

7.424 Considering the 'Extremely High Importance' Importance of Attribute and the 'Adverse-Small' magnitude of Impact (**Appendix 7.6**, Table A7.6.6), the overall potential outcome on hydrogeological receptors, in the absence of Mitigation Measures, could be 'moderate/slight (**Appendix 7.6**, Table A7.6.7). However, that is the purpose of the Mitigation Measures.

7.425 The application of criteria, as outlined in Tables A7.6.1 to A7.6.5 of **Appendix 7.6**, to the specifics of the study area provides a framework for general screening of the likely impact

RECEIVED: 12/12/2025

to the hydrological and hydrogeological environment. The methodology involves the identification of all the potential receptors within the site boundary and surrounding environment. This information is gathered during the desk study, site walkover, site investigation and monitoring phases of the study.

7.426 Upon collation and consideration of all project information for the site and macro scale, an Impact Assessment is completed and reported under headings, as follows:

- Potential Impacts
- Mitigation Measures
- Residual Impacts
- Do Nothing
- Cumulative Impacts
- Transboundary Impacts
- Dewatering Impact Appraisal (UK Environment Agency)
- SAC Protection Measures

7.427 Additional quantitative Impact Assessments are presented, specific to quarrying, relating to the following:

- Quantitative assessment regarding the potential use of explosives at the site to cause deterioration of groundwater quality in the context of the Threshold Values for Nitrogen Species, as specified in the Groundwater Regulations (2009, as amended), which is an arm of the Water Framework Directive.
- Quantitative assessment regarding the potential for the waters arising, which is deemed an 'Abstraction' by the EPA, to result in impact on the Quantitative Status of the Midleton GWB, in the context of the obligations of the Water Abstraction Regulations (2024), which is also an arm of the Water Framework Directive.

7.428 The restoration stage of the project describes the aftercare phase that follows the cessation of activities. The direct impacts identified as likely to occur during the restoration stage are deemed to be Significant to Moderate and permanent in duration.

7.429 Indirect impacts (or secondary impacts) are those which are not a direct result of the proposed activity, often produced away from the project site or because of a complex pathway. A positive indirect impact is that raw materials extracted and processed bring benefits to the progression of society housing and ensuring road safety by enabling the maintenance of roads.

RECEIVED: 27/12/2025

7.430 Consideration has also been given to environmental impacts associated with unplanned events such as intense rainfall events, spillage, accidents, fire, etc. The impacts identified as likely to occur due to unplanned events are deemed to be slight to significant and brief in duration.

RECEIVED 27/11/2025

Table 7-14: Summary of Potential Effects on the Water Environment

Phases	Activity	Attribute	Importance of attribute	Nature and description of the effect	Quality	Significance	Extent & Context	Probability of effects (pre-mitigation)	Frequency & Duration	Type of effect
Construction Phase	Stripping of Overburden	Transitional Waters	Transitional waters: Extremely High	Excavation and stockpiling of soil and subsoil creates potential for Suspended Solids mobilisation. Silt in runoff has potential to affect the quality of the discharge and degrade water quality.	Adverse	Significant	Great Island Channel SAC. Cork Harbour SPA.	Likely	Occasionally, infrequently, (e.g., extreme rainfall events). Temporary	Direct
	Use of excavator & dump trucks: spillages during refuelling, use and storage of lubricants.	Groundwater & Transitional Waters	Groundwater: High Transitional waters: Extremely High	Contamination of groundwaters and transitional waters with hydrocarbons. Potential to affect the quality of the discharge, groundwater and degrade water quality.	Adverse	Significant	Great Island Channel SAC. Cork Harbour SPA. Bedrock Aquifer. Midleton GWB	Unlikely	Rarely Temporary	Direct
Operational Phase	Blasting of bedrock.	Groundwater	GWB and Bedrock Aquifer: High	Deterioration in groundwater quality	Adverse	Small	Bedrock Aquifer. Midleton GWB	Unlikely (Blast Technology is Advanced)	Intermittent Monthly – Bi Monthly) Long-term	Direct
	Extraction of bedrock.	Groundwater	GWB and Bedrock Aquifer: High	Change in unsaturated thickness resulting in change in groundwater vulnerability classification. Deterioration in groundwater quality. Site is already Extreme vulnerability.	Adverse	Neutral	Bedrock aquifer, Midleton GWB	Likely	Permanent	Direct
	Movement of aggregate stockpiles.	Transitional waters	Transitional waters: Extremely High Importance	Mobilisation and migration of suspended solids. Sediment deposition in tidal channels disrupting sensitive marine habitats.	Adverse	Significant	Great Island Channel SAC. Cork Harbour SPA.	Likely	Occasional Temporary	Direct

RECEIVED 17/12/2025

Phases	Activity	Attribute	Importance of attribute	Nature and description of the effect	Quality	Significance	Extent & Context	Probability of effects (pre-mitigation)	Frequency & Duration	Type of effect
Operational Phase	Use of quarrying machinery: spillages when refuelling, lubricant use and storage.	Groundwater & Transitional Waters	Groundwater: High Transitional waters: Extremely High	Contamination of transitional waters and groundwaters with hydrocarbons	Adverse	Moderate	Great Island Channel SAC. Cork Harbour SPA. Bedrock Aquifer. Midleton GWB	Unlikely	Rarely Temporary	Direct
	Quarry dewatering, lowering groundwater levels	Groundwater & Transitional Waters	Groundwater: High Transitional waters: Extremely High	Reduction in third party well yields. Reduction in quantity of groundwater in the GWB.	Adverse	Significant	Third party wells within 500 m Midleton GWB	Unlikely	Long-term (Reversible)	Direct
	Use of settlement lagoons	Transitional waters	Transitional waters: Extremely High	Removal and entrapment of particulate matter entrained in waters leaving site.	Positive	Moderate	Great Island Channel SAC Cork Harbour SPA	Likely	Long-term Constant	Direct
	Cleaning of settlement lagoons	Transitional waters	Transitional waters: Extremely High	Improves efficiency of settlement lagoons, attenuation Mobilisation and migration of suspended solids	Neutral	Not Significant	Great Island Channel SAC Cork Harbour SPA	Likely	Annual Long-term	Direct
	Use of wheelwash	Transitional waters	Transitional waters: Extremely High	Removal and entrapment of particulate matter attached to vehicles	Positive	Slight	Great Island Channel SAC Cork Harbour SPA	Likely	Long-term Constant	Direct
	Wheelwash maintenance	Transitional waters	Transitional waters: Extremely High	Improves wheelwash efficiency and reduces mobilisation and migration of suspended solids	Neutral	Not Significant	Great Island Channel SAC Cork Harbour SPA	Unlikely	Long-term, Annual	Direct
	Use of hydrocarbon interceptors	Groundwater & Transitional Waters	Groundwater: High Transitional waters: Extremely High	Entrapment of hydrocarbons lost during refuelling/discharge	Positive	Slight	Great Island Channel SAC Cork Harbour SPA	Likely	Long-term Constant	Direct

RECEIVED 17/12/2025

Phases	Activity	Attribute	Importance of attribute	Nature and description of the effect	Quality	Significance	Extent & Context	Probability of effects (pre-mitigation)	Frequency & Duration	Type of effect
	Monitoring	Groundwater & Transitional Waters	Groundwater: High Transitional waters: Extremely High	Monitoring of discharge rates, suspended solids, discharge water quality, groundwater quality	Positive	Not Significant to Imperceptible	On- and off-site	Unlikely	Long-term, Hourly, quarterly, annually	Direct
Operational Phase	Pumped discharge of quarry waters	Transitional waters	Transitional waters: Extremely High	Deterioration in transitional water quality. Increased Coastal Flood Risk.	Adverse	Slight	Great Island Channel SAC Cork Harbour SPA	Unlikely	Long-term Constant	Direct
	Use of crushing/ screening plant	Transitional Waters	Groundwater: High Transitional waters: Extremely High	Contamination of transitional waters with small particles of rock and dust.	Adverse	Moderate	Great Island Channel SAC Cork Harbour SPA	Unlikely	Long-term, Constant	Direct
Restoration Phase	Removal of semi-mobile and mobile plant (pumps, generators, crusher/ screening plant, etc.)	Groundwater & Transitional Waters	Groundwater: High Transitional waters: Extremely High	Elimination of hydrocarbon sources	Positive	Moderate	Within site boundary	Likely	Permanent	Direct
	Dismantling and removal of fixed plant & machinery (wheelwash, etc.)	Groundwater & Transitional Waters	Groundwater: High Transitional waters: Extremely High	Elimination of hydrocarbon and dust sources	Positive	Moderate	Within site boundary	Likely	Permanent	Direct

RECEIVED 17/12/2025

Phases	Activity	Attribute	Importance of attribute	Nature and description of the effect	Quality	Significance	Extent & Context	Probability of effects (pre-mitigation)	Frequency & Duration	Type of effect
	Landscaping and movement of infrastructure and overburden stockpiles necessary to facilitate site restoration	Groundwater & Transitional Waters	Groundwater: High Transitional waters: Extremely High	Mobilisation and migration of suspended solids Sediment deposition in tidal area disrupting sensitive marine habitats	Adverse	Moderate	Great Island Channel SAC Cork Harbour SPA	Likely	Short-term	Direct & Indirect
	Cessation of pumping	Groundwater & Transitional Waters	Groundwater: High Transitional waters: Extremely High	Recovery of groundwater levels. Reduction in risk of contamination to transitional waters.	Positive	Significant	Within site boundary and 500m radius	Likely	Permanent	Direct
Unplanned Events (Major Accidents)	Major Spillage	Groundwater & Transitional Waters	Groundwater: High Transitional waters: Extremely High	Hydrocarbon contamination	Adverse	Significant	Within site boundary and 1 km radius	Likely	Momentary	Direct
	Intense Rainfall Events	Groundwater & Transitional Waters	Groundwater: High Transitional waters: Extremely High	On-site & off-site flooding	Adverse	Moderate	Within site boundary & local agricultural lands.	Likely	Brief	Indirect

RECEIVED: 17/12/2025

Quantitative Impact Assessment Blasting

7.431 Mass balance calculations are presented to mathematically demonstrate potential for effects of blasting to present nitrogen residues in the pore water of the bedrock, which has potential to impact the hydrochemical quality of groundwater and site's discharge. This is a quantitative and qualitative impact assessment. The risk to groundwater and transitional waters is assessed by quantifying the resultant hydrochemical concentrations for the potential residual nitrogen compounds Nitrate (NO_3), Ammonia (NH_4) and Nitrite (NO_2) remaining after the explosives have detonated during the blast process. Calculations have been performed for the existing and proposed sites both independent of one another, and in combination.

7.432 Peak activity rates for envisaged blasting frequency and extraction rates and the type of explosives used were supplied to Hydro-G by the Environmental Manager of the quarry.

7.433 The explosives contractor used by the quarry is Kemek and the explosives material used is Kemex 70, which is a site mixed bulk emulsion explosives produced from emulsion matrix. Emulsion matrix is essentially an aqueous solution of ammonium nitrate emulsified in oil. Kemex products may also contain ammonium nitrate prills, fuel oil, aluminium and/or gassing agents. The Technical Data Sheets (TDS's) and MATERIAL SAFETY DATA SHEET (MSDS's) for explosives, primers and detonators used at the site were used in the simulations presented here.

7.434 Literature suggests that small percentages of N compounds can remain as residual coating on bedrock following blasting. This has the potential to be dissolved when it comes into contact with water, albeit potential concentrations are low. The study that is most referenced was completed by Environment Canada in 1988 (Ferguson & Leask, 1988), which outlines a procedure for determining the residual N compounds for various site types. The stepwise procedure used in the 1988 study for predicting aqueous concentrations of N species, is as follows:

a) Calculate the annual leached nitrogen loading (kg/year) for the entire site based upon annual explosive mass usage and residual N fraction associated with explosive type.

b) Separate the leached nitrogen loading among quarry components (e.g. entering surface water, remaining on extracted rock etc.).

c) Separate into loadings of N compounds (Nitrate, Nitrite and Ammonia), and

d) Calculate the flow concentration.

RECEIVED: 17/12/2025

7.435 The concentrations of N species in discharge water from the blasting of bedrock in the proposed greenfield extension at the application site quarry are calculated using this procedure. This is presented in Table 7-15, below.

7.436 The highest residual is for nitrate (99%), and upper limits of the ranges are used in all cases to determine the concentration of N species in pumped water. These are very conservative assumptions and they will result in worst case simulation results.

7.437 The calculation also assumes that 100% of residual N is dissolved in drainage waters and is subsequently pumped from the quarry by dewatering. The results of calculations presented in Table 7-15 clearly show that the residual N compounds would have low concentrations. Resultant concentrations in waters discharged via the infiltration pond are calculated to be: 0.8 mg/l NO_3-N (3.5 mg/l as NO_3), 0.012 mg/l NH_4-N (12 µg/l as NH_4) and 0.021 mg/l NO_2-N (0.069 mg/l as NO_2).

7.438 Overall, the quantitative impact assessment presented in Table 7-15 demonstrates that the residual concentrations meet the requirements of the Threshold Values (TVs) of the Groundwater Regulations (2010), which prescribe TVs of 37.5 mg/l of NO_3, 65 to 175 µg/l as Ammonium and 375 µg/l as Nitrite. The calculated residuals for all N Species are a fraction of the TVs defined in the Groundwater Regulations. Consequently, there is no expected exceedance for Regulatory Threshold Values specified in the Groundwater Regulations (2010, as amended).

Table 7-15: N compound concentrations for explosives in dewatering discharge

		Existing Quarry	Proposed Extension	In-Combination
		Explosive Mass Balance		
Area	ha	12.6	12.5	25.1
Area	m^2	126,000	125,000	251,000
Rock depth Remaining to be blasted	m	31	55	
Approximate volume of rock to be extracted	m^3	3,906,000	6,875,000	10,781,000
Volume of rock accounting for 15% losses	m^3	3,320,100	5,843,750	9,163,850
Explosive mass required (general for all quarries)	kg/m^3	0.4	0.4	0.4
Explosives mass required	kg	1,328,040	2,337,500	3,665,540
Planned remaining duration of extraction	years	15	35	
Explosives mass required per year	kg/yr	88,536	66,786	155,322

RECEIVED: 17/12/2025

	Nitrogen Mass Balance Facts			0
Explosive mass as ammonium nitrate	%	94	94	94
Ammonium nitrate as N	%	35	35	35
Mass of N	kg/yr	38,759	30,762	69,521
Residual fraction		0.06	0.06	0.06
Residual N	kg/yr	2,326	1,846	4,172
	Residual N Compounds **			
Residual NO_3 (75 – 99% of Residual N value)	kg/yr	2,303	1,828	4,130
Residual NH_4 (0.5 – 24% of Residual N value)	kg/yr	558.24	443.04	1,001
Residual NO_2 (0 – 6% of Residual N value)	kg/yr	139.56	110.76	250
	** as part of a conservative approach the highest possible % residuals have been adopted from the available ranges			
	Water Balance			
Section 4 Permitted Daily Quarry Discharge	m^3/d	12,000	12,000	12,000
Section 4 Permitted Daily Quarry Discharge	l/yr	4,380,000,000	4,380,000,000	4,380,000,000
	Increase in Nitrogen compound concentrations ***			
Residual compound concentrations NO_3	mg/l	0.53	0.42	0.47
Residual compound concentrations NH_4	mg/l	0.13	0.10	0.11
Residual compound concentrations NO_2	mg/l	0.03	0.03	0.03
	*** calculation of residual concentrations = (kg/yr * 10^6 = mg/yr) / litres/yr)			

7.439 The calculated masses likely to result from the use of explosives at the site are an order of magnitude lower than the concentrations for nitrate in the groundwater and current discharge. Results for Nitrate suggest an additional 0.5 mg/l, results for ammonia suggest an additional 0.1 mg/l and for nitrite an additional 0.03 mg/l might be added when the maximum possible residuals are applied to each component of the nitrogen cycle, which is ultra conservative.

7.440 The calculated residuals, when added to baseline values, will remain compliant with Environmental Objectives for the downstream Transitional Waters. There will be no explosive's residuals impact on the underlying groundwater or the designated transitional waters to the south. The risk of impact to local and regional water quality arising from the use of explosives at the site is therefore negligible.

RECEIVED: 17/12/2025

Quantitative Impact Assessment – Abstraction, GWB Scale WFD Compliance

7.441 A GWB scale mathematical calculation for quantitative status and WFD compliance is presented here.

7.442 The Midleton GWB has an approximate area of 136 km^2 (GSI, 2004) and the GSI assigns a whole GWB area weighted average groundwater recharge value of c.375 mm/yr. The volume of groundwater associated with this groundwater body is therefore 51,061,200 m^3/yr, approximately.

7.443 A WFD based quantitative water balance for the Midleton Groundwater Body is presented as Table 7-16. Impact is determined based on the Long Term Annual Average (LTAA) volume of water intercepted, managed, treated and discharged from the quarry. The daily average LTAA is predicted to be 1,300 m^3/d; the predicted worst case scenario LTAA volume is 8,780 m^3/d.

Table 7-16: WFD & GWB Scale Quantitative Status Compliance

Final quarried area of entire quarry (existing Site and Proposed Lateral Extension)	ha	25.1
Final quarried area	m^2	251,000
Midleton GWB	km^2	136
Midleton GWB	m^2	136,000,000
Annual Average Rainfall/Recharge Rates		
GSI Effective Rainfall	mm/yr	626
GSI Groundwater Recharge	mm/yr	400
GSI Groundwater Recharge Area Average	m/yr	0.4
Recharge to Specified Areas		
Rainfall recharge to Midleton GWB (0.4 m x 136,000,000 m^2)	m^3/yr	54,400,000
Rainfall recharge to Midleton GWB	m^3/d	149,041
Quarry waters		
Predicted Average daily discharge (existing Site and Proposed Lateral Extension)	m^3/d	2,600
Section 4 Licence PERMITTED Maximum daily discharge	m^3/d	12,000
Predicted maximum daily discharge	m^3/d	12,000
Predicted maximum annual discharge	m^3/yr	4,380,000
Impact on Regional Groundwater Flows		
Proportion of waters managed at the overall site as a % of Midleton GWB annual recharge to groundwater	%	8

RECEIVED: 17/12/2025

7.444 The significance of the WFD scale GWB water balance information presented in Table 7-16 is that the maximum Long Term Annual Average volume of water intercepted, managed, treated and discharged from the quarry represents 8% of groundwater flowing through the GWB. WFD Working Group Guidance GW5 (WFD WG, 2004b) assigns a rating of 'Low Potential for Impact' for a 2 to 10% result in Low Storage groundwater systems, which the Midleton GWB is.

7.445 Aside from the Low to Moderate Impact Potential of the site, other mitigating factors are, as follows:

- Quarries discharge their 'abstraction' back to the hydrological system. Under pre-development greenfield conditions groundwater flow direction is from north to south through the application site, with all groundwater outfalling to the transitional waters to the south. The groundwater flow direction is only interrupted within the application site itself. All intercepted groundwaters are discharged to ground downgradient of the site, via an existing infiltration pond.
- Apart from small uses in product, there is no loss arising from a quarry's 'abstraction'.
- It is calculated that the proposed extension will intercept 8% of the annual rainfall recharge contribution to the Midleton GWB and then sends it straight to the Great Island North Island, as nature had originally intended.
- The outer, upgradient, boundary of the Midleton GWB extends to c.2.8 km from the quarry in a northerly direction. The application area is immediately upgradient of the ultimate discharge mechanism for the Midleton GWB, which is the Great Island North Channel. Groundwater intercepted and managed at the quarry is sent to the Great Island North Channel in any case.

Mitigation Measures

7.446 The significant potential Effects identified in Table 7-14, above, are resolved under the mitigation measures set out under Table 7-17, below. The key principles of avoidance, prevention, reduction and remedy/off-set have been adhered to in this regard.

7.447 There is a long established Section 4 Licence in which discharge quality results are reported to Cork County Council. Good site practices and pollution prevention are well established.

7.448 Key mitigation measures for the site include, as follows:

- Maintain the established and effective control measures for prevention of contamination from hydrocarbons.

RECEIVED: 17/12/2025

- Maintain the established and effective control measures for removal of sediment from discharge waters.
- Annual monitoring of groundwater levels across the application site, notably upgradient groundwater level monitoring points.
- Ongoing monitoring of discharge flow rates. Monitor discharge from the proposed extension and the existing quarry separately, and cumulatively.
- Ongoing groundwater and discharge water quality monitoring in line with current programme and terms of discharge license.

7.449 The restoration scheme will involve leaving the void open as a habitat and rainfall attenuation system with ecological benefit. Upon completion the final void volume shall be c.7,000,000 m^3, with water subsequently accumulating to c. 0 mOD, equivalent to 4,375,000 m^3. The lowest perimeter of the proposed c. 12.5 ha extension is 20 mOD at its southern boundary. An overflow mechanism shall be installed along the southern perimeter to allow exceed waters collecting in the void to overflow southwards. These waters shall be routed to the inlet of the settlement pond and will enter the infiltration pond.

7.450 Consequently, post-closure flooding poses no risk to third-party lands or to receiving waters.

Residual Impacts

7.451 Residual impacts refer to the degree of environmental change that will occur after the proposed mitigation measures have taken effect. Assuming implementation of the mitigation measures described above the residual impacts on the hydrological and hydrogeological environment during the operational phase are assessed to be long-term and imperceptible. Refer also to Table 7-17 below.

7.452 A potential residual impact at any quarry site is the reduction of groundwater levels in local third-party wells. The extremely low bedrock permeability values suggest short groundwater flow paths and thereby the proposed development should not impact local wells. It is understood that the dwellings on the local road to the north are served by a public mains supply. There have been no reported impacts to local domestic wells or public water supply wells to date.

RECEIVED: 17/12/2025

Unplanned Events

7.453 Consideration has been given to environmental impacts associated with unplanned events such as accidents, floods, etc. Intense rainfall events during the operational phase may give rise to increased runoff and hence increased sediment mobilisation. The sump is located within a topographical depression and no runoff leaves the site boundary without undergoing settlement. Hence any increase in sediment-laden runoff will be directed towards the lowest point of the quarry, i.e. active sump.

7.454 Unplanned events such as high-speed winds have the potential to generate dust. Mitigation measures for the dust suppression are currently in place at the site.

RECEIVED: 17/12/2025

Table 7-17: Summary of Mitigation Measures & Residual Effects

PHASES	POTENTIAL IMPACT			MITIGATION MEASURES	RESIDUAL EFFECT FOLLOWING MITIGATION	
	Activity	Attribute	Character of the Potential Impact	Description of Mitigation	Significance or Quality of the Effect	Probability of Effect Post Mitigation
Construction Phase	Stripping of Overburden.	Transitional Waters	Excavation and stockpiling of soil and subsoil creates potential for loss of particulates in the stockpiling of soils and subsoils. Silt in runoff has potential to affect the quality of the discharge and degrade water quality.	Working contours shall be such that there are no direct pathways for suspended solids to leave the site via uncontrolled runoff. Excavations at the site shall be clearly defined and restricted to the stated areas. Excavated overburden will remain exposed for as little time as possible. Topsoil stripping will be restricted to the minimum area required for efficient earthworks operation. Any stockpiles shall be located over 15 m from drainage channels. However, there are none at the site currently. Any stormwater leaving stripped areas shall be diverted towards the extension's sump, preferably via a temporary settlement pond. Perimeter berms shall be vegetated with grass seed. A silt fence shall surround the perimeter of the working area. Maintain a vegetated margin of at least 10 m around the working area where possible.	Imperceptible	Unlikely

RECEIVED: 17/10/2025

PHASES	POTENTIAL IMPACT			MITIGATION MEASURES	RESIDUAL EFFECT FOLLOWING MITIGATION	
	Activity	Attribute	Character of the Potential Impact	Description of Mitigation	Significance or Quality of the Effect	Probability of Effect Post Mitigation
Construction Phase	Use of excavators & dump trucks: spillages during refuelling, use and storage of lubricants	Groundwater & Transitional Waters	Contamination of groundwaters and transitional waters with hydrocarbons. Potential to affect the quality of the discharge, groundwater and degrade water quality.	Potentially contaminating substances will be stored in a designated area that is isolated from potential receptors. There are no drainage ditches or surface waters within or on the perimeter of the greenfield application area. Hazardous wastes such as waste oil will be stored in designated, sealed containers on the existing quarry site. All waste containers and fuel tanks shall be stored within a secondary containment system (e.g., a bund for static tanks or a drip tray for mobile stores and drums). The bunds will be capable of storing 110% of tank capacity, plus a minimum 30 mm rainwater allowance where the bund is uncovered. Where more than one tank is stored, the bund must be capable of holding 110% of the largest tank or 25% above the aggregate capacity. Drip trays used for drum storage must be capable of holding at least 25% of the drum capacity. Regular monitoring of water levels within drip trays and bunds on the existing quarry site due to rainfall will be undertaken to ensure sufficient capacity is maintained at all times. Refuelling shall be by mobile bunded bowser at a designated area, i.e., site compound, or where possible within the existing quarry. An adequate supply of spill kits and hydrocarbon absorbent packs shall be stored in a works area on the application site. An oil interceptor forms part of the system the settlement lagoon system and removes hydrocarbons that may be present in the water.	Imperceptible	Unlikely

RECEIVED: 17/10/2025

PHASES	POTENTIAL IMPACT			MITIGATION MEASURES	RESIDUAL EFFECT FOLLOWING MITIGATION	
	Activity	Attribute	Character of the Potential Impact	Description of Mitigation	Significance or Quality of the Effect	Probability of Effect Post Mitigation
Operational Phase	Blasting of bedrock.	Groundwater	Deterioration in groundwater quality	Bedrock blasting at all sites is Gardai licenced, supervised and controlled. Installation of, and detonation of, explosives can only be completed by Industry specialists. In the EIAR, a sequence of calculations were presented to estimate the residuals of all nitrogen species (Nitrate, Ammonia, Nitrite) in all site waters after blasting. The results of the calculations show that the simulated resultant concentrations all N Species are microscopically very low and satisfy the relevant Environmental Quality Standards (EQSs) of the Surface Water Regulations and Groundwater Regulations by at least an order of magnitude. It is surmised that the risk of impact to the environment and water quality is imperceptible.	Imperceptible	Unlikely
	Extraction of bedrock.	Groundwater	Permanent removal of bedrock for society's use.	Vulnerability classification in the area shall be altered from the current classification of High to Extreme. Mitigation measures shall prevent any potential contamination to groundwater.	Imperceptible	Unlikely
	Movement of aggregate stockpiles.	Transitional waters.	Mobilisation and migration of suspended solids Elevated Suspended Solids in the discharge resulting in sediment deposition in tidal waters disrupting sensitive marine habitats.	A sumps on the application site quarry floor shall act as an intermediary settlement lagoon for waters that run off the aggregates. There is a specifically designed final settlement lagoon system which has been demonstrated to function efficiently. The final discharge is monitored quarterly and samples analysed in an accredited laboratory for a range of hydrochemical parameters, including Suspended Solids. The EPA Extractive Industry Guidelines (2006) recommend a Suspended Solids ELV concentration of 35 mg/l SS. The quarry's Section 4 in Licence ENV/W/78 ELV is 35 mg/l SS and all recorded occasions the discharge's SS is <LOD. The established water management systems are fit for purpose to serve the proposed greenfield application area because the quarry already receives, attenuates, manages and discharges the greenfield area's rainfall runoff, epikarst discharges and subterranean groundwater seeps.	Imperceptible	Unlikely

RECEIVED: 17/10/2025

PHASES	POTENTIAL IMPACT			MITIGATION MEASURES	RESIDUAL EFFECT FOLLOWING MITIGATION	
	Activity	Attribute	Character of the Potential Impact	Description of Mitigation	Significance or Quality of the Effect	Probability of Effect Post Mitigation
	Use of quarrying machinery: spillages when refuelling, lubricant use and storage.	Groundwater & Transitional Waters	Contamination of transitional waters and groundwaters with hydrocarbons	The same Mitigation Measures apply to the use of Quarrying Machinery, Spillages, refuelling, use of Lubricants as was presented, above, for the Construction Phase. The same control and mitigation measures will apply to all site activities: enabling, operational and restoration.	Imperceptible	Unlikely
	Quarry dewatering, lowering groundwater levels.	Groundwater & Transitional Waters	Reduction in third party well yields. Reduction in quantity of groundwater in the GWB.	Beneath the proposed quarry extension area, almost the entire depth to the proposed floor level of -35 mOD is relatively homogenous limestone of low permeability. Clay infill has been logged but are not considered to be significant groundwater flow paths. Hence proposed works are unlikely to introduce notable volumes of additional groundwater from the bedrock aquifer above this predicted in dewatering calculations. The proposed works have potential to create some minor drawdown effects around the site, predicted to be in the order of 100 m beyond the perimeter of the extraction area. However, groundwater gradients are steep and this is not likely to be a significant impact. There will be no net loss or gain in the GWB system because volume intercepted and managed at the site is a negligible fraction of the regional groundwater volume. The existing quarry has already excavated bedrock to -35 mOD. There have been no significant groundwater strikes encountered in the existing quarry and site investigation works show bedrock is expected to the same in the application area. There are no 3rd party operational, in use, wells within radius of influence of the proposed greenfield application area. The evaluation of, and action on, the Groundwater Monitoring Programme is the Mitigation Measure.	Imperceptible	Unlikely

RECEIVED: 17/10/2025

PHASES	POTENTIAL IMPACT			MITIGATION MEASURES	RESIDUAL EFFECT FOLLOWING MITIGATION	
	Activity	Attribute	Character of the Potential Impact	Description of Mitigation	Significance or Quality of the Effect	Probability of Effect Post Mitigation
				With respect to the potential for the waters arising at the quarry to impact the Quantitative Status of the Midleton GWB, simulations suggest that the quarry intercepts 6% of the groundwater flowing through the GWB. The WFD Working Group (2004b) assign 'Low Potential for Impact' for a 2 to 10% result in Low Storage groundwater systems, which is what the Midleton GWB is. 'Low Potential for Impact' is deemed acceptable in the context of the facts that the quarry sits at the most downgradient, southerly, location within the Midleton GWB and the waters arising at the quarry would very soon enter Rossmore Bay in any case. The outer, upgradient, boundaries of the Midleton GWB extend to c.3 km from the quarry in a northerly direction. The quarry is very close to the ultimate discharge mechanism for the Midleton GWB, which are the transitional waters of Rossmore Bay. Groundwater intercepted and managed at the quarry ultimately enters Rossmore Bay and hence there is no net loss to the overall hydrogeological system. Overall, there is no risk presented to the GWB by the quarry's proposal to continue and extend.		
	Use of settlement lagoons	Transitional Waters	Removal and entrapment of particulate matter entrained in waters leaving site.	The site's Settlement Lagoons are in use and have the benefit of prior planning. The Mitigation Measure is in place: discharge waters will pass through a sequence of sumps on the floor of the proposed application area before being pumped to the existing settlement pond, which is maintained in good condition. Quarterly monitoring results from an accredited laboratory prove that lagoons are fit for purpose and efficient. These serve to clarify pumped quarry waters prior to them leaving site. The Conditions of the site's Section 4 Licence specify monitoring of the discharge and this is a Mitigation Measure already in place. AERS are returned each year and the results from the water management system is monitored internally on a daily and monthly basis. Calculations have been presented to confirm that quarry floor, sump and settlement lagoon system shall sufficient volumetric capacity to accommodate all waters for the required residence time. Discharge will be of a quality that will not have a detrimental impact on surface water quality in terms of suspended solids.	Imperceptible	Unlikely

RECEIVED: 17/10/2025

PHASES	POTENTIAL IMPACT			MITIGATION MEASURES	RESIDUAL EFFECT FOLLOWING MITIGATION	
	Activity	Attribute	Character of the Potential Impact	Description of Mitigation	Significance or Quality of the Effect	Probability of Effect Post Mitigation
	Cleaning of settlement lagoons	Transitional Waters.	Improves efficiency of settlement lagoons, attenuation Mobilisation and migration of suspended solids	Particulate matter captured in settlement ponds is managed sustainably. Particulate matter captured in settlement ponds to be transferred to landscaped perimeter bunds.	Imperceptible	Unlikely
	Use of wheelwash	Transitional waters	Removal and entrapment of particulate matter attached to vehicles	The existing site wheel wash facility shall be utilised by the extension area. Internal haulage routes will be served by sprinkler systems. Regular monitoring and maintenance of the wheel wash's tank and silt traps shall be undertaken in accordance with the manufacturer's specifications.	Imperceptible	Unlikely
	Wheelwash maintenance	Transitional waters	Improves wheelwash efficiency and reduces mobilisation and migration of suspended solids	The wheelwash shall be maintained in accordance with manufacturer's specifications.	Imperceptible	Unlikely
	Use of hydrocarbon interceptors	Groundwater & Transitional Waters	Entrapment of hydrocarbons lost during refuelling/discharge	The site's infrastructure is already in place to manage solids and interception of oils in the interceptor at the inlet to the settlement lagoon system and prior to discharge.	Imperceptible	Unlikely
	Monitoring	Groundwater & Transitional Waters	Monitoring of discharge rates, suspended solids, discharge water quality, groundwater quality	The Conditions of the existing Section 4 Licence prescribe monitoring. There is no Mitigation needed. The action is Positive.	Imperceptible	Unlikely

RECEIVED: 17/10/2025

PHASES	POTENTIAL IMPACT			MITIGATION MEASURES	RESIDUAL EFFECT FOLLOWING MITIGATION	
	Activity	Attribute	Character of the Potential Impact	Description of Mitigation	Significance or Quality of the Effect	Probability of Effect Post Mitigation
Operational Phase	Pumped discharge of quarry waters	Transitional waters	Deterioration in transitional water quality. Increased coastal flood risk.	With respect to the potential for deterioration in transitional water quality, the Conditions of the existing Section 4 Licence specify ELVs that have been demonstrated to ensure compliance with the relevant EQOs. The water management systems are proven to work: quarterly monitoring results submitted to Cork County Council demonstrate this. The site's discharge does not change the hydrochemical signal of coastal waters because sampling has shown that waters in the existing quarry sump and in groundwaters beneath the application site are brackish. The void on the floor of the proposed extraction area shall be large enough to accommodate and holdback all extreme rainfall events until the storms have passed in the downstream systems. Discharge of sump waters to the infiltration pond will not propagate an increase in flood risk.	Imperceptible	Unlikely
	Use of crushing/ screening plant	Transitional Waters	Contamination of transitional waters with small particles of rock and dust.	Dust and small rock particles can present significant adverse impact potential for water arising on the floor of a quarry. However, as previously stated, the site's floor sumps and settlement lagoons are appropriately sized, operated and managed, so as to ensure no elevated suspended solids concentrations in the site's discharge. Quarterly monitoring, reported in AERs demonstrate that there is adequate mitigation in place.	Imperceptible	Unlikely
Restoration Phase	Removal of semi-mobile and mobile plant (pumps, generators, etc.)	Groundwater & Transitional Waters	Elimination of hydrocarbon sources	Positive impact. No mitigation required.	Imperceptible	Unlikely

RECEIVED: 17/10/2025

PHASES	POTENTIAL IMPACT			MITIGATION MEASURES	RESIDUAL EFFECT FOLLOWING MITIGATION	
	Activity	Attribute	Character of the Potential Impact	Description of Mitigation	Significance or Quality of the Effect	Probability of Effect Post Mitigation
	Dismantling and removal of fixed plant (e.g. wheelwash, etc.)	Groundwater & Transitional Waters	Elimination of hydrocarbon and dust sources	Positive impact. No mitigation required.	Imperceptible	Unlikely
	Landscaping and movement of infrastructure and overburden stockpiles necessary to facilitate site restoration	Groundwater & Transitional Waters	Mobilisation and migration of suspended solids Sediment deposition in tidal areas disrupting sensitive marine habitats.	Site restoration will take place on a phased basis as extraction is completed in defined areas of the site. In the final restoration of boundaries with adjoining lands levels will be graded to harmonise with the surrounding landscape. Perimeter silt fence to be installed at the toe of any overburden stockpiles. Restored areas to be vegetated to enhance stability.	Imperceptible	Unlikely
	Cessation of pumping	Groundwater & Transitional Waters	Recovery of groundwater levels. Risk of contamination to transitional waters.	Post-completion groundwater levels will return to current baseline levels, thereby partially filling any voids. These voids may be left as open waterbodies for recreational or ecological benefits. Chapter 2 outlines how 6,000,000 m^3 of bedrock is to be excavated at the application site. On the basis of the 12.5 proposed extension to the existing site, its proposed floor of -35 mOD, and resting groundwater levels of c. 0 mOD, there will be a final water-filled void volume of c.4,375,000 m^3 (though this volume does not factor in bedrock left in-situ on bench perimeters). Based on the rainfall runoff contribution data (Table 7.4 and text following), c.3,000,000 m^3/yr of rainfall runoff will accumulate on the floor (400 mm/yr recharges to groundwater through the floor). It is estimated that it will take at c.10 - 15 years for the void to fill with water after the cessation of works at the quarry. It is likely to take a little longer, given uncertainties and some lateral movement through the walls of the void's epikarst. It is therefore	Imperceptible	Unlikely

RECEIVED: 17/10/2025

PHASES	POTENTIAL IMPACT			MITIGATION MEASURES	RESIDUAL EFFECT FOLLOWING MITIGATION	
	Activity	Attribute	Character of the Potential Impact	Description of Mitigation	Significance or Quality of the Effect	Probability of Effect Post Mitigation
				predicted that the void will be a lake type habitat by 2065, considering that this is a 25 year application for consent and that means that it will be at least 2050 by the end of works. The topographical elevations are lowest on the southern boundary of the proposed extraction area (20 mOD). Groundwater levels are currently approximately 0 mOD at the southern end of the proposed extraction area. Hence upon recovery of groundwater levels the water surface will be 20 m below the lowest point of the perimeter. As a safety mitigation an overflow ditch will be cut into the southern boundary, and will connect to the western boundary (current inlet) of the settlement lagoon. This will allow any excessive accumulation of water in the void to overflow by gravity into the existing settlement pond, before entering the existing infiltration pond.		
Unplanned Events	Major Spillage	Groundwater & Transitional Waters	Hydrocarbon contamination	As specified above, Spill Kits are SOP and all Refueling Vehicles will carry those Spill Kits. bunded tanks, drip trays, appropriate containers in appropriate locations will be ensured.	Imperceptible	Unlikely
	Intense Rainfall Events	Groundwater & Transitional Waters	On-site flooding. Off-site flooding.	The floor of the quarry is large and this is the mitigation measure. In the operational phase of the quarry, the pumps in the sump can be shut off it there is a threat of flooding, caused by storm events, in the wider environment. In the post closure phase when the final water level is at 0 mOD, there is adequate freeboard between the flooded water level and the elevation of the perimeter berms. Regular monitoring and maintenance of the mitigation systems will be conducted to ensure their continued effectiveness. Compliance with relevant environmental regulations and standards will be maintained throughout the operational and post closure phases.	Imperceptible	Unlikely

RECEIVED: 17/11/2025

Cumulative & In Combination Impacts

7.455 The aim of this exercise is to examine whether any other developments, existing or proposed, have the potential to act in-combination with the proposed application, subsequently giving rise to effects that would not otherwise be significant. The assessment considers the phasing of the proposed project.

7.456 The cumulative impact assessment considered proposed and permitted activities within the Midleton GWB. Discretion has been used to select only those activities most likely to have an in-combination effect with the application site.

7.457 The application area constitutes an extension to a working quarry which contains an active extraction area in addition to processing plant and associated ancillary facilities. The primary mitigating factor for this site, whether the water environment or other impacts are to be considered, is that the rock is so competent and the groundwater component relatively small such that there will be no significant spread of effects. The application site is self-contained, and both discharge and groundwater monitoring programmes are already in place to quantify the hydrogeological regime within the site and in the surrounding environs.

The cumulative impact assessment considered activities within a 5 km radius. A search of Cork County Council's and An Bord Pleanála's online planning search facilities was availed of to identify planned developments in the vicinity of the application site that have the potential to have any significant cumulative effects with the proposed development.

Quarries

7.458 The primary in-combination effect is likely to be with the existing active quarry. In addition to that, consideration has also been given to other quarries in the locality. For this purpose, reference was made to the GSI Active Quarry Register, aerial maps and the Cork County Council planning database to identify other active quarries in the area.

7.459 The following quarries are within a 5 km radius of the application site:

- Breedon, Rossmore = 40 m to the west;
- Kilsaran, Rossmore = 275 m to the west;
- Roadstone, Carrigtwohill = 1,800 m to the northeast;
- Breedon, Milebush = 2,500 m to the northeast.

RECEIVED: 17/12/2025

7.460 These quarries are regionally important in terms of supply of raw materials and readymix concrete to Cork City and surrounding areas.

Breedon Rossmore

7.461 The impacts of the combined abstraction from both the existing Breedon quarry at Rossmore and the proposed extension can be conceptualised as the impacts from a combined dewatering sump with a maximum abstraction rate of 12,000 m^3/d (139 l/s). This is the approved ELV set out in discharge license WP(W)08/18(R). A conceptual model has been developed that considers the drawdown impacts of the existing Breedon quarry deepening to -50 mOD and the proposed extension to the east dewatering to -35 mOD (see Figure 7-15 and Figure 7-16).

7.462 The proposed floor of the extension will extend to a minimum 15 m above the final floor of the existing Breedon quarry and site investigation works have proven that the geology is the same in both quarries.

7.463 The existing radius of influence caused by dewatering of the existing quarry is not expected to be altered significantly as a result of the proposed extension. The radius of influence to the existing quarry was estimated in previous studies to be up to 300 m from the northern perimeter of the existing quarry.

7.464 As the quarry is deepened further into even lower permeability bedrock it is not envisaged that the radius of influence will significantly increase.

7.465 The radius of influence likely to be caused by the proposed extension has been calculated as extending approximately 100 m from the eastern perimeter. The in-combination radius of influence is illustrated in Figure 7-11. There are no wells or other groundwater receptors located within this radius of influence, and hence no impact possible.

7.466 The hydraulic conductivity values calculated previously for the wells in the existing site are similar to those returned for wells in the proposed extension. As a result it is appropriate to conceptually model the groundwater inflows in a similar manner. This is backed up by actual discharge data from the existing quarry.

7.467 The existing quarry currently extends to -35 mOD, which is close to the proposed floor of the extension. Average daily discharge from the existing quarry is c. 1,300 m^3/d. Based on all of the site investigation data collected it is reasonable to assume that average daily discharge from the proposed extension will be similar, *i.e.* 1,300 m^3/d. The combined

RECEIVED: 17/12/2025

average daily discharge is therefore expected to be < 3,000 m^3/d. This is less than the licensed flow ELV. The existing water management system has been designed to cater for 12,000 m^3/d so under average daily discharge conditions there will be no in-combination effects to the receiving waters.

7.468 Worst-case scenarios have been considered. For the existing quarry the worst-case scenario is likely to be the maximum daily discharge, this being 4,000 m^3/d. For the proposed extension the worst-case scenario was estimated by applying the highest hydraulic conductivity values returned from field testing across the entire extension area. This yielded a potential ingress of 8,780 m^3/d. This is an extremely unlikely scenario given bedrock across most of the extension area has proven to be of low permeability.

7.469 The intertidal zone in Rossmore Bay is underlain by low permeability muds, while sands and gravels are exposed in the deepest central part of the channel below the low tide mark south of the site. Any additional drawdown effects to the south of the existing Breedon quarry and the proposed extension would be confined and would have no effect on the hydrology of the intertidal muds which are inundated twice daily by the tide and are hydraulically isolated from the underlying aquifer.

7.470 Any saline waters that do enter the quarry via highly permeable bedrock zones are simply returned to the tidal waters to the south via the settlement ponds and infiltration area.

7.471 The existing infiltration pond is located approximately 120 m from the proposed southern face of the extension. This distance is likely to be greater when benches are taken into account. This means that the infiltration pond will remain outside the combined radius of influence to the existing quarry and proposed extension.

Kilsaran Rossmore

7.472 The measured discharge rates at the existing Breedon Rossmore quarry take into account ongoing activities at the Kilsaran site. The Kilsaran site operates under discharge license WP(W)10/18, which has no ELV with respect to discharge. However the activities at Kilsaran Rossmore are well established and progression of excavation at that site is likely to be vertical, into lower permeability bedrock.

7.473 The Kilsaran quarry is permitted to excavate to a final depth of -40 mOD which is close to the current floor of the existing Breedon Rossmore quarry (-35 mOD) and that of the proposed extension (-35 mOD). Dewatering rates from these sites are expected to be

RECEIVED: 17/12/2025

broadly similar approaching completion. Hence there is considered to be no cumulative impact between radius of influence to the proposed extension due to activities at the Kilsaran site.

7.474 As stated above, it is important to note that the radius of influence of the proposed extension east of the existing Breedon quarry will not be influenced by Kilsaran dewatering operations.

Breedon Milebush

7.475 The Breedon quarry at Milebush (Ballynaboitra) has ceased bedrock extraction.

7.476 There is no discharge from the site under historical or proposed activities. Direct rainfall and treated runoff infiltrate to ground.

7.477 The proposed activity at Breedon Milebush will therefore have no in-combination impact on identified hydrological/hydrogeological receptors.

Roadstone Carrigtwohill

7.478 Cork County Council provided Hydro-G with information available to them regarding the quarry at Ballintubrid East, Carrigtwohill, Co. Cork, operated by Roadstone Ltd. Cork County Council did not provide Hydro-G with actual discharge volumes since the license was issued. The Roadstone quarry avails of a license to discharge waters which was granted by Cork County Council in 2017 under the Local Government (Water Pollution) Acts 1977 and 1990 (Ref: WP(W)03/17(R)). The maximum permitted rate is 28,000 m^3/d or 1,272 m^3/hr and the discharge waters enter the Great Island North Channel at Cork Harbour. The groundwater flood risk assessment compiled by Conroy (2012) implies that groundwater levels in the area remain within a relatively stable range regardless of whether Ballintubrid East quarry is dewatering.

7.479 Hence there is not considered to be any perceptible quantitative impact in terms of groundwater flows and levels as a result of cumulative impacts with Roadstone Carrigtwohill.

7.480 Given the above, there are no significant impacts anticipated with respect to the hydrological or hydrogeological environment from the proposed development in combination with other existing developments and land uses within the locality.

RECEIVED: 17/11/2025

All Quarries Combined

7.481 Having assessed the impact of the combined dewatering of the existing Kilsaran and Breedon quarries, the identified impacts in relation to the proposed extension are the slight extension of the radius of influence to the east and north of the proposed extension. There is potential for an increase in the volume of saline water being drawn in from the centre of the Rossmore Bay channel through the underlying sands and gravels. These impacts are assessed as being acceptable and the water management system has the capacity to treat and discharge the anticipated volumes.

7.482 Given the dynamic of tidal and freshwaters in the area the cumulative discharges from all bedrock quarries in the area is not likely to have a detrimental impact on transitional water quality to the south. The effect of the discharge on transitional water quality within the Great Island North Channel is greatly ameliorated by the tidal exchanges through the channel, which reduces the average water residence time. The volumes of water discharging from all of the quarries in the area to the tidal waters are minuscule compared to the volumes flowing through the Great Island North Channel. There is a very low level of freshwater discharge into Great Island North Channel and the dilution and mixing is provided entirely by the ebb and flow of the tides. The tidal nature of the channel results in frequent changes of the water mass indicating that the receiving water in the channel is refreshed on a regular basis. As a result the concentrations of the dispersed effluent parameters are removed from the channel frequently.

East Cork Civic Amenity Site

7.483 Cognisance is given to the effect of the proposed extension in-combination with the East Cork Civic Amenity Site, which contains a historic landfill, 400 m to the south of the proposed extraction area. The historic landfill is referred to as East Cork Landfill site.

7.484 East Cork Landfill Site operates under the Waste License W022-1 issued by the EPA in 2000. The license requires reporting on quarterly monitoring of landfill gas, surface water quality, groundwater quality and leachate.

7.485 The site located on a small protruding island which projects southwards into Rossmore Bay. Inferred groundwater flow directions mean that there is no interaction between groundwater

RECEIVED: 17/12/2025

at the proposed quarry extension and those below the historic landfill at East Cork Landfill site.

Shellfish Production

7.486 A commercial shellfish production facility is located 600 m south of the site, operating under the name Atlantic Shellfish Ltd. (trading as Rossmore Oysters). Areas used for the production of shellfish designated under the Shellfish Waters Directive (SWD) are protected under the WFD as 'areas designated for the protection of economically significant aquatic species'.

7.487 The requirement from a WFD perspective is to ensure that water quality does not impact on shellfish, as set out in the Shellfish Regulations (SI 268 of 2006). The Quality of Shellfish Waters Regulations (S.I. No. 268 of 2006) as amended in 2009 outline the following relevant water quality criteria:

- pH = 7 - 9;
- Temperature = discharge must not cause an increase of more than 2℃;
- SS = discharge must not increase suspended solids content of receiving waters by 30%;
- DO = equal to or greater than 80%.

7.488 Water bodies containing designated shellfish waters will be At Risk where a water quality parameter is above the concentrations given in the Regulations.

7.489 The discharge license under which the existing quarry operates ((WP(W)08/18(R)) will continue to be the regulatory standard controlling waters leaving the proposed extension. Providing the specified ELVs are satisfied there will be no cumulative impact to local shellfish waters.

7.490 There is no impact to the hydrological environment when the proposed extension and the existing shellfish farm are considered in-combination.

Transboundary Impacts

7.491 EIA Directive 2014-52-EU invokes the Espoo Convention on Environmental Impact Assessment in a Transboundary Context (1991) and applies its definition of transboundary impacts.

RECEIVED: 27/11/2025

7.492 Given the location of the site being c. 260 km at its closest position to the border with Northern Ireland the nature, size and scale of the proposed development and the fact that waters flow in a south-southwest direction towards the coastline, it is expected that the development will not have any significant transboundary effects with respect to WFD water bodies.

Do Nothing Scenario

7.493 This item requires consideration of the effect on the environment as it would be in the future should the proposed works not be carried out. As the proposed activities are an extension of an existing quarry site in line with current activities it is envisaged that no new or different potential impacts shall be introduced when compared to the operational phase to date.

7.494 The proposed activities include restoration of the site following completion of bedrock extraction.

7.495 In terms of protecting groundwater and surface water resources it is considered more appropriate to continue activities in areas adjoining the current application site, as opposed to opening a new quarry on a greenfield site in another area, in order to meet the demands of the construction industry. Discharge of groundwater and rainfall-runoff across the site boundary is managed under a discharge license issued by Cork County Council.

7.496 Given the lowest bench in the proposed extension area will not be lower than the adjacent permitted quarry, it is envisaged that, there will be no significant alterations to the current water management system.

7.497 The operator is now established at this site and this site has been integrated into the local environment. It is also in line with the Cork County Development Plan 2022 – 2028. The operational phase will not involve an intensification in extraction rates or rates of water usage in processing of raw material at Breedon Rossmore. Whilst machinery will be replaced as necessary there will be no increase in use of hydrocarbons.

7.498 If the proposed development did not proceed, the aggregate resource would remain unused in situ, and the local supply of quality aggregates and concrete products would be more restricted, the availability of materials for road maintenance would be constrained until another company filled the need.

RECEIVED: 27/11/2025

7.499 It is expected that the site would not undergo any changes in terms of surface and groundwater under a 'do-nothing' scenario, and that the interception and discharge from the site will not significantly change the groundwater dynamics component of the site.

7.500 The demand for rock resources continues to be driven by the ongoing need for housing, roads, shopping centres, data centres and industrial parks. The 'Do-Nothing' scenario would create a temporary supply shortfall in the construction market, which would eventually restore itself, but likely at a higher cost to the consumer.

7.501 With respect to this water assessment, and water dependent habitats and species, given that the quarry has been in operation for many decades and there is no observable environmental or ecological effect there is no reason to enter the Do Nothing Scenario.

Monitoring Measures

7.502 A designated person will have overall responsibility for ensuring that all operations are carried out in such a way as to minimise potential impacts to surface water and groundwater receptors. This person will also have responsibility of monitoring the performances of any pollution control measures adopted.

7.503 Groundwater level monitoring, discharge water quality monitoring and discharge flow monitoring will continue in line with current practice.

7.504 A project-specific Environmental Management Plan (EMP) will be established and maintained by the operator during all phases of work. The EMP will cover all potentially polluting activities and include an emergency response procedure. All personnel working on the site will be trained in the implementation of the procedures during a site induction meeting.

7.505 All personnel working on the site are trained in the implementation of procedures. As a minimum, training and operations are formulated in consideration of the standard best international practice including but not limited to:

- EPA (2006) Environmental Management Guidelines for the Extractive Industry (Non-Scheduled Minerals).
- CIRIA, 2011. Control of Water Pollution from Construction Sites, Guidance for Consultants
- CIRIA, 2005. Environmental Good Practice on Site (C650).
- EI, 2005. Oil Storage Guidelines (BPGCS005).

RECEIVED: 17/12/2025

- Environment Agency, 2004. UK Pollution Prevention Guidelines (PPGs).

7.506 Hydrocarbon and silt interceptors are serviced and maintained on a regular basis by an independent licensed contractor.

7.507 Regular inspections of the site infrastructure (settlement ponds, hardstanding, drainage infrastructure, on site WWTP and discharge zone, etc.) are undertaken by a designated person.

7.508 Both the Quarry Manager and the site's Environmental Manger understand that it is part of their work and overall responsibility to ensure that all operations are carried out in such a way as to minimise potential impacts on water receptors. The quarry manager is in constant communication, and works in the same office, as the operative monitoring the performances of pollution control measures adopted to ensure that the proposed development is not impacting on the environment. The site has an existing environmental management system which is accredited to ISO 14001 standard and this will be implemented at the proposed extension area.

Interaction with Other Measures

7.509 The EIAR guidelines (EPA, 2022) highlight that the interaction of impacts to the hydrological and hydrogeological environment arising from the proposed activities, with potential receptors identified in other EIAR chapters, must be given due consideration.

7.510 Biodiversity, Land, Soils and Geology and Water are the only components of the EIA that have any potential to be connected. Each of these EIA components and the mitigation measures that are proposed are addressed in detail in the relevant chapters of the EIAR. Considering the conclusions and residual impact assessment of the Water Chapter, there are no negative impacts to interact with each other.

Application of Dewatering Impact Appraisal Methodology (UK EA)

7.511 In addition to the usual impact assessment, description of likely impacts and mitigation measures presented above, Hydro-G presented a UK Environment Agency (Boak, R. et. al., 2007) 'best practice' approach to a hydrogeologically focussed assessment (refer to **Appendix 7.7**). As previously outlined, the UK EA's approach suggests a stepwise thought-

RECEIVED: 17/12/2025

process. Following on from the completed desk and field studies, Hydro-G answers to each of the steps can be summarised as follows:

- ***Step 1:*** Establish the regional water resource status:
- **Groundwater** is mapped as a Regionally Important Diffuse Karst Aquifer (Rkd), named the Midleton Groundwater Body, assigned EPA WFD 'Good' Status (EPA 2016 - 2021) & 3rd Cycle 'Review'.
- **Surface Waters:** The site is not within a topographical catchment that drains to a surface watercourse of waterbody.
- **Transitional Waters:** the Great Island North Channel transitional waterbody is assigned EPA WFD 'Moderate' Status (EPA 2016 - 2021) & 3rd Cycle 'At Risk'.

- ***Step 2:*** Develop a conceptual model for the abstraction and the surrounding area:
- Recharge to the greenfield application area is rainfall driven. Groundwater flow direction through the site is from north to south-southwest. This groundwater is made of up of direct recharge and rainfall rejected on the raised sandstone plateau 3 km to the north. There are only few surface watercourses or drainage channels in the area. Groundwater through the application site currently enters Rossmore Bay, part of the Great Island Channel SAC and Cork Harbour SPA.
- Bedrock to be extracted is pure limestone belonging to the Clashavodig and Little Island Formations. This bedrock is classified as a Regionally Important Karst aquifer dominated by diffuse flow (Rkd).
- Bedrock encountered during drilling was largely competent. Clay-filled cavities were encountered with most of these being dry clay infill. Some of these cavities were developed following drilling and were water-bearing.
- The proposed extension to the east of the existing quarry will be extracted down to a floor level of -35 mOD. The existing quarry is currently extracting rock at c. -35 mOD. Site investigation works showed similarities in terms of bedrock type and hydraulic conductivities.
- Hence the existing quarry can be considered conceptually representative of the proposed extension. There was no significant difference between radius of influence calculated for the existing site (300 m) when compared with that of the proposed extension. Predicted discharge rates from the proposed extension can be approximated from actual measured discharge rates from the existing quarry.

RECEIVED: 17/12/2025

- ***Step 3:*** Identify all potential water features that are susceptible to flow impacts:
- Midleton GWB
- Rossmore Bay, part of Great Island North Channel Transitional Waterbody
- Great Island Channel SAC and Cork Harbour SPA.

- ***Step 4:*** Apportion the likely flow impacts to the water features.
- The GWB scale water balance suggests that the site accounts for 6% of the Midleton Groundwater Body water balance. This is 'Low Potential For Impact' value. The Conceptual Model allows that Low Impact to be considered mitigated because the quarry does not cause a loss of that water from Rossmore Bay, which would have been and remains the receiver of the groundwater in any case.
- No impacts to the above listed water features have been detected from the existing quarry. There are no predicted flow impacts to the above water features arising from the proposed extension.

- ***Step 5:*** Allow for the mitigating effects of any discharges, to arrive at net flow impacts:
- Waters will be discharged from the site under existing discharge license WP(W)08/18(R).
- Results of quarterly sampling of the existing discharge are submitted to CCC. Results demonstrate that the quality of the quarry discharge is compliant with the Conditions of the Licence.

- ***Step 6:*** Assess the significance of the net flow impacts.
- There is no net loss to flows entering transitional wates, i.e. not significant.

- ***Step 7:*** Define the search area for drawdown impacts.
- The radius of influence for the existing quarry was predicted to be 300 m.
- The radius of influence for the proposed extension was predicted to be 100 m to the east.

- ***Step 8:*** Identify all features in the search area that could be impacted by drawdown.
- No domestic wells were identified as receptors that could be impacted by drawdown.
- Dwellings on the public road to the north are served by a public mains supply.

- ***Step 9:*** For all these features, predict the likely drawdown impacts.

RECEIVED: 11/12/2025

- None predicted.

- ***Step 10:*** Allow for the effects of measures taken to mitigate the drawdown impacts.
- Not applicable.

- ***Step 11:*** Assess the significance of the net drawdown impacts.
- Not applicable.

- ***Step 12:*** Assess the water quality impacts.
- Calculations have been completed with respect to explosives residues and no cumulative impact to water quality is predicted.
- Cork County Council licensed the discharge under WP(W)08/18(R) and issued ELVs that would ensure no water quality impacts.
- Discharge quality monitoring demonstrates discharge satisfies the ELVs set out in the discharge license. This proves that the existing settlement lagoon and infiltration pond have been designed and constructed satisfactorily.
- There is likely connectivity between the final infiltration pond and the transitional waters in Rossmore Bay. The discharge ELV is miniscule when compared with the daily tidal ebb and flow through Great Island North Channel.

- ***Step 13:*** If necessary, redesign the mitigation measures to minimise the impacts.
- Not necessary.

- ***Step 14:*** Develop a monitoring strategy.
- Sampling of the discharge and groundwater at designated monitoring points will continue as per current protocol.

Conservation Objective Site Protection Measures (NATURA 2000)

7.512 The site is within 140 m of the Great Island North Channel, which is mapped as an SAC Conservation Objective Site: Great Island Channel SAC (Site Code: 001058) and an SPA Conservation Objective site: Cork Harbour (Site Code: 004030).

RECEIVED: 17/12/2025

7.513 Conservation Objective sites were presented in detail in the Desk Study section of this EIAR in a section entitled Conservation Objective Sites. (Refer to Figure 7-2).

7.514 The Great Island North Channel has two site-specific Statutory Instruments associated:

- S.I. No. 206/2019 - European Union Habitats (Great Island Channel Special Area of Conservation 001058) Regulations 2019
- S.I. No. 391/2021 - European Union Conservation of Wild Birds (Cork Harbour Special Protection Area 004030) Regulations 2021

7.515 The Cork Great Island North Channel is a Shellfish Area under S.I. No. 55 of 2009.

7.516 The detail of the EIAR demonstrated that there is no potential for a proposed extension to Breedon Rossmore Quarry to cause any negative impact on the CO sites to which it is directly connected to: Great Island North Channel. There is no potential for the proposed extension to Breedon Rossmore Quarry to affect the shellfish populations in the downstream receiving environment.

Water Framework Directive Compliance Assessment

7.517 A WFD Compliance Assessment is reported in full in a separate report accompanying this application and associated EIAR. Summary points are presented here.

7.518 With respect to the direct hydrological link from the quarry to the Great Island North Channel Transitional Waterbody IE_SW_060_0300.

- The site's Section 4 Licence and quarterly monitoring of groundwater and the discharge demonstrate no risk posed to the Good Status Objective of the Great Island North Channel. The waterbody is mapped as Moderate Status.
- The Pressures on the Great Island North Channel are not related to quarrying (the only pressure is mapped as Agriculture). The proposed development does not have potential to affect the Status or Risk to the Great Island North Channel.

7.519 The underlying Midleton Groundwater Body is mapped by the EPA as Good Status (2016 – 2021) and WFD 3rd Cycle Risk as 'Review'. With respect to an assessment of the potential of the proposed development to affect Groundwater Body Status and Risk,

- A quantitative, numerical, water balance has been completed for the underlying Midleton GWB [IE_SW_G_058] and reported in this work. The result is that the abstraction/licensed discharge of waters from the site accounts for 8% of the available groundwater resource volume. Quantitative impact values of 2 - 10% are within the **'Low Potential for Impact'** category of the WFD (2004b) Working Group GW5 Guidance Document on Groundwater

RECEIVED 17/12/2025

Abstractions. Given the proximity of the discharge point to the downgradient boundary of the Midelton GWB there is no potential impact to the GWBs quantitative status. All groundwater flowing through the quarry will flow into Great Island North Channel under the pre- and post-development scenarios.

- A quantitative impact assessment on the potential impact of the use of explosives in blasting was completed. The resultant concentrations presented in the EIAR suggest full compliance with the suite of Nitrogen Species Environmental Quality Objectives of the Surface Water Regulations (2009, as amended) and the Groundwater Regulations (2010, as amended).

7.520 The Breedon Rossmore quarry has operated through all 3 Cycles of the WFD and never has it been identified as a pressure or caused an issue. Quarries are not the published Issues or Pressures for receiving waters: agriculture is the reported. The quarry poses no risk to the Objectives of the WFD.

Appendices

RECEIVED: 17/12/2025

CONTENTS

APPENDIX 7.1 1
Statements of Expertise 1
APPENDIX 7.2 3
Section 4 Discharge Licence, As Built Drawings & & Neighbouring Licence 3
APPENDIX 7.3 26
Guidance Documents & Legislative Instruments 26
APPENDIX 7.4 29
Desk Study Resources, Data & Maps 29
APPENDIX 7.5 36
Historic Consultations of Relevance to Water 36
APPENDIX 7.6 47
Impact Effect Assessment Methodologies & Detail 47
APPENDIX 7.7 56
Dewatering Impact Appraisal Methodology (UK EA) 56
APPENDIX 7.8 57
EPA WFD Reports (2019, 2024) 57
APPENDIX 7.9 79
GSI GWB Descriptor Sheet 79
APPENDIX 7.10 86
WFD Assessment 86
APPENDIX 7.11 117
Borehole Logs 117
APPENDIX 7.12 143
Bedrock Permeability Site Investigation & Synopsis of Field Data 143
APPENDIX 7.13 156
Laboratory Certificates of Analysis 156

Making Sustainability Happen

RECEIVED: 17/12/2025

Appendix 7.1

The evaluation of the hydrological and hydrogeological environment and the assessment of impacts was completed collaboratively by Dr. Pamela Bartley and Dr. Colin O'Reilly.

Statement of Expertise: Pamela Bartley

The evaluation of the Water (hydrological and hydrogeological) environment and the assessment of effects and potential impacts, with mitigation measures and remedial impacts, was completed by Dr. Pamela Bartley (Hydro-G) who is considered a karst groundwater specialist with quarry, Section 4 Discharge Licencing and Public Water Supply expertise.

Hydro-G holds the required Professional Indemnity Insurance, Employers and Public Liability Insurance. Hydro-G is the Registered Trading name of Bartley Hydrogeology Ltd.

Pamela is a member of Engineers Ireland and the International Association of Hydrogeologists (Irish Group).

Pamela is a water focussed civil engineer with almost 30 years of practical experience in field-based groundwater investigations, drilling, instrumentation, surface water sampling, flow gauging, impact assessments, public water supply from groundwater boreholes, quarry assessments, Section 4 Discharge Licensing and wastewater treatment using Nature Based Systems.

Pamela completed her primary training in the RTC system. She completed a Certificate in Civil Engineering in Letterkenny RTC and a Diploma in Water and Wastewater Engineering at Sligo RTC in the early 1990's. Her Bachelor of Engineering degree was completed in the school of Civil Engineering at Queen's University, Belfast, and her postgraduate education at the School of Civil Engineering at Trinity College, Dublin (TCD). She completed an MSc. in Environmental Engineering at the School of Civil Engineering at TCD, which had geotechnical, hydrology, hydrogeology and legislation specialities and later a hydrogeologically focussed Ph.D at TCD.

Pamela is considered an Expert Service Provider to Uisce Eireann, she is a panel hydrogeologist, PSCS and PSDP approved and Supplier Number 1855 applies.

With respect to the extractive industry, Pamela is considered an EIA specialist with discharge licensing competency in the context of the Water Pollution Act, enacted Irish Regulation and EU Directives.

She has completed impact assessments and assisted in successful permission attainment for many regionally important quarries in SAC settings.

Pamela's quarry assessments, successful EIARs gaining planning and associated Section 4 Discharge Licences include, as follows:

i. Bennettsbridge Limestone, Co. Kilkenny consent to continue at an existing site following previous refusals at Board level and successful review update of the Section 4 Discharge Licence (ENV/W/78, 2017) permitting a range of 22,000 m^3/d as the annual average with maximums up to 70,000 m^3/d throughout the rainfall season. The discharge is to a drain that discharges to the River Nore. The large range is because it is a diffuse karst aquifer

RECEIVED: 17/12/2025

and during high rainfall there is a large volume of water on the floor carried through the epikarst of the walls.

ii. Mc Grath Limestone Works Ltd, Cong, Co. Galway (W391/05_R1, 2019) permitting a discharge of 10,000 m^3/d to the Cong Canal upstream of Lough Corrib (SAC, SPA, proposed NHA & Public Water Supply for Galway City and environs).

iii. Churchill Stone Ltd. (Cassidys), Keeloges, Churchill, Letterkenny, Co. Donegal. Section 4 Discharge (Lwat65) permitting discharge to a headwater and upstream of the commencement of mapping for a Pearl Mussel River.

iv. Harrington Concrete and Quarries, Ardgaineen, Co. Galway (W_502_22) permitting a discharge of 1,435 m^3/d to a grassed vegetation area, following an oil interceptor, and subsequent discharge to groundwater via a Nature Based System in a conduit karst aquifer in a Hydrometric Area of Lough Corrib SAC and SPA.

v. MC Group, Castleisland (W214), Co. Kerry, permitting a discharge of 540 m^3/d to surface water.

Each of these quarries operates within SAC catchments or in proximity to NHA Bogs and they have successfully managed their discharge, under licence, for many years.

Statement of Expertise: Colin O'Reilly

Dr. Colin O'Reilly has a doctorate degree in soil's systems and hydrology. He has over 20 years of professional and field-based experience as a hydrogeologist coupled with a doctorate degree in hydrology, awarded by the Centre for Water Resources Research, School of Architecture, Landscape and Civil Engineering, UCD, while a recipient of a Teagasc Walsh Fellowship. Colin's company is Envirologic, which has key competencies in hydrogeology and hydrology with expertise in flood assessments in addition to assessment of quarries across a range of diverse hydrogeological conditions across Ireland.

RECEIVED: 17/12/2025

Appendix 7.2

Section 4 Discharge License WP(W)08/18(R)

& As Built Drawings

& Neighbouring Licence

Comhairle Contae Chorcaí
Cork County Council

An Stiúrthóireacht Comhshaoil,
Inis Cara, Co. Corcaigh P31 X738.
Fón: (021) 4532700 • Faics: (021) 4532727
Suíomh Gréasáin: www.corkcoco.ie
Environment Directorate,
Inniscarra, Co. Cork P31 X738.
Tel. No. (021) 4532700 • Fax No. (021) 4532727
Web: www.corkcoco.ie

RECEIVED: 17/12/2025

25 FEB 2019

Lagan Quarries Limited
Dominica Baird
SLR Consulting
7 Dundrum Business Park, Windy Arbou
Dublin D14 N2Y7

RE: Application for Licence Register Number WP(W)08/18(R)

A Chara,

I refer to your application for a Licence under the Water Pollution Act received on 19/09/2018

Please find enclosed Licence issued as a result of your application. I draw your attention to the notes on the decision to grant regarding the appeal of the decision.

Is Mise le Meas,

Cork County Council
Environment Department
21 FEB 2019
Inniscarra

Adam McCarthy

Environment Department

c.c. Alan Costello, Cork County Council, Inniscarra
c.c. South Western Regional Fisheries Board, Macroom
c.c. Executive Engineer, Cork County Council, 3

Recycled

CORK COUNTY COUNCIL

RECEIVED: 17/12/2025

LOCAL GOVERNMENT (WATER POLLUTION) ACTS 1977 AND 1990

Licence to discharge Trade Effluent or Sewage Effluent to Waters

Reference No. In WP(W)08/18(R)

TO / Lagan Quarries Limited
Rosemount Business Park
Ballycoolin Road
Dublin 11

The Council of the County of Cork, in excercise of the powers conferred on it by the Local Government (Water Pollution) Acts, 1977 to 2007, as amended, hereby **GRANTS** a Licence, Reference Number WP(W)08/18(R)

To **Lagan Quarries Limited**
Rosemount Business Park
Ballycoolin Road
Dublin 11

To Discharge **Trade effluent arising from Quarry operations including the quarrying, the crushing of stone and asphalt production**

To (River) **Groundwater at Rossmorre**

Located at **Rossmore, Carrigtwohill, Co. Cork**

subject to the Conditions set out in the schedule attached hereto. It should be noted that a person shall not be entitled solely by reason of a licence to make, cause or permit a discharge to a sewer.

ENVIRONMENT DEPARTMENT,
ROOM FF14,
CORK COUNTY COUNCIL,
INNISCARRA,
CO CORK.

Signed on behalf of the said Council,

John O'Regan

STAFF OFFICER

Dated this 21st **day of** February, 2014

NOTE:

An appeal against a decision made by a Sanitary Authority under Section 4, Section 16 and Section 17 of the Act of 1977, may be made to An Bord Pleanala under Section 20 of the Act, as inserted by Section 15 of the Local Government (Water Pollution) (Amendment) Act, 1990 within one month of the date of the Licence.

Appeals should be addressed to THE SECRETARY, AN BORD PLEANALA,

64 Marlborough Street, Dublin 1, and will be invalid unless accompanied by an additional fee of €126.00.

A request for an oral hearing shall be accompanied by an additional fee of €63.00.

A party to an appeal shall give to An Bord Pleanala any document, information or evidence in his possession or procurement, which An Bord Pleanala consider necessary for the purpose of determining the appeal.

RECEIVED: 17/12/2025

Cork
County Council
Comhairle Contae Chorcaí

Environment Directorate,
Inniscarra,
Co. Cork

License to Discharge a Trade Effluent to Water
Issued under Section 4 of the Local Government (Water Pollution) Acts
1977 to 2007

WP (W) 08/18 (R)

Lagan Quarries Limited,
Rosemount Business Park,
Ballycoolin Road,
Dublin 11.

Discharge from:

Lagan Quarries Limited,
Rossmore,
Carrigtwohill,
Co. Cork

RECEIVED: 17/12/2025

Schedule

Wastewater Discharges shall take place only as specified in the licence application **WP(W)08/18 (R)** as modified and/or controlled by this licence and subject to the requirements of law. Any changes in the nature or quantity of any emission shall require the Licensee to notify the Licensing Authority and in the case of any material change, for the Licensee to request a review or obtain a new licence as may be determined by the Licensing Authority prior to any such change being made. The Licensing Authority shall determine whether any change is material or not.

In the event of the licence being transferred to another party or company the applicant shall notify the Licensing Authority of this fact and shall also provide the details of the new licence holder prior to the transfer of the licence.

1 WASTEWATER MANAGEMENT

1.1. The Licensee shall employ the best available techniques in the avoidance, minimisation, treatment and disposal of wastewaters produced on site, having regard to any environmental quality standard established for the receiving waters.

1.2. Standard operating procedures shall be prepared in respect of wastewater control and treatment systems to assist personnel with responsibilities for the operations of such systems and plant. These procedures shall be retained on site for inspection and submitted to the Licensing Authority on request.

1.3. Employees with responsibilities in the wastewaters control and treatment shall receive training adequate to enable them to execute their tasks in relation to pollution control. These records shall be retained on site for auditing by the Licensing Authority.

1.4. No substances listed in Table 12 of Schedule 6 of the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009) shall be discharged from this site.

1.5. Surface water drainage from the impermeable hard stand refueling area shall be discharged via Class 1 hydrocarbon interceptor (to IS EN 858). A high level alarm shall be fitted to the oil storage chamber of the hydrocarbon interceptor. The interceptor and sump shall be installed and operated to the satisfaction of the Licensing Authority.

Reason: For the management of wastewaters on the site

2 CONTAMINATED WASTE WATERS

2.1. All contaminated wastewater, including surface water runoff, arising from the operation of Lagan Quarries Limited, Rossmore, Carrigtwohill, Co. Cork shall be collected and discharged following treatment to groundwater (Midleton Groundwater Body - IE_SW_G_058) as indicated on drawings and maps which accompanied this application.

2.2. The Licensee shall ensure that any discharge from the site does not cause deterioration in the status of the receiving groundwater body.

RECEIVED: 17/12/2025

2.3. The wastewater flow from the wastewater treatment system shall not exceed 12,000m^3/day or 500m^3/hr. A flow meter shall be provided within 3 months of the date of issue of this licence.

2.4. In the event that there is a deterioration in the water quality indentified in EPA harbour monitoring assessments, the applicant shall at the request of the Licensing Authority, undertake an assessment of the impact of this discharge on the receiving water.

2.5. The Licensee shall agree with the Licensing Authority an effluent monitoring point, representative of the final effluent. Safe access shall be provided and maintained to this sampling point which shall be clearly identified with a permanent sign 'GW01 – Sampling Point'.

2.6. The Licensee shall establish a monitoring programme for the parameters listed in Table 1 at the required frequency. Grab samples shall be taken at GW01 – Sampling Point. A sample taken at GW01 shall be assumed to be representative of the discharge until the contrary can be shown.

Table 1: Discharge Point SW01

Parameter	Unit	ELV	Commencement date	Monitoring Frequency
pH	pH units	6.0 – 9.0	01/04/2019	Quarterly
Temperature	°C	25	01/04/2019	Quarterly
Suspended Solids	mg/L	35	01/04/2019	Quarterly
Total Heavy Metals (Ba, Cd, Cr, Cu, Hg, Ni, Pb,Zn)	mg/L	1	01/04/2019	Quarterly
Chromium VI	mg/L	0.15	01/04/2019	Annually
Phenols	mg/L	1	01/04/2019	Quarterly
Benzo(a)pyrene	mg/L	0.05	01/04/2019	Annually
Naphtalene	mg/L	0.05	01/04/2019	Annually

2.7. Test methods used by the Licensee for the monitoring of the nature of the discharge shall be derived from Standard Methods For the Examination of Water and Wastewater (APHA, AWWA, WEF).

2.8. In the event of malfunction or breakdown of the pollution abatement equipment, or, any other incident on site which may give rise to water pollution, the Licensee shall immediately report the incident to the Licensing Authority by telephone (**021 4532700**) or fax (**021 4532777**) and shall confirm the communication in writing within twenty four hours.

2.9. For parameters other than pH, eight out of ten consecutive results shall not exceed the emission limit value. No individual results similarly calculated shall exceed 1.2 times the emission limit value. pH shall not deviate from specified range.

Reason: To control the emissions prior to discharge

RECEIVED: 17/12/2025

3 SURFACE & GROUND WATERS

3.1. The Licensee shall on request of the Licensing Authority, implement a programme of surface and/or groundwater monitoring agreed in advance with the Licensing Authority. This monitoring shall include the monitoring of a minimum of three wells, one of which shall be located above and one below the site's hydraulic gradient. The locations of the wells are to be agreed with the Licensing Authority.

3.2. All fuels, chemicals, lubricants and concrete additives shall be stored in a bunded area, impervious to the material stored within. Storage areas shall be bunded to a volume 110% of the volume of the largest tank. The bunded area shall be fitted with a locking penstock valve which shall only open to discharge storm water surface drainage system.

Reason: To protect surface and ground waters from polluting matter

4 RESPONSIBLE PERSON

4.1 The Licensee shall ensure that a person or persons is/are available at all times to give relevant information on emissions to the Licensing Authority. The Licensee shall identify to the Licensing Authority each such person.

Reason: To protect surface and ground waters from polluting matter

5 MONITORING

5.1. The Licensee shall grant immediate and unhindered access to the site and any portion of the pollution abatement equipment to any authorized personnel representing any Body having statutory responsibility for water pollution control, at all times, to carry out such inspections monitoring and investigations as the Body deems necessary. The Licensing Authority may install such equipment as may be necessary to collect this information at the Licensee's premises. The cost of this work will be borne by the Licensee.

5.2. The Licensee shall keep records of all monitoring carried out and shall retain such records for a minimum period of five years. The Licensee shall submit to the Licensing Authority at **quarterly intervals** the result of all monitoring relating to the previous quarter, together with any other records relating to pollution control which may be required by the Licensing Authority.

5.3. Any non-compliance with the terms of the licence shall be highlighted and the reason why this occurred shall be stated. The measures taken to ensure non-recurrence of the non-compliance shall also be outlined.

5.4. All submitted reports shall be signed by the Licensee's facility manager or other senior officer designated by the company.

Reason: To provide for adequate monitoring

RECEIVED: 17/12/2025

6 TREATMENT PLANT

6.1. The Licensee shall initiate an approved maintenance programme for all such plant in use in the treatment process or in pollution control. As a minimum the following conditions shall be performed:

Oil/water separators, washdown and silt trap separators shall be inspected at least monthly and cleaned at a minimum annual basis. Wastes from all pollution abatement equipment shall be removed by licensed waste disposal contractors only.

Reason: To provide for the operation of pollution abatement equipment

7 CONTRIBUTIONS

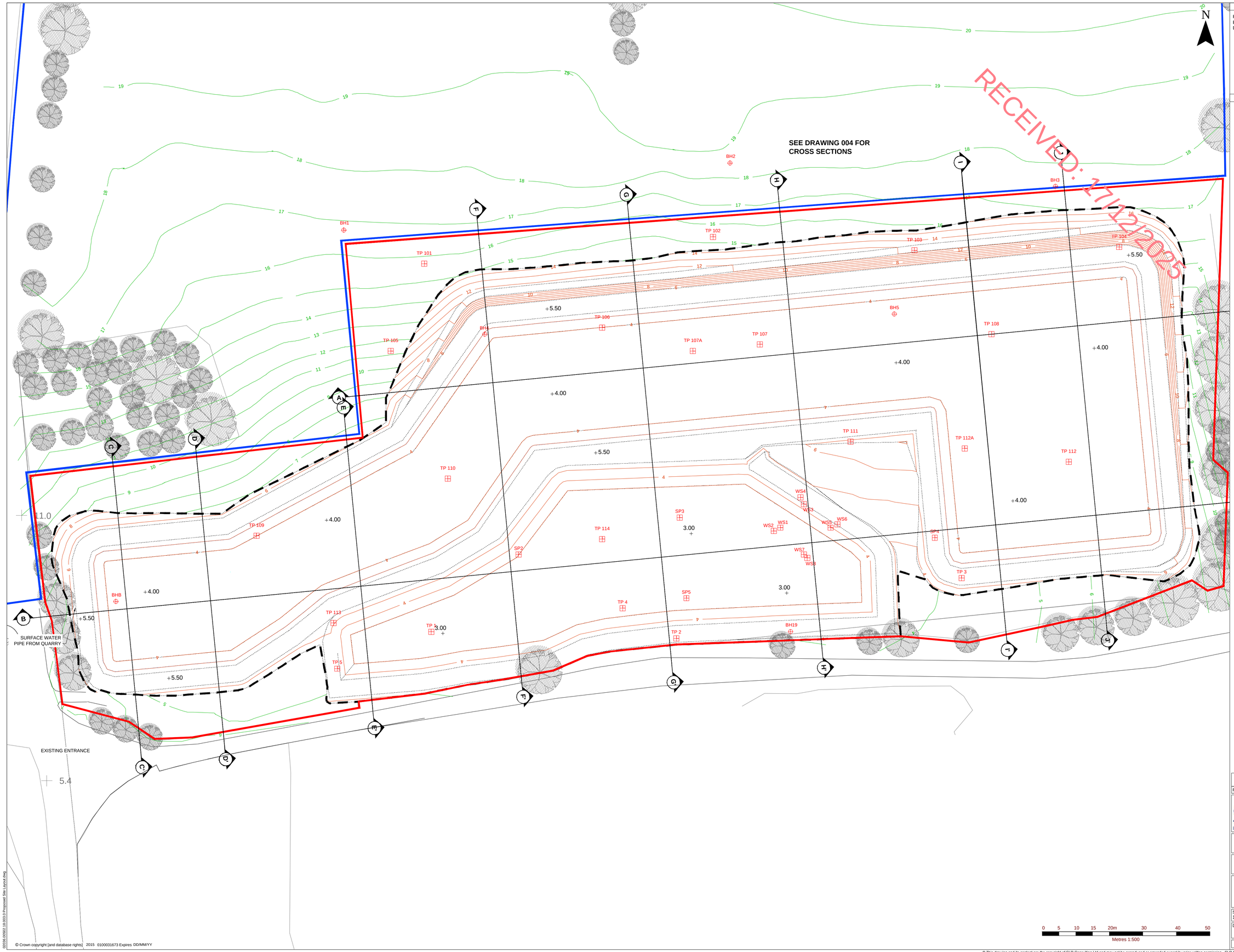
7.1 The Licensee shall pay to the Licensing Authority such annual contributions towards the cost of monitoring the discharge as the Licensing Authority considers necessary for the performance of its duties under this Act as follows:

a) Not later than September 30th 2019 the Licensee shall pay to the Licensing Authority a contribution of not less than (€1150).

b) In subsequent years the Licensee shall pay to the Licensing Authority an annual amount of not less than (€1150) updated in accordance with the Consumer Price Index from the date of the grant of this licence to the value pertaining at the time of payment of each annual contribution.

c) Not withstanding the foregoing, the rate of contribution each year shall take account of the actual costs of monitoring as incurred by the Licensing Authority in the previous year and as estimated for the next year.

Reason: To provide for the sampling and implementation of licence



RECEIVED: 17/12/2025

NOTES

PLAN TAKEN FROM ORS CONSULTING ENGINEERS, PROPOSED SITE LAYOUT, DWG No. 121_068_203, REV1

LEGEND

- APPLICATION BOUNDARY
- LAND HOLDING
- LIMIT OF WORKS
- TOPOGRAPHIC CONTOURS
- DESIGN CONTOURS
- +5.50 SPOT LEVEL
- BH5 GROUND INVESTIGATION BOREHOLES
- TP 108 GROUND INVESTIGATION TRIAL PITS

Revision	By	Chk'd By	Date	Comments
C0	AB	IW	04/18	CONSTRUCTION ISSUE

SLR global environmental solutions
FULMAR HOUSE
BEIGNON CLOSE
OCEAN WAY
CARDIFF. CF24 5PB
T: 029 2049 1010
F: 029 2048 7903
www.slrconsulting.com

Site: ROSSMORE QUARRY, CORK

Project: PROPOSED SETTLEMENT LAGOONS

Drawing Title: **PROPOSED SITE LAYOUT**

Scale: 1:500 @A1

Date: APRIL 2018

Drawing Number: **DRAWING 3**

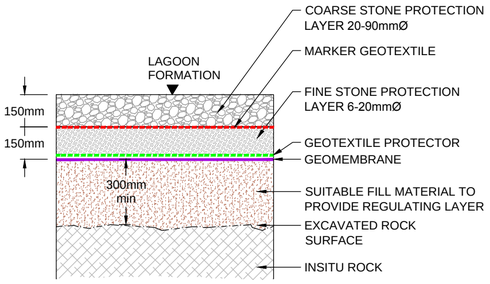
Revision: **C0**

FOR CONSTRUCTION

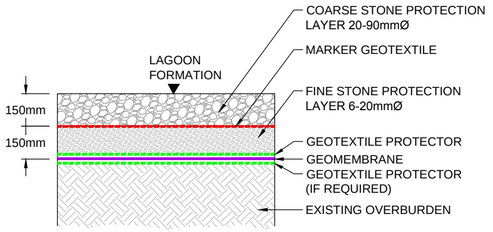
© Crown copyright [and database rights] 2015 0100031673 Expires DD/MM/YY

© This drawing and its content are the copyright of SLR Consulting Ltd and may not be reproduced or amended except by prior written permission. SLR Consulting Ltd accepts no liability for any amendments made by other persons.

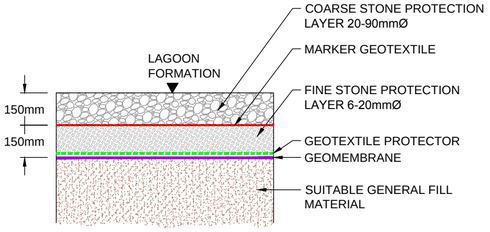
SETTLEMENT LAGOON LINING SYSTEM CONSTRUCTION DETAILS



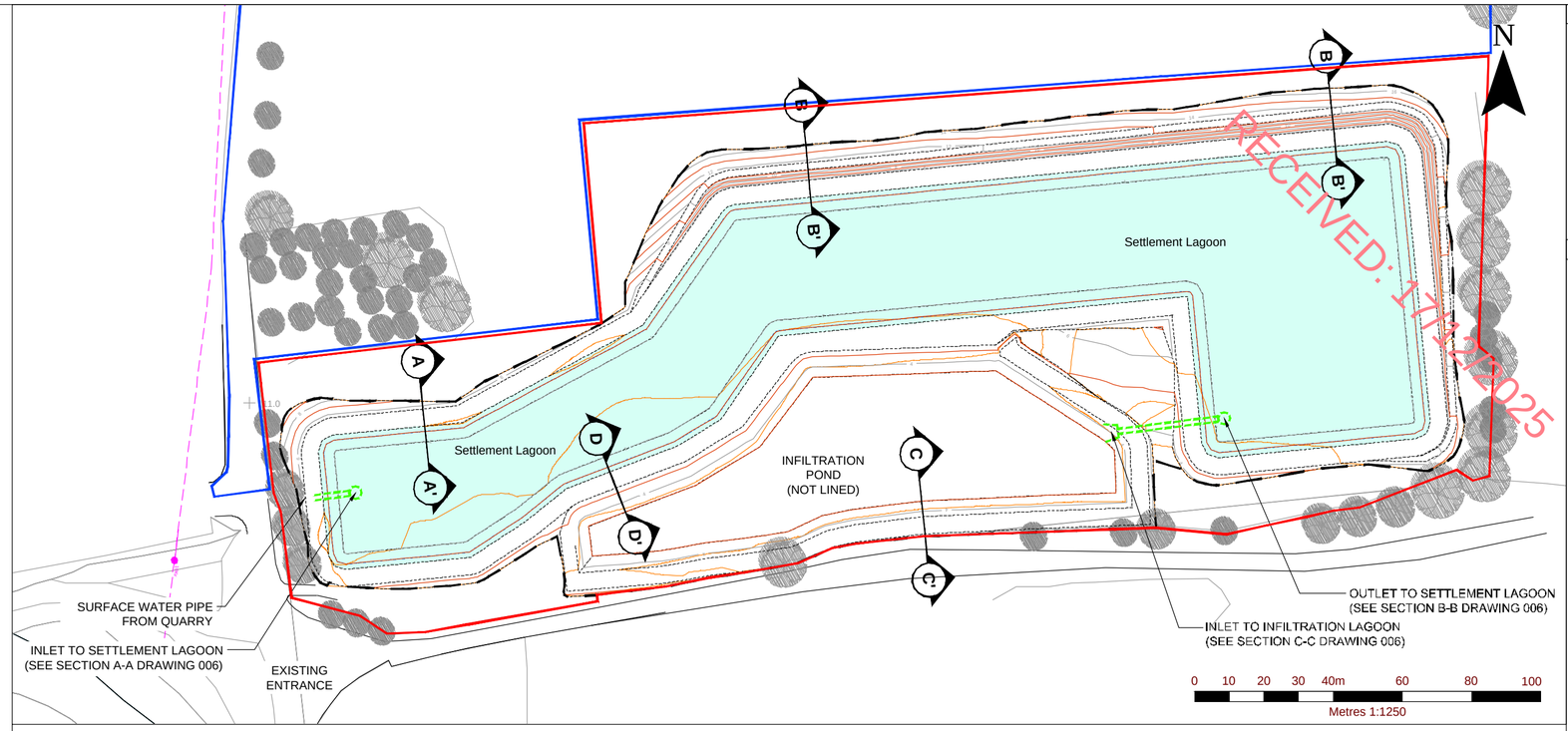
DETAIL 1 -
TYPICAL BASAL LINING DETAIL TO SETTLEMENT LAGOON REQUIRING ROCK EXCAVATION
SCALE 1:40



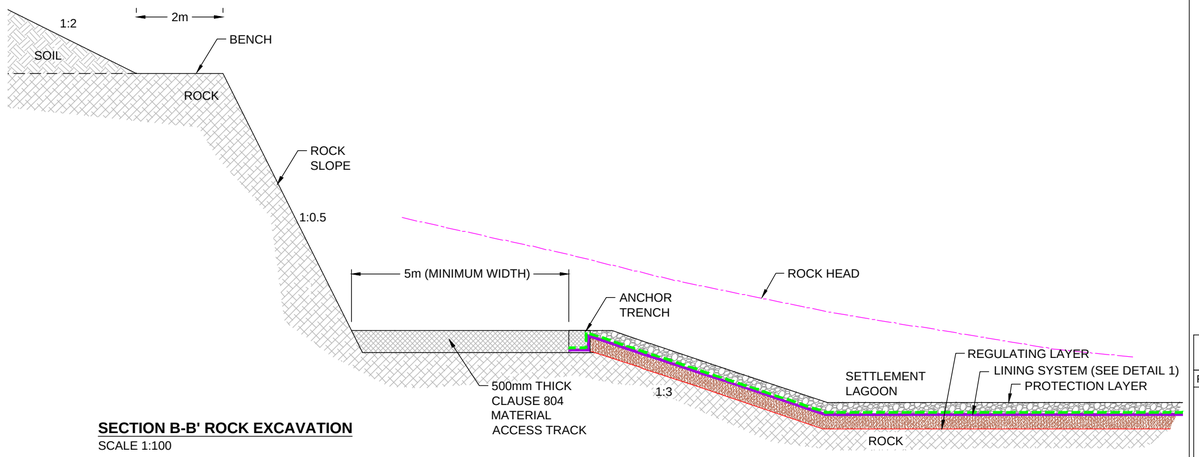
DETAIL 2
TYPICAL BASAL LINING DETAIL TO SETTLEMENT LAGOON REQUIRING OVERBURDEN EXCAVATION
SCALE 1:40



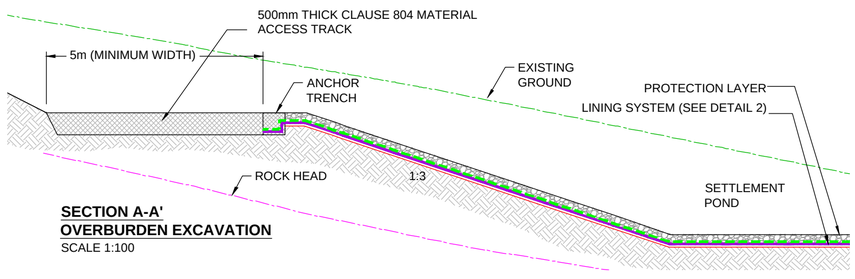
DETAIL 3
TYPICAL BASAL LINING DETAIL TO SETTLEMENT LAGOON REQUIRING FILL
SCALE 1:40



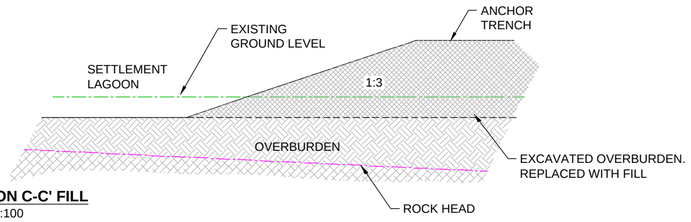
RECEIVED: 17/12/2025



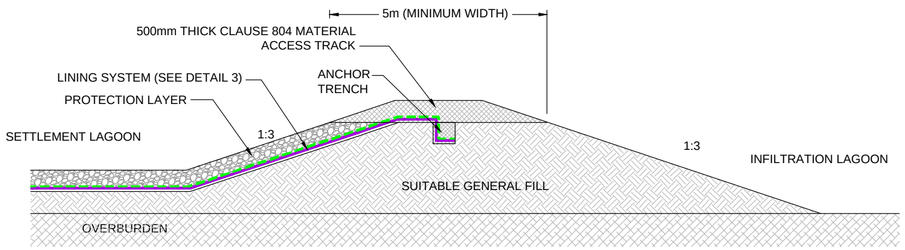
SECTION B-B' ROCK EXCAVATION
SCALE 1:100



SECTION A-A'
OVERBURDEN EXCAVATION
SCALE 1:100



SECTION C-C' FILL
SCALE 1:100



SECTION D-D'
SCALE 1:100

NOTES

1. TMS ENVIRONMENTAL LTD PREPARED THE CONCEPTUAL DESIGN
2. BASE DESIGN DERIVED FROM ORS CONSULTING ENGINEERS, PROPOSED SITE LAYOUT, REF 121_068_203, DATED 11/12/2015

LEGEND

- PLANNING BOUNDARY
- OTHER LANDS IN APPLICANT OWNERSHIP
- LIMIT OF EXCAVATION
- EXTENT OF LINER

Revision	By	Chk'd By	Date	Comments
C0	KMS	IW	04/18	CONSTRUCTION ISSUE

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

Site: ROSSMORE QUARRY, CORK

Project: PROPOSED SETTLEMENT LAGOONS

Drawing Title: **LINING SYSTEM CONSTRUCTION DETAILS**

Scale: AS SHOWN @A2

Date: APRIL 2018

Drawing Number: **DRAWING 5**

Revision: **C0**

FOR CONSTRUCTION

© This drawing and its content are the copyright of SLR Environmental Consulting (Ireland) Ltd and may not be reproduced or amended except by prior written permission. SLR Environmental Consulting (Ireland) Ltd accepts no liability for any amendments made by other persons.

02036.00502.18.005.0 Lining System Construction Detail.dwg

RECEIVED: 17/12/2025

Cork County Council
Environment Department,
Room FF14,
Cork County Council,
Inniscarra,
Co. Cork.
By Email Only to John.ORegan@CorkCoCo.ie & Alan.Costello@CorkCoCo.ie

25th May 2020

Re: Lagan Materials Ltd. - Quarry at Rossmore, Carrigtwohill, Co. Cork.
Discharge Licence Ref. WP(W)08/18 – Compliance Submission

Dear Sirs,

We refer to the above referenced discharge licence, which was granted by Cork County Council on 21st February 2019 pursuant to Local Government (Water Pollution) Acts 1977 and 1990.

A number of conditions contained within the licence require agreement with the planning authority, each of which is addressed, as follows.

Condition 1.2

"Standard operating procedures shall be prepared in respect of wastewater control and treatment systems to assist personnel with responsibilities for the operations of such systems and plant. These procedures shall be retained on site for inspection and submitted to the Licencing Authority on request."

Our water management procedure (copy enclosed) is provided as document DP008 within the Environmental Management System (EMS) for the site. The EMS is accredited to ISO14001 standard. The policy details how water and wastewater are managed and controlled onsite, how monitoring and reporting is undertaken, and the corrective actions to be followed in the event of a non-compliance. A full copy of the EMS was included within Appendix 08 of the discharge licence application.

Condition 1.5

"Surface water drainage from the development shall be discharged via Class 1 hydrocarbon interceptor (to IS EN 858) prior to discharge. A high level alarm shall be fitted to the oil storage chamber of the hydrocarbon interceptor. The interceptor and sump shall be installed and operated to the satisfaction of the Licencing Authority."

In order to ensure that surrounding watercourses remain protected against any potential hydrocarbon contamination arising from the site, we have implemented a targeted approach to the 'source-pathway-receptor' model in relation to hydrocarbon retention arrangements.

Lagan Materials Limited
Rosemount Business Park,
Ballycoolin Road,
Dublin, D11 K2TP.

Tel: 00 353 1 885 99 99
Fax: 00 353 1 820 19 01
www.breedongroup.com

Registered office: Rosemount Business Park, Ballycoolin Road, Dublin, D11 K2TP.
Company Reg. No: 123494. VAT No: IE4816055K. GB 141 7157 29
Directors: T. Lagan, C. Cassidy, R. Wood, R. McDonald. Secretary: C. Cassidy.

We have significantly reduced the hydrocarbon risk, with no bulk fuels stored onsite. All fuels are transported to site for the refueling of plant and machinery directly from the transport tank of the fuel supplier. During refueling, drip trays are used to capture any hydrocarbon drips from refueling nozzles.

Hydrocarbon spill kits will continue to be maintained at locations throughout the entire site, and personnel are trained on the correct use of hydrocarbon spill kits.

As outlined in the discharge licence application documentation, it is proposed to install baffle / scum boards at the outlet to the settlement lagoon to inhibit outflow of any hydrocarbons which may enter the settlement lagoon. A schematic is shown in Figure 1 below.

RECEIVED: 17/12/2025

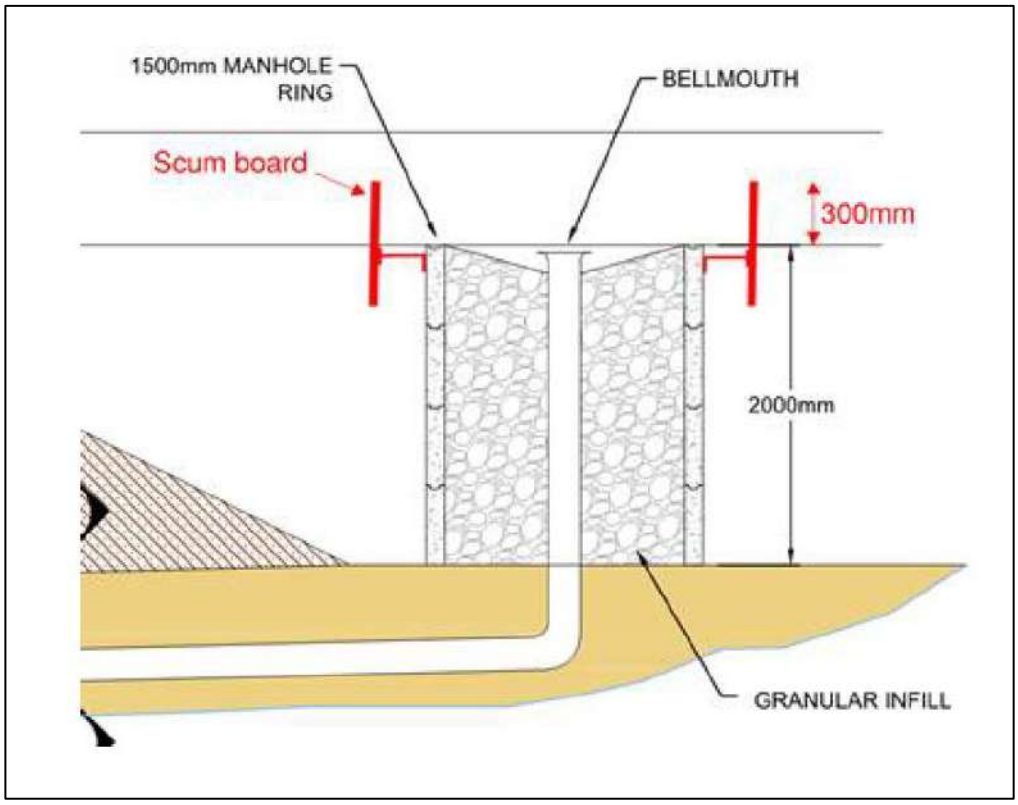


Figure 1 - Proposed Baffle Boards / Scum Boards

Condition 2.3

"The wastewater flow from the wastewater treatment system shall not exceed 500m^3/day or 25m^3/hr. A flow meter shall be provided within 3 months of the date of issue of this licence."

An in-line ultrasonic flow meter has been ordered and will be installed on the discharge line as soon as possible. This flow meter will automatically record discharge flow volumes.

Condition 2.5

RECEIVED 17/12/2025

"The Licensee shall agree with the Licencing Authority an effluent monitoring point, representative of the final effluent. Safe access shall be provided and maintained to this sampling point which shall be clearly identified with a permanent sign 'GW01 – Sampling Point'.

The proposed effluent monitoring point which is representative of the final effluent from the site is identified as GW1 on Figure 2 below. The sample is collected at the culvert where water discharges from the settlement pond into the infiltration area as shown on Figure 3. We have ordered a sign to clearly identify this monitoring point as 'GW1' and this will be erected at the monitoring point as soon as possible.

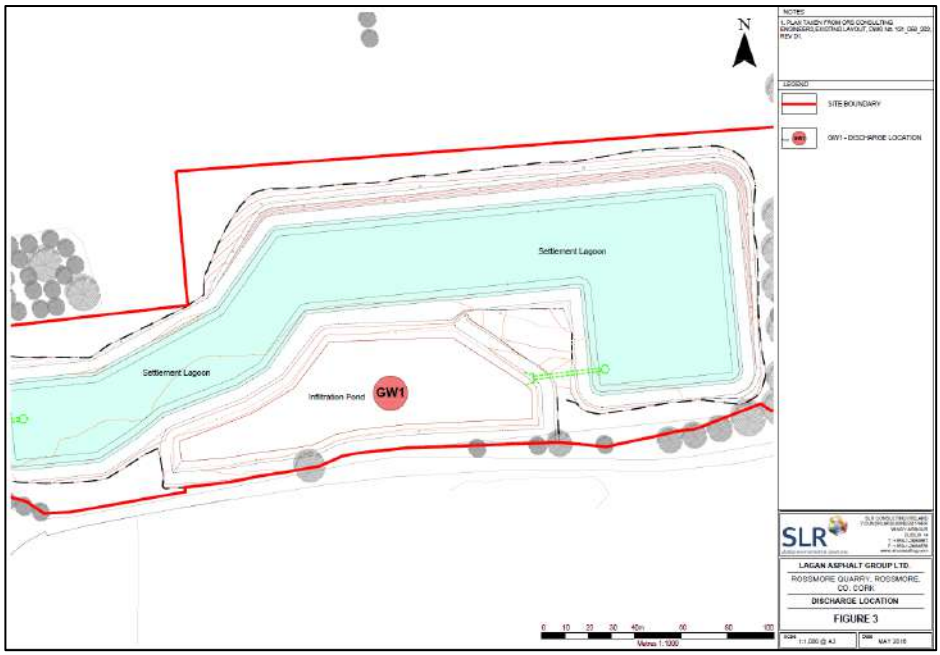


Figure 2 - GW1 Monitoring Location



Figure 3 - GW1 Sampling Point

RECEIVED 17/12/2025

Condition 2.6

"The Licensee shall establish a monitoring programme for the parameters listed in Table 1 at the required frequency. Grab samples shall be taken at GW01 – Sampling Point. A sample taken at GW01 shall be assumed to be representative of the discharge until the contrary can be shown."

We currently utilise the services of TMS Environment Ltd. to undertake water sampling at the site in accordance with the requirements of the discharge licence. Samples are taken at the culvert where water discharges from the settlement pond to the infiltration area, as per Figure 3 above.

Condition 3.2

"All fuels, chemicals, lubricants and concrete additives shall be stored in a bunded area, impervious to the material stored within. Storage areas shall be bunded to a volume of 110% of the volume of the largest tank. The bunded area shall be fitted with a locking penstock valve which shall only open to discharge storm water surface drainage system.

We do not store any bulk fuels onsite and as such, there are no storage tanks present which require bunding. Small drums containing up to a maximum of 40L of lubricants are placed on mobile bunds to ensure that a 110% capacity is maintained.

Condition 4.1

"The licensee shall ensure that a person or persons is/are available at all times to give relevant information on emissions to the Licensing Authority. The Licensee shall identify to the Licensing Authority each such person."

In the event that relevant information on emissions is required by the Licencing Authority, the following personnel can be contacted:

1. Stuart King (Quarry Manager)
   Tel: 086-8212658
   Email: stuart.king@breedongroup.com

2. John Fennell (Planning & Estates Officer)
   Mob: 087-3761688
   Email: john.fennell@breedongroup.com

Condition 5.2

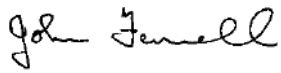
"The Licensee shall keep records of all monitoring carried out and shall retain such records for a minimum period of five years. The Licensee shall submit to the Licensing Authority at quarterly intervals the result of all monitoring relating to the previous quarter, together with any other records relating to pollution control which may be required by the Licensing Authority."

We will keep records of all monitoring carried out and shall retain such records for a minimum period of five years. All monitoring results will be submitted to the licensing authority on a quarterly basis, together with any other records relating to pollution control which may be required by the licensing authority.

RECEIVED: 17/12/2025

We would be grateful if you could confirm that our submission is in order and should you have any questions, please don't hesitate to contact the undersigned.

Yours sincerely,



John Fennell
Planning & Estates Officer
Lagan Materials Ltd.

Tel: 01-8859999
Mob: 087-3761688
Email: john.fennell@breedongroup.com

Enclosed: DP008 Water Management

RECEIVED: 17/12/2025

DP008 Water Management

Scope: This procedure defines the conditions relating to management, monitoring and control of surface water discharges, trade effluent discharges and groundwater dewatering and management for the site.

1. Relevant Permits, Licences, Authorisations & Conditions

A copy of all Permits, Licences and Authorisations must be held on site and available for inspection by the relevant Authorities at all times.

2. Management and Control

A current and accurate site drawing showing all surface water drainage and discharge points shall be held on site and should clearly differentiate between surface and foul water drainage. A map showing all groundwater monitoring locations shall be maintained at the site. All water usage at the site shall be monitored and recorded. Any significant changes in water usage shall be investigated and the findings documented.

All discharge points shall be visually inspected daily unless otherwise specified in any regulatory requirement. A sampling regime that is in line with the requirements of the discharge licence and the site's pollution risks shall be established. This shall include testing of samples where appropriate. Where any visual pollution is detected in the discharge, a sample shall be taken immediately and tested.

Water with high suspended solids shall be prevented from entering watercourses and surface water drains by proper onsite management of surface water and by using silt traps, interceptors and settlement systems where appropriate. Settlement systems shall be carefully managed to ensure effective settlement capacity by desilting or rotation.

Effective controls to prevent contamination of groundwater resources and an effective monitoring programme to monitor groundwater quality and supply shall be put in place. The main controls planned for the protection of groundwater resources at the site and in the area include:

- Measures shall be taken to minimise water demand where appropriate;
- Wheel washing water travels into the underground interceptor for treatment prior to discharge into storm drain. Sampling is carried out at this discharge point.
- The drainage arrangements proposed for the site shall ensure that no uncontrolled discharge of drainage from the site occurs at any time, and hence no infiltration to groundwater.
- Storage of wastes, fuels and hazardous materials shall be in designated bunded storage areas to prevent any risk of contamination of groundwater.

In instances when an actual or suspected uncontrolled release of pollutants occurs to a watercourse or ground water, site management shall inform the Technical Manager immediately and the emergency response procedures as per depot procedure DP004 shall be implemented.

3. Monitoring and Reporting

Environmental monitoring reports will be prepared by external consultants and shall contain all information as required by the various conditions set out in the permissions. A hardcopy report with the results assessed against the permit limits will be issued to the permitting authority and also to the site. A soft-copy will be issue to the Lagan Macadam and Quarries head office.

4. Corrective Actions

RECEIVED: 17/12/2025

If a non-compliance with an Objective or Target is noted, an immediate review will be undertaken to identify the cause of the non-compliance. The details of the investigation together with details of corrective actions to be taken will be recorded in accordance with the Corrective Action Depot Procedure.

RECEIVED: 17/12/2025

CORK COUNTY COUNCIL

LOCAL GOVERNMENT (WATER POLLUTION) ACTS 1977 AND 1990

Licence to discharge Trade Effluent or Sewage Effluent to Waters

Reference No. In WP(W)10/18

TO / Kilsaran Concrete t/a Kilsaran Build
Piercetown
Dunboyne
Co. Meath

The Council of the County of Cork, in excercise of the powers conferred on it by the Local Government (Water Pollution) Acts, 1977 to 2007, as amended, hereby **GRANTS** a Licence, Reference Number WP(W)10/18

To **Kilsaran Concrete t/a Kilsaran Build**
Piercetown
Dunboyne
Co. Meath

To Discharge **Trade effluent arising from quarrying operations including the quarrying, the crushing and screening of stone, readymix concrete production and block production**

To (River) **Groundwater**

Located at **Rossmore, Carrigtohill, Co. Cork**

subject to the Conditions set out in the schedule attached hereto. It should be noted that a person shall not be entitled solely by reason of a licence to make, cause or permit a discharge to a sewer.

ENVIRONMENT DEPARTMENT,
ROOM FF14,
CORK COUNTY COUNCIL,
INNISCARRA,
CO CORK.

Signed on behalf of the said Council,

John O'Regan

STAFF OFFICER

Dated this 8th **day of** March 2019

NOTE:

An appeal against a decision made by a Sanitary Authority under Section 4, Section 16 and Section 17 of the Act of 1977, may be made to An Bord Pleanala under Section 20 of the Act, as inserted by Section 15 of the Local Government (Water Pollution) (Amendment) Act, 1990 within one month of the date of the Licence.

Appeals should be addressed to THE SECRETARY, AN BORD PLEANALA,
64 Marlborough Street, Dublin 1, and will be invalid unless accompanied by an additional fee of €126.00.

A request for an oral hearing shall be accompanied by an additional fee of €63.00.

A party to an appeal shall give to An Bord Pleanala any document, information or evidence in his possession or procurement, which An Bord Pleanala consider necessary for the purpose of determining the appeal.

RECEIVED: 17/12/2025

Cork
County Council
Comhairle Contae Chorcaí

Environment Directorate,
Inniscarra,
Co. Cork

License to Discharge a Trade Effluent to Water.
Issued under Section 4 of the Local Government (Water Pollution) Acts 1977 to 2007

WP (W) 10/18

Kilsaran Concrete t/a Kilsaran Build
Piercetown
Dunboyne
Co. Meath

Discharge from:
Kilsaran Quarry
Rossmore
Carrigtohill
Co. Cork

Schedule

Wastewater Discharges shall take place only as specified in the licence application **WP (W) 10/18** as modified and/or controlled by this licence and subject to the requirements of law. Any changes in the nature or quantity of any emission shall require the Licensee to notify the Licensing Authority and in the case of any material change for the Licensee to request a review or obtain a new licence as may be determined by the Licensing Authority prior to any such change being made. The Licensing Authority shall determine whether any change is material or not.

RECEIVED 17/12/2025

This licence supersedes all previous licenses and correspondence issued in respect of the facility under the terms of the Local Government Water Pollution Act 1977 to 2007.

In the event of the licence being transferred to another party or company the applicant shall notify the Licensing Authority of this fact and shall also provide the details of the new licence holder prior to the transfer of the licence.

RECEIVED: 17/12/2025

1 WASTEWATER MANAGEMENT & POLLUTION CONTROL

1.1. The Licensee shall employ the best available techniques in the avoidance, minimisation, treatment and disposal of wastewaters produced on site

1.2. Standard operating procedures shall be prepared in respect of wastewater control and treatment systems to assist personnel with responsibilities for the operations of such systems and plant. These procedures shall be retained on site for inspection and submitted to the Licensing Authority on request.

1.3. The Licencee shall ensure that a documented Accident Prevention and Control Procedure is in place that addresses the hazards on-site, particularly in relation to the prevention of accidents with a possible impact on the environment. The Licencee shall ensure that this procedure shall be reviewed annually by a competent person and updated as necessary, and shall maintain written proof of all such reviews and shall make them available to the Licensing Authority on request.

1.4. Employees with responsibilities in wastewater control and treatment shall receive training adequate to enable them to execute their tasks in relation to pollution control. These records shall be retained on site for auditing by the Licensing Authority.

1.5. No substances listed in Table 12 of Schedule 6 of the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009) shall be discharged from this site.

1.6. Within three months of the date of issue of this licence, a risk assessment of all site fuel storage, handling facilities and emergency response protocols shall be undertaken by a competent person. This assessment will have regard to *Wetstock Reconciliation at Fuel Storage Facilities- An Operator's Guide , Health and Safety Authority, 2013* and *Design, construction, modification, maintenance and decommissioning of filling stations, 4th edition, Association for Petroleum and Explosives Administration (APEA) and Energy Institute, 2018.*

Reason: For the management of wastewater and prevention of pollution on the site

2 CONTAMINATED WASTE WATERS

RECEIVED: 17/12/2025

2.1. All contaminated wastewater including surface water runoff arising from the operation of Kilsaran Concrete t/a Kilsaran Build at Rossmore, Carrigtohill,, Co. Cork shall be collected and discharged to ground waters (Midleton IE_SW_G-058) as indicated on drawings and maps which accompanied this application.

2.2. WP(W)10/18 authorizes the discharge of a trade effluent arising from the following activities:

2.2.1. Concrete and concrete products manufacturing
2.2.2. Quarrying and extraction activities , inc. washings from aggregate crushing and sorting
2.2.3. Void ground/surface water arising from quarrying activities below water table

2.3. Pumping from the quarry sump shall be managed and restricted so that water shall not overflow from the final surface water feature (referred to as 'Pond No. 3' in application documents) to Cork Harbour North Channel.

2.4. The licencee shall agree with the Licensing Authority an effluent monitoring point, representative of the final discharge. Safe access and egress shall be provided and maintained to this sampling point which shall be clearly identified with a permanent sign 'SW-01'.
Samples taken from SW-01 shall be assumed to be representative of the discharge to ground water unless the contrary can be shown.

2.5. The licencee shall establish a monitoring programme for the parameters listed in Table 1 at the required frequency. Grab samples shall be taken of the discharge at SW01. This monitoring programme shall commence on 01/04/2019, and quarterly thereafter.

Table 1: Effluent Monitoring

Parameter	Unit	ELV	Commencement date	Monitoring Frequency
pH	pH units	6.0 – 9.5	01/04/2019	Quarterly
Total Heavy Metals (Ba, Cd, Cr, Cu, Hg, Ni,	mg/L	1	01/04/2019	Quarterly
Chromium VI	mg/L	0.15	01/04/2019	Quarterly
Phenols (as Total C)	mg/L	1.0	01/04/2019	Quarterly
Total BTEX	mg/L	0.5	01/04/2019	Quarterly
Mineral Oils	mg/L	1.0	01/04/2019	Quarterly

2.6. Test methods used by the Licensee for the monitoring of the nature of the discharge shall be derived from Standard Methods For the Examination of Water and Wastewater (APHA, AWWA, WEF).

2.7. In the event of malfunction or breakdown of the pollution abatement equipment, or, any other incident on site which may give rise to water pollution, the Licensee shall immediately report the incident to the Licensing Authority by telephone **(021 4532700)** and shall confirm the communication in writing within twenty four hours, or by email environment.licences@corkcoco.ie

Reason: To control the emissions prior to discharge

RECEIVED: 17/12/2025

3 GROUNDWATER

3.1. An area shall be clearly delineated for the washing of readymix plant and truck washouts. Wash water shall pass through a series of settlement chambers with the final chamber discharging to 'Pond 2'.

3.2. All fuels, chemicals, lubricants and concrete additives shall be stored in a clearly delineated bunded area, impervious to water and any material stored within. Storage areas shall be bunded to a volume 110% of the volume of the largest tank. All inlets, outlets, vent pipes, valves and gauges shall be within the bunded area.

3.3. Within 3 months of the date of issue of this licence, and every five years thereafter, all bunds and drum/tank storage areas shall be certified as being in compliance with condition 3.2 by a Chartered Engineer. The licencee shall maintain copies of such certification and shall make them available to the Licensing Authority on request.

3.4. The domestic wastewater treatment plant shall be operated and maintained in accordance with manufacturers recommendations and evidence of a maintenance agreement shall be made available on request.

Reason: To protect groundwaters from polluting matter

4 RESPONSIBLE PERSON

4.1 The Licensee shall ensure that a person or persons is/are available at all times to give relevant information on emissions to the Licensing Authority. The Licensee shall identify to the Licensing Authority each such person.

5 MONITORING

5.1. The Licensee shall grant immediate and unhindered access to the site and any portion of the pollution abatement equipment to any authorized personnel representing any body having statutory responsibility for water pollution control, at all times, to carry out such inspections monitoring and investigations as the body deems necessary. The Licensing Authority may install such equipment as may be necessary to collect this information at the Licensee's premises. The cost of this work will be borne by the Licensee

5.2. The Licensee shall keep records of all monitoring carried out and shall retain such records for a minimum period of five years. The Licensee shall submit to the Licensing Authority at **quarterly intervals** the result of all monitoring relating to the previous quarter, together with any other records relating to pollution control which may be required by the Licensing Authority.

5.3. Any non-compliance with the terms of the licence shall be highlighted and the reason why this occurred shall be stated. The measures taken to ensure non-recurrence of the non compliance shall also be outlined.

5.4. All submitted reports shall be signed by the Licensee's plant manager or other senior officer designated by the company.

Reason: To provide for adequate monitoring

6 POLLUTION CONTROL EQUIPMENT

RECEIVED: 17/12/2025

6.1 The Licensee shall initiate an approved maintenance programme for all such plant in use in the treatment process or in pollution control.

6.2 Oil/water separators, washdown and silt trap separators shall be inspected at least monthly and cleaned at a minimum annual basis. Wastes from all pollution abatement equipment shall be removed by licensed waste disposal contractors only.

6.3 Spill trays shall be provided for all vehicle maintenance operations. Plant and equipment waste maintenance materials (e.g. oil filters, used hydraulic fluids etc.) shall be stored in a secure bunded area while awaiting recovery/disposal

6.4 All production operatives and their supervisors shall be trained to operate/deploy pollution control equipment, and of their reporting obligations. Evidence of such training shall be made available on request by the Licensing Authority.

Reason: To provide for the operation and maintenance of pollution abatement equipment

7 CONTRIBUTIONS

7.1 The Licensee shall pay to the Licensing Authority such annual contributions towards the cost of monitoring the discharge as the Licensing Authority considers necessary for the performance of its duties under this Act as follows:-

a) Not later than September 30th 2019 the Licensee shall pay to the Licensing Authority a contribution of not less than € 1150.

b) In subsequent years the Licensee shall pay to the Licensing Authority an annual amount of not less than €1150 updated in accordance with the Consumer Price Index from the date of the grant of this licence to the value pertaining at the time of payment of each annual contribution.

c) Not withstanding the foregoing, the rate of contribution each year shall take account of the actual costs of monitoring as incurred by the Licensing Authority in the previous year and as estimated for the next year.

Reason: To provide for the sampling and implementation of licence

RECEIVED: 17/12/2025

Appendix 7.3

Guidance Documents & Legislative Instruments

Department of Environment, Heritage and Local Government (2004) Quarries and Ancillary Activities – Guidelines for Planning Authorities.

Department of Housing, Planning and Local Government (2013) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Official Journal L 327, 22.12.2000, p. 1–73.

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (EIA Directive).

EPA (1999) WWT systems for small communities and businesses.

EPA (2006) Environmental Management Guidelines for the Extractive Industry (Non-Scheduled Minerals).

EPA (2011) Guidance on the Authorisation of Discharges to Groundwater. Version 1 - December 2011.

EPA (2019) 19_2 Catchment Lee, Cork Harbour and Youghal Bay_SC_010 Subcatchment Tibbotstown WFD Cycle 2.

EPA (2021) Code of Practice Domestic Waste Water Treatment Systems (Population Equivalent ≤ 10). Published by the Environmental Protection Agency, Ireland. March 2021.

EPA (2022) Guidelines on the information to be contained in Environmental Impact Statements. ISBN 978-1-80009-005-7. May 2022.

European Communities (Birds and Natural Habitats) (Amendment) Regulations, 2021. S.I. No. S.I. No. 293 of 2021.

European Communities (Birds and Natural Habitats) Regulations, 2011. S.I. No. 477 of 2011, as amended 2021 as S.I. No. 293 of 2021.

European Communities (Quality of Salmonid Waters) Regulations, 1988. S.I. No. 293/1988.

European Communities (Freshwater Pearl Mussel) Regulations, 2009. S.I. No. 296/2009.

European Communities Environmental Objectives (Groundwater) (Amendment) Regulations, 2011, S.I. No. 389 of 2011.

European Communities Environmental Objectives (Groundwater) (Amendment) Regulations, 2012, S.I. No. 149 of 2012.

European Communities Environmental Objectives (Groundwater) (Amendment) Regulations, 2016. S.I. No. 366 of 2016.

RECEIVED: 17/12/2025

European Communities Environmental Objectives (Groundwater) Regulations, S.I. No. 9 of 2010, as amended 2019 as S.I. No. 366 of 2019.

European Communities Environmental Objectives (Surface Waters) Regulations 2009 Statutory Instruments S.I. No. 272 of 2009, as amended 2012 (S.I. No. 327 of 2012), 2015 (S.I. No. 386 of 2015) and 2019 (S.I. No. 77 of 2019).

European Union (2017) Environmental Impact, Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU). Accessed through the Europa server (http://ec.europa.eu). Paper ISBN 978-92-7974373-3 KH-04-17-939-EN-C doi:10.2779/8247. PDF ISBN 978-92-7974374-0 KH-04-17-939-EN-N doi:10.2779/41362.

European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018. S.I. No. 296/2018.

European Union (Environmental Impact Assessment) (Environmental Protection Agency Act 1992) (Amendment) Regulations 2020. S.I. No. 191/2020.

European Union (Drinking Water) Regulations 2023 (S.I. No. 99 of 2023).

Institute of Geologists of Ireland (IGI, 2002) Geology in Environmental Impact Statements: A Guide

Institute of Geologists of Ireland (IGI, 2013). Guidelines for the Preparation of Soils, Geology & Hydrogeology Chapters of Environmental Impact Statements.

NRA (2008) Environmental Impact Assessment of National Road Schemes – A Practical Guide.

NRA (2009) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes. @ https://www.tii.ie/technical-services/environment/planning/Guidelines-on-Procedures-for-Assessment-and-Treatment-of-Geology-Hydrology-and-Hydrogeology-for-National-Road-Schemes.pdf.

Office of Public Works and Department of Environment, Heritage and Local Government (2009) The Planning System and Flood Risk Management: Guidelines for Planning Authorities.

SNH (2018) Scottish National Heritage A handbook on environmental impact assessment: Guidance for Competent Authorities, Consultees and others involved in the Environmental Impact Assessment Process in Scotland, Scottish Natural Heritage, 5th Edition, 2018. Section C8.

RECEIVED: 17/12/2025

Appendix 7.4

Desk Study Resources, Data & Maps

The following Desk Study Resources, Books, Data & Mapping information were used in the compilation of this assessment:

AGEC Ltd (2012) Geotechnical Review Rossmore Quarry, Carrigtwohill, Co. Cork. Prepared for: Irish Asphalt June 2012. AGEC, Bagenalstown, Co. Carlow. Ireland.

Allen, A.R. & Milenic, D. (2007). Groundwater vulnerability assessment of the Cork Harbour area, SW Ireland. Environ Geol, 53:485-492.

Apex (2024) Report on the Geophysical Investigation 2024 At Rossmore, Carrigtwohill, Co Cork For the Breedon Group. AGP24052_01_Rev.

Bartley, P. (2003) Nitrate Responses in Groundwater beneath Dairy grassland Agriculture. PhD Tesis Trinity College Dublin. Vol I and Vol II. Available at https://www.tara.tcd.ie/handle/2262/76240/discover

Boak, et al. (2007) Using Science to Create a Better Place: Hydrogeological Impact Appraisal for Dewatering Abstractions. Environment Agency, Science Report – SC40020/SR1. Bristol, UK.

Bradford, R., McCormack, T., Campanya, J., Naughton, O. (2019) Groundwater Flooding in Ireland: New Methods for Flood Monitoring And Mapping. IAH Irish Group Conference Tullamore, April 2019.

Conroy, P. (2012) Carrigtohill Flood Risk Assessment Study Groundwater Flood Risk Assessment. Prepared by: Peter Conroy On behalf of Cork County Council In Collaboration with: JBA Consulting. Available at http://corkcocoplans.ie/wp-content/uploads/bsk-pdf-manager/2016/07/Appendix-C-1023_CarrigtohillGroundwaterFRA_RevA-_withFig2Aand2B.pdf

Davis (2006). Late Pleistocene-Holocene Buried Valleys in the Cork Syncline, Ireland. Journal of Maps (79-93).

Department of Housing, Local Government and Heritage (2024). Water Action Plan 2024: A River Basin Management Plan for Ireland. Plus associated Appendices: e.g., Appendix 2: Programme of Measures - List of Measures; https://www.gov.ie/en/policy-information/8da54-river-basin-management-plan-2022-2027/.

Drew, D. and Jones, G.L. (2000) Post-Carboniferous Pre-Quaternary karstification in Ireland. Proceedings of the Geologists' Association 111, 345–53.

Drew, D.P., Doerfliger, N. and Formentin, K. (1997) The use of bacteriophages for multi-tracing in a lowland karst aquifer in western Ireland. In A. Kranjc (ed.) Tracer Hydrology, 33–8. Rotterdam, Balkema.

EPA mapping and surface water and groundwater quality data (https://gis.epa.ie/EPAMaps/).

EPA (2018) WFD Cycle 2. Catchment: Lee, Cork Harbour & Youghal Bay. Sub-catchment: Owenacurra_SC_010. Waterbody: Code 19_13.

EPA (2019) WFD Cycle 2. Catchment: Lee, Cork Harbour & Youghal Bay. Sub-catchment: Tibbotstown_SC_010. Waterbody: Code 19_2.

EPA (2024) WFD Cycle 3: HA 19 – Lee, Cork Harbour and Youghal Bay Catchment Report (HA 19).

GSI (2002). County Cork (Southern Division) Groundwater Protection Scheme.

GSI (2004) Midleton Groundwater Body Description. Geological Survey of Ireland.

GSI On-line Groundwater database. Aquifer Classification, Aquifer Vulnerability, Teagasc Soil Classification, Subsoils, Karst features, groundwater recharge – online mapping resources (www.gsi.ie).

GWP Consultants and David Jarvis Associates Limited, UK (2014) A Quarry Design Handbook. 2014 Edition.

RECEIVED: 17/12/2025

Kelly, C. & Drew, D. (2014) Karzy Korck Karst. 'Cork & Waterford' Annual IAH Field Trip 2014. https://www.iah-ireland.org/field-guides/2014.pdf

Hogan, D. & Larkin, D. (2014) Midleton Distillery Karst. 'Cork & Waterford' Annual IAH Field Trip 2014. https://www.iah-ireland.org/field-guides/2014.pdf

Kimberley, S., Naughton O., Regan, S. (2014) Assessing significant damage to selected Irish Groundwater Dependent Terrestrial Ecosystem (GWDTE) types as part of groundwater body classification under the EU Water Framework Directive. International Association of Hydrogeologists (IAH) Irish Group, Tullamore, Ireland. In: Water Resource Management: The role

Kinahan, G.H. (1865) Explanations to cover sheets 115–116. Dublin. Memoirs Geological Survey of Ireland.

Lamplugh, G.W., Kilroe, JR, Henry, M.A., Seymour, H.J., Wright, W.B. and Muff, H.B. (1905). The Geology of the Country around Cork and Cork Harbour. Memoirs of the Geological Survey of Ireland. Printed at His Majesties Stationery Office. Available at http://www.geologicalmaps.net/IrishHistMapsDownload/B02131.pdf

McCormack, T., Naughton, O., Bradford, R., Campanyà, J., Morrissey, P., Gill, L., (2020) GWFlood Project: Monitoring, Modelling and Mapping Karst Groundwater Flooding in Ireland Geological Survey Ireland Report.

McCormack, T., Naughton, O., Bradford, R., McAteer, J., (2018). "Satellite flood mapping: New approaches for monitoring and mapping groundwater flooding in Ireland", 38th Annual Groundwater Conference - International Association of Hydrogeologists (IAH) Irish Group, Tullamore, Ireland.

Met Eireann (https://www.met.ie/).

Moore, J.P. & Walsh, J.J. (2013) Analysis of fracture systems and their impact on flow pathways in Irish bedrock aquifers. Groundwater newsletter. Issue 51. ISSN 0790-7753. Oct 2013.

NPWS (2013). Site Synopsis: Great Island Channel SAC 001058.

NPWS (2014). Conservation Objectives: Great Island Channel SAC 001058. Version 1.

NPWS (2014). Conservation Objectives: Cork Harbour SPA 004030.

NPWS (2015). Site Synopsis: Cork Harbour SPA 004030.

Naughton, O. and T. McCormack (2018). Monitoring Groundwater Flooding in Ireland Using Sentinel-1 SAR. NEREUS/ESA/EC "The Ever Growing use of Copernicus across Europe's Regions": p174-175.

Naughton, O., Johnston, P.M. and Gill, L.W., (2012). Groundwater flooding in Irish karst: The hydrological characterisation of ephemeral lakes (turloughs). Journal of Hydrology, 470– 471(0): 82-97.

OPW (2018). Flood Risk Management Plan Lee, Cork Harbour & Youghal Bay. National CFRAM Programme.

OPW (2025). Hydrometric flow and level data from EPA/OPW hydrometric stations www.waterlevel.ie Office of Public Works.

OSI. Sheets, 1:50,000 Discovery Map Series. Ordnance Survey of Ireland.

Reclamation Planning in Hard Rock Quarries. Department of Civil & Structural Engineering, University of Sheffield, Edge Consultants & Mineral Industry Research Organisation (2004).

Sleeman, A.G., McDonnell, B., Claringbold, K., O'Connor, P., Warren, W.P. & Wright, G. 1995. Sheet 22: Geology of East Cork-Waterford. 1:100,000 Bedrock Geology Map.

TMS Environment Limited (2013). Water Management System for Proposed Deepening of Existing Quarry at Rossmore Quaary, Rossmore, Carrigtwohill, Co. Cork. Prepared on behalf of Lagan Bitumen Ltd. Report Ref 18968-3 Rev. 1.0. 31st October 2013. (presented as Appendix 8.9: Proposed Surface Water Management System 2015 EIS Tom Phillips & Associates).

RECEIVED: 17/12/2025

Tom Philips & Associates (2015) EIAR for Further Development of Quarry at Rossmore, Carrigtohill, Co Cork. Water Chapter 8.0 (TMS, 2015) and associated Appendices.

Water Framework Directive Reports and "Watermaps" Map Viewer (www.wfdireland.ie).

WFD Working Group (2004a) Guidance document no. GW3: The Calcareous/ Non-Calcareous ("Silicius") Classification of Bedrock Aquifers in the Republic of Ireland.

WFD Working Group (2004b) Guidance Document no. GW5: Guidance on the Assessment of the Impact of Groundwater Abstractions.

Cork County Council planning records for the site and adjacent sites were reviewed, to include previous Environmental Impact Statements, Flood Risk Assessments and other reports associated with developments as follows:

- Planning Ref. 02/5476 - Irish Asphalt Ltd.
- Planning Ref. 03/4570 - Readymix (ROI) Ltd.
- Planning Ref. 05/7886 - Healy Brothers Ltd.
- Planning Ref. 20/04124 - Lagan Materials Ltd.
- Planning Ref. 18/6874, 195050, 20/06709 - Lagan Materials Ltd.
- Planning Ref. 21/5965, 18/6465, 03/4570 - Kilsaran.

RECEIVED: 17/12/2025

Appendix 7.5

Historic Consultations of Relevance to Water

RECEIVED: 17/12/2025

Cork County Council
Environment Department,
Room FF14,
Cork County Council,
Inniscarra,
Co. Cork.
By Email Only to John.ORegan@CorkCoCo.ie & Alan.Costello@CorkCoCo.ie

25th May 2020

Re: Lagan Materials Ltd. - Quarry at Rossmore, Carrigtwohill, Co. Cork.
Discharge Licence Ref. WP(W)08/18 – Compliance Submission

Dear Sirs,

We refer to the above referenced discharge licence, which was granted by Cork County Council on 21st February 2019 pursuant to Local Government (Water Pollution) Acts 1977 and 1990.

A number of conditions contained within the licence require agreement with the planning authority, each of which is addressed, as follows.

Condition 1.2

"Standard operating procedures shall be prepared in respect of wastewater control and treatment systems to assist personnel with responsibilities for the operations of such systems and plant. These procedures shall be retained on site for inspection and submitted to the Licencing Authority on request."

Our water management procedure (copy enclosed) is provided as document DP008 within the Environmental Management System (EMS) for the site. The EMS is accredited to ISO14001 standard. The policy details how water and wastewater are managed and controlled onsite, how monitoring and reporting is undertaken, and the corrective actions to be followed in the event of a non-compliance. A full copy of the EMS was included within Appendix 08 of the discharge licence application.

Condition 1.5

"Surface water drainage from the development shall be discharged via Class 1 hydrocarbon interceptor (to IS EN 858) prior to discharge. A high level alarm shall be fitted to the oil storage chamber of the hydrocarbon interceptor. The interceptor and sump shall be installed and operated to the satisfaction of the Licencing Authority."

In order to ensure that surrounding watercourses remain protected against any potential hydrocarbon contamination arising from the site, we have implemented a targeted approach to the 'source-pathway-receptor' model in relation to hydrocarbon retention arrangements.

Lagan Materials Limited
Rosemount Business Park,
Ballycoolin Road,
Dublin, D11 K2TP.

Tel: 00 353 1 885 99 99
Fax: 00 353 1 820 19 01
www.breedongroup.com

Registered office: Rosemount Business Park, Ballycoolin Road, Dublin, D11 K2TP.
Company Reg. No: 123494. VAT No: IE4816055K. GB 141 7157 29
Directors: T. Lagan, C. Cassidy, R. Wood, R. McDonald. Secretary: C. Cassidy.

We have significantly reduced the hydrocarbon risk, with no bulk fuels stored onsite. All fuels are transported to site for the refueling of plant and machinery directly from the transport tank of the fuel supplier. During refueling, drip trays are used to capture any hydrocarbon drips from refueling nozzles.

Hydrocarbon spill kits will continue to be maintained at locations throughout the entire site, and personnel are trained on the correct use of hydrocarbon spill kits.

As outlined in the discharge licence application documentation, it is proposed to install baffle / scum boards at the outlet to the settlement lagoon to inhibit outflow of any hydrocarbons which may enter the settlement lagoon. A schematic is shown in Figure 1 below.

RECEIVED: 17/12/2025

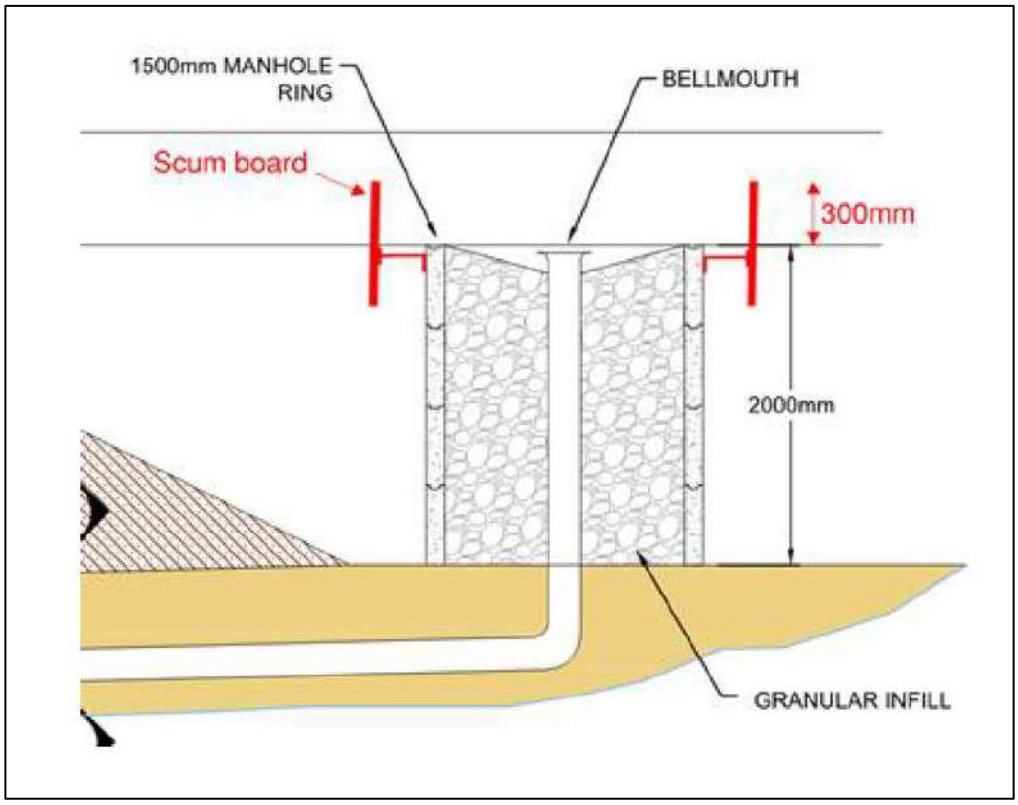


Figure 1 - Proposed Baffle Boards / Scum Boards

Condition 2.3

"The wastewater flow from the wastewater treatment system shall not exceed 500m^3/day or 25m^3/hr. A flow meter shall be provided within 3 months of the date of issue of this licence."

An in-line ultrasonic flow meter has been ordered and will be installed on the discharge line as soon as possible. This flow meter will automatically record discharge flow volumes.

Condition 2.5

RECEIVED 17/12/2025

"The Licensee shall agree with the Licencing Authority an effluent monitoring point, representative of the final effluent. Safe access shall be provided and maintained to this sampling point which shall be clearly identified with a permanent sign 'GW01 – Sampling Point'.

The proposed effluent monitoring point which is representative of the final effluent from the site is identified as GW1 on Figure 2 below. The sample is collected at the culvert where water discharges from the settlement pond into the infiltration area as shown on Figure 3. We have ordered a sign to clearly identify this monitoring point as 'GW1' and this will be erected at the monitoring point as soon as possible.

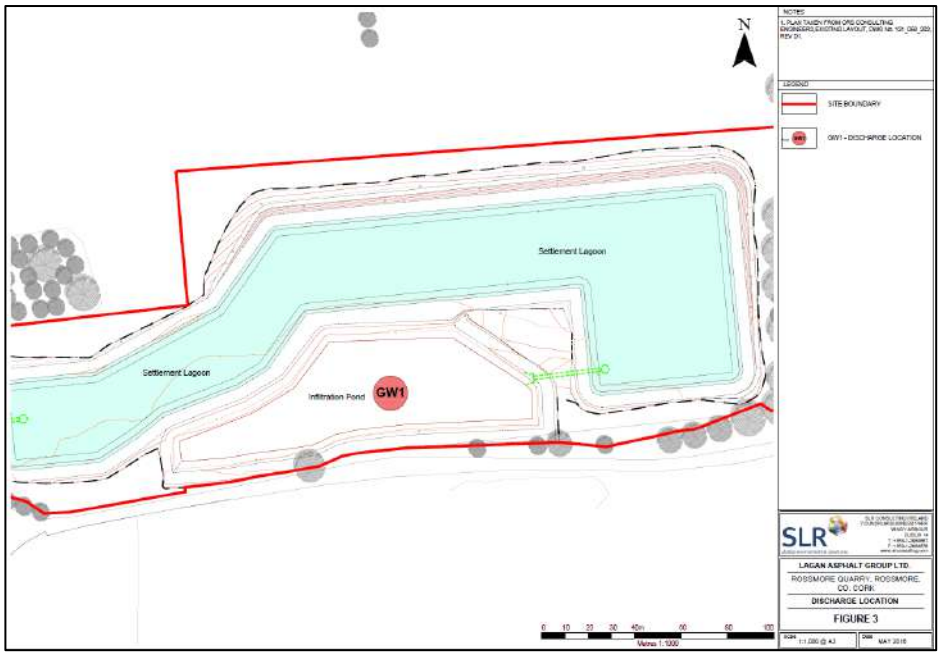


Figure 2 - GW1 Monitoring Location



Figure 3 - GW1 Sampling Point

RECEIVED 17/12/2025

Condition 2.6

"The Licensee shall establish a monitoring programme for the parameters listed in Table 1 at the required frequency. Grab samples shall be taken at GW01 – Sampling Point. A sample taken at GW01 shall be assumed to be representative of the discharge until the contrary can be shown."

We currently utilise the services of TMS Environment Ltd. to undertake water sampling at the site in accordance with the requirements of the discharge licence. Samples are taken at the culvert where water discharges from the settlement pond to the infiltration area, as per Figure 3 above.

Condition 3.2

"All fuels, chemicals, lubricants and concrete additives shall be stored in a bunded area, impervious to the material stored within. Storage areas shall be bunded to a volume of 110% of the volume of the largest tank. The bunded area shall be fitted with a locking penstock valve which shall only open to discharge storm water surface drainage system.

We do not store any bulk fuels onsite and as such, there are no storage tanks present which require bunding. Small drums containing up to a maximum of 40L of lubricants are placed on mobile bunds to ensure that a 110% capacity is maintained.

Condition 4.1

"The licensee shall ensure that a person or persons is/are available at all times to give relevant information on emissions to the Licensing Authority. The Licensee shall identify to the Licensing Authority each such person."

In the event that relevant information on emissions is required by the Licencing Authority, the following personnel can be contacted:

1. Stuart King (Quarry Manager)
   Tel: 086-8212658
   Email: stuart.king@breedongroup.com

2. John Fennell (Planning & Estates Officer)
   Mob: 087-3761688
   Email: john.fennell@breedongroup.com

Condition 5.2

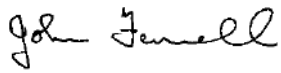
"The Licensee shall keep records of all monitoring carried out and shall retain such records for a minimum period of five years. The Licensee shall submit to the Licensing Authority at quarterly intervals the result of all monitoring relating to the previous quarter, together with any other records relating to pollution control which may be required by the Licensing Authority."

We will keep records of all monitoring carried out and shall retain such records for a minimum period of five years. All monitoring results will be submitted to the licensing authority on a quarterly basis, together with any other records relating to pollution control which may be required by the licensing authority.

RECEIVED: 17/12/2025

We would be grateful if you could confirm that our submission is in order and should you have any questions, please don't hesitate to contact the undersigned.

Yours sincerely,



John Fennell
Planning & Estates Officer
Lagan Materials Ltd.

Tel: 01-8859999
Mob: 087-3761688
Email: john.fennell@breedongroup.com

Enclosed: DP008 Water Management

RECEIVED: 17/12/2025

DP008 Water Management

Scope: This procedure defines the conditions relating to management, monitoring and control of surface water discharges, trade effluent discharges and groundwater dewatering and management for the site.

1. Relevant Permits, Licences, Authorisations & Conditions

A copy of all Permits, Licences and Authorisations must be held on site and available for inspection by the relevant Authorities at all times.

2. Management and Control

A current and accurate site drawing showing all surface water drainage and discharge points shall be held on site and should clearly differentiate between surface and foul water drainage. A map showing all groundwater monitoring locations shall be maintained at the site. All water usage at the site shall be monitored and recorded. Any significant changes in water usage shall be investigated and the findings documented.

All discharge points shall be visually inspected daily unless otherwise specified in any regulatory requirement. A sampling regime that is in line with the requirements of the discharge licence and the site's pollution risks shall be established. This shall include testing of samples where appropriate. Where any visual pollution is detected in the discharge, a sample shall be taken immediately and tested.

Water with high suspended solids shall be prevented from entering watercourses and surface water drains by proper onsite management of surface water and by using silt traps, interceptors and settlement systems where appropriate. Settlement systems shall be carefully managed to ensure effective settlement capacity by desilting or rotation.

Effective controls to prevent contamination of groundwater resources and an effective monitoring programme to monitor groundwater quality and supply shall be put in place. The main controls planned for the protection of groundwater resources at the site and in the area include:

- Measures shall be taken to minimise water demand where appropriate;
- Wheel washing water travels into the underground interceptor for treatment prior to discharge into storm drain. Sampling is carried out at this discharge point.
- The drainage arrangements proposed for the site shall ensure that no uncontrolled discharge of drainage from the site occurs at any time, and hence no infiltration to groundwater.
- Storage of wastes, fuels and hazardous materials shall be in designated bunded storage areas to prevent any risk of contamination of groundwater.

In instances when an actual or suspected uncontrolled release of pollutants occurs to a watercourse or ground water, site management shall inform the Technical Manager immediately and the emergency response procedures as per depot procedure DP004 shall be implemented.

3. Monitoring and Reporting

Environmental monitoring reports will be prepared by external consultants and shall contain all information as required by the various conditions set out in the permissions. A hardcopy report with the results assessed against the permit limits will be issued to the permitting authority and also to the site. A soft-copy will be issue to the Lagan Macadam and Quarries head office.

4. Corrective Actions

RECEIVED: 17/12/2025

If a non-compliance with an Objective or Target is noted, an immediate review will be undertaken to identify the cause of the non-compliance. The details of the investigation together with details of corrective actions to be taken will be recorded in accordance with the Corrective Action Depot Procedure.

RECEIVED: 17/12/2025

CORK COUNTY COUNCIL

LOCAL GOVERNMENT (WATER POLLUTION) ACTS 1977 AND 1990

Licence to discharge Trade Effluent or Sewage Effluent to Waters

Reference No. In WP(W)10/18

TO / Kilsaran Concrete t/a Kilsaran Build
Piercetown
Dunboyne
Co. Meath

The Council of the County of Cork, in excercise of the powers conferred on it by the Local Government (Water Pollution) Acts, 1977 to 2007, as amended, hereby **GRANTS** a Licence, Reference Number WP(W)10/18

To **Kilsaran Concrete t/a Kilsaran Build**
Piercetown
Dunboyne
Co. Meath

To Discharge **Trade effluent arising from quarrying operations including the quarrying, the crushing and screening of stone, readymix concrete production and block production**

To (River) **Groundwater**

Located at **Rossmore, Carrigtohill, Co. Cork**

subject to the Conditions set out in the schedule attached hereto. It should be noted that a person shall not be entitled solely by reason of a licence to make, cause or permit a discharge to a sewer.

ENVIRONMENT DEPARTMENT,
ROOM FF14,
CORK COUNTY COUNCIL,
INNISCARRA,
CO CORK.

Signed on behalf of the said Council,

John O'Regan

STAFF OFFICER

Dated this 8th **day of** March 2019

NOTE:

An appeal against a decision made by a Sanitary Authority under Section 4, Section 16 and Section 17 of the Act of 1977, may be made to An Bord Pleanala under Section 20 of the Act, as inserted by Section 15 of the Local Government (Water Pollution) (Amendment) Act, 1990 within one month of the date of the Licence.

Appeals should be addressed to THE SECRETARY, AN BORD PLEANALA,

64 Marlborough Street, Dublin 1, and will be invalid unless accompanied by an additional fee of €126.00.

A request for an oral hearing shall be accompanied by an additional fee of €63.00.

A party to an appeal shall give to An Bord Pleanala any document, information or evidence in his possession or procurement, which An Bord Pleanala consider necessary for the purpose of determining the appeal.

Hydro-G

50 Henry St.
Galway

pamela@hydro-g.com

087 8072744

RECEIVED: 31/12/2025

30/05/2024

Re: Rossmore Planning Conditions Compliance Note 2024: Condition 6

Cork County Council PL 21/6983

To Whom it may Concern

Condition 6 of the Grant of Permission in Cork County Council Planning ref. 21/6983 outlines a number of actions to be undertaken by the developer prior to the commencement of the development granted. Hydro-G has been engaged by Lagan Materials to offer a Technical Advice Note with respect to the wording of Condition 6 of PL 21/6983, specifically in the context of the actual intention of the "Heritage-Related Observations and Recommendations" outlined in the 9th May 2022 communication by the Development Applications Unit of the National Parks & Wildlife Service (NPWS).

In the 9th of May 2022 "Heritage-Related Observations and Recommendations" communication from the Development Applications Unit of the National Parks & Wildlife Service (NPWS) to Cork County Council, the DAU suggest that *"The following type of condition is recommended"* and the exact text of the DAU suggestion on *"type of condition"* then got directly transferred by Cork County Council into *Planning Reference 21/6983, Condition 6, as follows:*

> *"Prior to the deepening of the quarry below -20m OD, baseline water quality (including salinity) and flow rate data shall be collected from two intertidal percolation flows through the cobble bank above the mudflats, immediately to the south of Rossmore townland. Water quality shall be monitored annually by qualified surveyors at low flows up to the end of the restoration period. Flow rate will be monitored annually by qualified surveyors and at appropriate times when groundwater head pressure is expected to be highest, up to the end of the restoration period. The results shall be made available to the relevant regulatory authorities, on request. Where water flow is found to be likely to be increasing, a report shall be sent to the relevant regulatory authorities which determines if there is increased risk of flood water building behind the embankments at Rossmore and / or further east at Ballintubbrid West. The extent of coastal erosion of these embankments shall also be assessed and a risk assessment of their over-topping shall be carried out."*

Hydro-G herein provides technical comment in respect of the wording of Condition 6 and how it is, in essence, already provided for in the ongoing Site Monitoring of Discharge Flows and the Compliance Monitoring Reporting to Cork County Council's Environment Section in their administration of the current,

legally compliant, Section 4 Discharge Licence (WP(W)08/18, granted by Cork County Council on 21st February 2019 pursuant to Local Government (Water Pollution) Acts 1977 and 1990) and upheld by the applicant for the Development Site in question. Dr. Pamela Bartley's Evidence of Competency is provided for at the end of this note.

RECEIVED: 11/12/2025

In relation to the Site's compliance with the Intention of Condition 6, the information in the EIAR Water & Ecology (Biodiversity) Chapters presented no potential for impact on the SAC. Therefore, the Intention of the Condition has been achieved in the Documentation AND in the ongoing compliance with the Section 4 Discharge Licence (WP(W)08/18, granted by Cork County Council on 21st February 2019.

The actions specified in the wording of Condition 6 would have no material benefit that is not already achieved in the compliance with Section 4 Discharge Licence (WP(W)08/18, granted by Cork County Council on 21st February 2019. There is neither logical nor hydrogeological merit in monitoring the salinity of the tidal waters. The Cork Harbour SPA and Great Channel SAC are infinitely bigger that the quarries and the Cork County Council East Cork Landfill Site: W0022-01 (Reg No. W0022-01). There is no scientific resolution that could distinguish between the Water Facilities impact and the quarry's impact. The Impact of the quarry's discharge on the bay is appropriately controlled by the monitoring conditions of WP(W)08/18.

A comprehensive water chapter as part of the EIAR was submitted with the planning application and was completed by Hydro-G. In the EIAR, Hydro-G considered the primary question of note, regarding deepening the existing excavation at the site, to be as follows:

> *"Given that we are in an SAC setting, will deepening the quarry present a risk of an adverse effect on groundwater flow, local groundwater wells or the downstream regional receptor SAC's?"*

Hydro-G's overall conclusion is that there is no potential for impact on the adjacent SAC.

Within Condition 6 of Pl. Ref. 21/6983, percolation flow data is required to be collected through two intertidal percolation flows through the cobble bank above the mudflats, immediately to the south of Rossmore townland. These percolation flows that were identified during the NPWS site visit during the assessment stage of the planning application, are diffuse flows as they represent seeps of overland flow over a large spatial extent. Erosion impacts as a result of such small percolation flows is not the dominant hydraulically driven component of flow in the bay: the tides of Cork Harbor are.

Measurement of diffuse flows is not technically possible without the use of environmental dyes and it is offered that the potential impact of the dyes is not warranted when the risk is already controlled in WP(W)08/18.

On a physical basis, if dyes are not used, compliance with British Standards for Open Channel Flow would require that the diffuse, and small, discrete flows of percolation flow need to be channeled into a 'control structure' such as a broad crested channel or V-notch weir, or similar where the combined diffuse flows would be measured. On a practical basis, the attempt to combine all the diffuse flows to a single monitoring point would be extremely difficult and would most likely not be successful. Additionally, it is the experienced opinion of Hydro-G that the negative disturbance to the SAC that such an attempt at installing monitoring infrastructure would create would far surpass any positive net value that the data would deliver. Such measurement would require the installation of infrastructure and significant development along the cobble beach, which would require AA Screening and there would be no scientific justification considering that Cork County Council have already adequately applied control measures by virtue of the Conditions of WP(W)08/18.

In relation to the assumed groundwater head pressure building as a result of infiltration of discharged water from the settlement ponds – this infiltration occurs under gravity into unconfined aquifer conditions. Ordinarily, ponding of water does not occur as the underlying aquifer at the infiltration point is capable of accepting the volume of water discharged. Significant field work was completed to support this conclusion in the documentation submitted to Cork County Council's Environment Section in their determinations and Conditions of WP(W)08/18. Ponding of water occurs infrequently, and then only to depths of a maximum of approximately 20cm. Hence, perceptions of risks are unfounded in fact, and any requirement to monitor or mitigate for an increase of head pressure as a result of discharged water from the development is also unnecessary.

RECEIVED: 11/12/2025

Hydro-G has assessed the potential for impact on the Great Island Channel SAC (Site Code 001058) and the Cork Harbour SPA (Site Code 004030) and concluded that potential hydrological or hydrogeological impacts on these designated sites are unlikely to result from the proposed development or its WP(W)08/18 Licensed discharge. Yes, the site is licensed to discharge a maximum potential future volume of 12,000m3/day. However, that is a worst-case SIMULATION scenario and not a target. No business enterprise wishes to unnecessarily manage large volumes of water. The site manages a small fraction of the permitted maximum Emission Limit Volume with pertinent facts, as follows:

i. Currently the site dewaters 396m3/day, on average. This is the discharge volume. This is a small volume and the porosity of the subsoil and sand permeability in the coastal zone discussed by the DAU will accommodate it easily.

ii. No sustained volumes of water were found in any of the Site Investigation 8" diameter Boreholes, drilled to be pumpable if needed as part of the development of the Site Conceptual Model and to be used to determine potential for impact in the EIAR associated with the Grant of PL21/6983. Therefore, no large increases in volumes of water are envisaged.

iii. Deepening of the quarry is not expected to substantially increase dewatering requirements because, with increasing depth of excavation, the diffuse karst nature of the aquifer, along with the coastal setting suggests that the limestone will be denser at depth, and will have decreasing transmissivity – *ie.,* the rate at which groundwater will flow through the aquifer will decrease. Hence, assessments have shown that an increase in "the cone of depression" around the quarry is not anticipated.

iv. The current volume of waters arising ranges from 50m3/day to 800m3/day approximately. The volumes currently encountered at <10% of those that were predicted for the excavation level of -20m OD, which some of the site is now at.

v. Therefore, the prediction of 12,000m3/day in the documentation submitted in revision of the site's discharge licence in 2018 (WP(W)0818) has not been realised and that volume remains valid as a volume that could, but probably will not, be experienced in the future when the site continues to -50mOD.

vi. Rainfall Runoff is the dominant component of MEASURED site volumes of water arising. The waters are discharged to an infiltration area relatively close to the quarry.

vii. The infiltration area feeds the estuary. Therefore, there is no significant net loss of water from the catchment to the estuary.

Most importantly, the site is licensed to discharge up to a maximum of 12,000m3/day. Therefore, all discharge volumes below 12,000m3/day and in compliance with the emission limit value (ELV) for all parameters have been deemed to be acceptable by Cork County Council's Environment Section. The site is in full compliance with the requirements of the discharge licence. This means that there is no need for any diffuse percolation or salinity measurements. The Conditions of WP(W)08/18 already address and constrain impacts on the downstream environment.

RECEIVED: 17/12/2025

In overall conclusions:

1. The finding of **no potential for** impact by the quarry on the adjacent Great Island Channel SAC (Site Code 001058) and the Cork Harbour SPA (Site Code 004030) was confidently asserted by Hydro-G in the EIAR supporting this development.

2. The Grant of Permission by the Local Planning Authority (Cork County Council) in their Grant for PL21/6983, and An Bord Pleanála in their upholding of the same, was made in the understanding of **no potential for** impact by the quarry on the adjacent Great Island Channel SAC (Site Code 001058) and the Cork Harbour SPA (Site Code 004030).

3. SLR's Flood Risk Assessment (2020) concluded no potential for coastal waters overtopping the southern berms of the site.

4. Hydro-G assessed no potential for accumulation of groundwater within the site.

5. There is no geotechnical risk. Perception of risk by the DAU is not enough to warrant a Condition of monitoring of diffuse percolation flows or salinity in a bay with multiple and diverse pressures and industries.

6. It is respectfully proposed that compliance with Condition 6 of PL 21/6983 is afforded, by default, in the ongoing an demonstrated compliance with WP(W)08/18's Conditions for Flow and Emission Limit Values for hydrochemistry and Physiochemistry. No increase is predicted, no build up of pressure head is possible.

Yours Sincerely

Pamela Bartley

Dr. Pamela Bartley B.Eng, M.Sc., Ph.D

Statement of Expertise PAMELA BARTLEY B.Eng., M.Sc., Ph.D:

Pamela Bartley is a respected assessor of potential impacts from regionally important quarries and their Section 4 Licensing. She is responsible for successful grants for Quarries and their Section 4 Licences in proximity to SAC Habitats in Counties from Donegal through to Galway, Kerry, Cork and Kilkenny. She is a water focussed civil engineer with over 25 years of experience and field-based practice in hydrogeology and hydrology. She is considered a specialist in the design and development of large-scale boreholes for Group Water and Public Water Supply Schemes. She has assessed

site suitability and designed large scale nature-based solutions to be employed with conventional wastewater treatment systems: Constructed Wetlands and Willow Systems.

RECEIVED: 17/12/2025

Pamela Bartley's company is Bartley Hydrogeology ltd., registered to trade as Hydro-G. The company holds professional indemnity insurance of €2million in each period and the company holds the requisite employers and public liability insurances. Pamela is qualified and IOSH certified to act as PSDP (Project Supervisor Design Phase) & PSCS (Project Supervisor Construction Stage) as defined by the Construction Regulations.

The company is a registered Irish Water Supplier (no. 1855) and Pamela Bartley is HSQE approved within Irish Water, is one of their Hydrogeologist service providers and is the Panel Hydrogeologist for the North West. However, she has also completed Irish Water assessments and remediations as far south as Cape Clear, Co Cork, north in Letterkenny, Co Donegal and northeast as far as Clones, Co. Monaghan. She has developed a particular skillset in borehole rehabilitation.

Upon completion of a Diploma in Water and Wastewater Technology at Sligo RTC, she completed her primary degree in Civil Engineering at Queens University, Belfast and then completed a Masters in Environmental Engineering followed by a hydrogeologically focussed Ph.D. within the school of Civil Engineering at Trinity College, Dublin. As well as engineering abstractions for groundwater as a source of public water supply, she is considered an expert consultant in the sphere of EIA, the EIA Directive, EPA EIA Guidelines and resultant EIAR components.

Pamela has successfully completed post doctorate formal course training in the areas of:

- PSDP & PSCS (IOSH certified, 2016)
- Karst Hydrogeology (GSI, 2013)
- On Site Wastewater & Water Services Amendment Act 2012 (IE, Western Region & Dublin 2012)
- Zero Discharge Willow Wastewater Design Courses (Denmark 2008, 2011 & Ireland 2012);
- Expert Witness (IE, 2011)
- Planning & Development Act (IE, 2010)
- Surface Water Regulations 2009 (DoE, 2010 & 2011)
- Sustainable Drainage (Wallingford/CIRIA, 2005 & 2008)
- Source Protection Zone Delineation (IGI/GSI, 2007)
- Groundwater & Contaminant Microbiology (IGI/GSI, 2006)
- Applied Groundwater Modelling (ESI, UK, 2000)
- Site Suitability Assessment (FETAC, 2002)

As a result of work in evaluating planning appeals, Pamela has become specialist in evaluations in the context of enacted Irish Regulation and EU Directives concerning the water environment such as the Water Framework Directive and its Irish Statutory Instruments: the Groundwater Regulations (S.I. No. 9 of 2010 as amended) and Surface Water Regulations (S.I. No. 272 of 2009 as amended). In addition, her successful attainment for Section 4 Licenses in landscapes in hydraulic connectivity with Designated and Conservation Objective Sites has ensured Pamela's intricate understanding of the Habitats' Directive and the Birds and Habitats Regulations.

Pamela is a qualified and certified 'Site Assessor' and was an interviewer of examination candidates in respect of eligibility for the Site Suitability FETAC Qualification. In the past, she has lectured in third level institutions (WIT, CIT, 1996 – 1999), delivered practical laboratory instruction in the assessment of subsoils for the FETAC Site Assessor programme and also demonstrated hydraulics laboratory modules at Trinity College Dublin (1996). She has been an invited guest speaker at An Board Pleanála, The Irish Concrete Federation, The Health Service Executive, Environmental Health Officers National Conference, The Irish Planning Institute's National Conference, The International Association of Hydrogeologists National Conference (Irish Branch) and has delivered hydrogeological lectures to the public during Science Week.

Pamela's water supply borehole expertise has been gained in the field by personal supervision of the drilling and designing large scale Public Water abstractions for many DBO2 Group Water Schemes, Public Supply sources for Galway County Council, Clare County Council and later for Irish Water in Counties from Donegal to Galway and the Roscommon

border. She has completed large scale commercial groundwater wells for a lot of Motorway Service Stations, hotels and international business including pharmaceuticals, creameries, whiskey distilleries and soft drink's manufacturers.

RECEIVED: 17/12/2025

RECEIVED: 17/10/2025

Appendix 7.6

Impact Effect Assessment Methodologies & Detail

This appendix provides a logical work through of the procedure for determining Effects to the Water environment that are likely to occur during all activities that take place during the enabling, operational and restoration phases. Mitigation measures are then applied to each. For each mitigation measure, residual impacts are then evaluated following application of the mitigation measure.

Legislation & Guidance

As previously stated, the complete list of Guidance and Legislation employed in the completion of this work was presented in Appendix 8.3.

This EIA was completed in accordance with enacted EU and Irish legislation pertaining to Environmental Impact Assessment (Directive 2014/52/EU, meaning the EIA Directive and Irish EIA Regulations (2018, as amended 2020).

The Impact Assessment was completed with reference to Guidance relating to EIA and the preparation of EIA Reports, which includes the EU (2017); Department of Housing, Planning and Local Government (2018) and EPA (2022) on Guidelines on the information to be contained in Environmental Impact Assessment Reports.

Criteria for assessing importance of site attributes and their magnitude of importance were taken from the NRA Guidelines (NRA, 2008) and 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (IGI, 2013). The tools and structure of Impact Assessment are presented here. Industry Standard Tables for rating of the Importance of Criteria, Potential Impacts, Mitigation Measure, Residual Impacts are now presented.

Significance of Impact

Unless otherwise stated, the EPA's method (2022) of determining the significance of impacts has been applied. There are three components to Table 3.4 of EPA (2022) and they relate to Effects under headings as follows:

i. Quality, Significance, Extent and Context of Effects
ii. Probability and Duration of Effects
iii. Types of Effects.

Each of the components of EPA (2022) Table 3.4 is presented here labelled as in Table A7.6.1 to A8.6.3.

RECEIVED: 17/12/2025

Table A7.6.1: Criteria and Terminology to be Used in Description of Effects: Quality, Significance, Extent and Context of Effects (EPA, 2022, Table 3.4)

Quality of Effects It is important to inform the non-specialist reader whether an effect is positive, negative or neutral	**Positive Effects** A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	Neutral Effects No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative/adverse Effects A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Describing the Significance of Effects "Significance' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful (also see *Determining Significance* below.).	**Imperceptible** An effect capable of measurement but without significant consequences.
	Not significant An effect which causes noticeable[2] changes in the character of the environment but without significant consequences.
	Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very Significant An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound Effects An effect which obliterates sensitive characteristics
Describing the Extent and Context of Effects Context can affect the perception of significance. It is important to establish if the effect is unique or, perhaps, commonly or increasingly experienced.	**Extent** Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
	Context Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)

As described in Table A7.6.1, above:

- The Quality of Effects can be Positive, Neutral or Negative/Adverse.
- The Significance of Effects are described in Table A7.6.1, above, under seven generalised degrees, which are described in EPA (2022) Table 3.4 as follows:
  - i. Imperceptible: An impact capable of measurement but without noticeable consequences.
  - ii. Not Significant: An effect which causes noticeable changes in the character of the environment but without significant consequences.
  - iii. Slight: An impact which causes noticeable changes in the character of the environment without affecting its sensitivities.
  - iv. Moderate: An impact that alters the character of the environment in a manner consistent with existing and emerging trends.
  - v. Significant: An impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.

RECEIVED: 17/12/2025

vi. Very Significant: An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.

vii. Profound: An impact which obliterates sensitive characteristics.

As shown in Table A7.6.1, the Extent and Context of the Effect must also be described.

Table A7.6.2: Criteria and Terminology to be Used in Description of Effects: Probability & Duration of Effects (EPA, 2022, Table 3.4 continued)

Describing the Probability of Effects Descriptions of effects should establish how likely it is that the predicted effects will occur so that the CA can take a view of the balance of risk over advantage when making a decision.	**Likely Effects** The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely Effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Describing the Duration and Frequency of Effects 'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	**Momentary Effects** Effects lasting from seconds to minutes.
	Brief Effects Effects lasting less than a day.
	Temporary Effects Effects lasting less than a year.
	Short-term Effects Effects lasting one to seven years.
	Medium-term Effects Effects lasting seven to fifteen years.
	Long-term Effects Effects lasting fifteen to sixty years.
	Permanent Effects Effects lasting over sixty years.
	Reversible Effects Effects that can be undone, for example through remediation or restoration.
	Frequency of Effects Describe how often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).

As described in Table A7.6.2, above, EPA (2022) requires statements on the Probability, Duration and Frequency of Effects.

RECEIVED: 17/12/2025

Table A7.6.3: Criteria and Terminology to be Used in Description of Effects: Types of Effects (EPA, 2022, Table 3.4 continued)

Describing the Types of Effects	**Indirect Effects (a.k.a. Secondary or Off-site Effects)** Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative Effects The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.
	'Do-nothing Effects' The environment as it would be in the future should the subject project not be carried out.
	'Worst-case' Effects The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable Effects When the full consequences of a change in the environment cannot be described.
	Irreversible Effects When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual Effects The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic Effects Where the resultant effect is of greater significance than the sum of its constituents (e.g. combination of SOx and NOx to produce smog).

As described in Table A7.6.3, above, EPA (2022) requires a professional interpretation Describing the Types of Effects. Examples of the Types of Effects include, as follows:

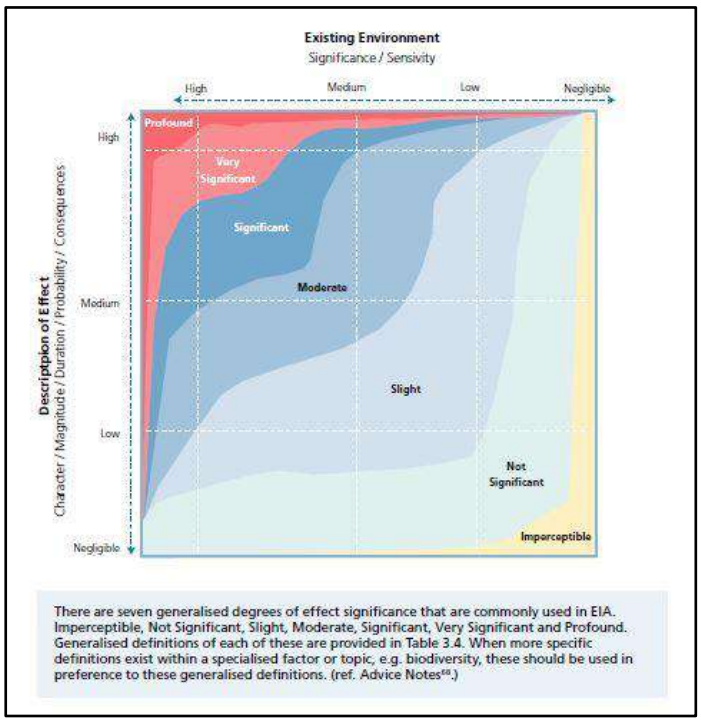
- Indirect
- Cumulative
- Do Nothing
- Worst Case
- Indeterminable
- Irreversible
- Residual
- Synergistic

Significance of Effects

Using the definitions for the degree of impact significance outlined above, the methodology for combining project information was presented in EPA (2022), as Figure 3.5, and is reproduced here in Plate A7.6.1.

RECEIVED: 17/12/2025

Plate A7.6.1: EPA's Chart Showing 'Indicative' Typical Classifications of the Significance of Effects (EPA, 2022) as adapted from SNH (2018)



Hydrological and Hydrogeological Impact Assessment

The assessment of impacts within this chapter is carried out with respect to the hydrogeological and hydrological environment. Within this chapter, potential impacts are considered to be effects of the proposed development's resultant changes to the environment.

Criteria for assessing importance of site attributes and their magnitude of importance were evaluated using NRA Guidelines (NRA, 2008) [as prescribed in 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (IGI, 2013)]. NRA rating criteria uses the same significance terminology as the EPA. However, the NRA & IGI Guidance suggest intermediate steps to justify using that terminology, as follows:

- **Step 1:** Quantify the Importance of a feature for hydrology and hydrogeology;
- **Step 2:** Estimate the Magnitude of the impact on the feature from the proposed development;
- **Step 3:** Determine the Significance of the impact on the feature from the matrix based on the Importance of the feature and the Magnitude of the impact.

IGI (2013) and NRA (2008) tables of significance to this study are presented here as Table A7.6.4, Table A7.6.5, Table A7.6.6 and Table A7.6.7. These frameworks for assessment have been applied in EIA relating to Water and Land, Soils and Geology.

Step 1

The application of the NRA's (2008) criteria (Table A7.6.4) to the site under consideration enables an 'Importance Attribute' conclusion, as follows:

RECEIVED: 17/12/2025

- With reference to hydrology, there are no direct links to any overland flow surface water system.

Table A7.6.4: Criteria for Rating Site Importance of Hydrological Features (NRA, 2008)

Importance of Attribute	Criterion	Example
Extremely High	Attribute has a high quality, or value on an international scale.	• River, wetland or surface water body ecosystem protected by EU legislation, e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations
Very High	Attribute has a high quality or value on a regional or national scale.	• River, wetland or surface water body ecosystem protected by national legislation – NHA status • Regionally important potable water source supplying > 2,500 homes • Quality Class A (Biotic Index Q4, Q5) • Floodplain protecting more than 50 residential or commercial properties from flooding • Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale.	• Salmon fishery • Locally important potable water source supplying > 1000 homes • Quality Class B (Biotic Index Q3-Q4) • Floodplain protecting between 5 and 50 residential or commercial properties from flooding • Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale.	• Coarse fishery • Local potable water source supplying >50 homes • Quality Class C (Biotic Index Q3, Q2-3) • Floodplain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale.	• Locally important amenity site for small range of leisure activities • Local potable water source supplying <50 homes • Quality Class D (Biotic Index Q2, Q1) • Floodplain protecting 1 residential or commercial property from flooding • Amenity site used by small numbers of local people

The Criteria for Rating Site Importance of Hydrogeological Features (IGI, 2013) is presented in Table A7.6.5.

RECEIVED: 19/12/2025

The application of the IGI's (2013) criteria (Table A7.6.5) to the site under consideration enables an 'Importance Attribute' conclusion, as follows:

- With reference to hydrogeology, the site and the aquifer within which it lies is deemed to be an attribute of 'High' importance rating because it is mapped as a Regionally Important Aquifer.

Table A7.6.5: Criteria for Rating Site Importance of Hydrogeological Attributes (IGI, 2013, Table C3)

Importance of Attribute	Criterion	Example
Extremely High	Attribute has a high quality, significance or value on an international scale.	• Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation, e.g. SAC or SPA status
Very High	Attribute has a high quality, significance or value on a regional or national scale.	• Regionally important aquifer with multiple wellfields. • Groundwater supports river, wetland or surface water body ecosystem protected by national legislation.
High	**Attribute has a high quality, significance or value on a local scale.**	• **Regionally important aquifer.** Groundwater provides large proportion of base flow to local rivers. • Locally important potable water source supplying >1000 homes. • Outer source protection area for regionally important water source. • Inner source protection area for locally important water source
Medium	Attribute has a medium quality, significance or value on a local scale.	• Locally important aquifer. Potable water source supplying >50 homes
Low	Attribute has a low quality, significance or value on a local scale.	• Poor bedrock aquifer. Potable water source supplying < 50 homes

Step 2

Using the Importance Criteria ratings of Table A7.6.5, the Criteria for Estimating the Magnitude of Impact on a Hydrogeology Attribute is provided in the IGI (2013) Guidance as shown in Table A8.6.6.

Table A7.6.6: Criteria for Estimating Magnitude of Impact: Hydrogeology Attribute (IGI, 2013, Table C5)

Impact	Magnitude	Example
Adverse	Negligible	• No measurable changes in attribute
	Small	• **Removal of small proportion of aquifer.**

RECEIVED: 17/12/2025

		• Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. • Potential low risk of pollution to groundwater from routine run-off. • Calculated risk of serious pollution incident >0.5% annually.
	Moderate	• Removal of moderate proportion of aquifer • Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems • Potential medium risk of pollution to groundwater from routine runoff • Calculated risk of serious pollution incident >1% annually
	Large	• Removal of large proportion of aquifer • Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems • Potential high risk of pollution to groundwater from routine runoff • Calculated risk of serious pollution incident >2% annually
Beneficial	Minor	• Minor enhancement of aquifer
	Moderate	• Moderate enhancement of aquifer
	Major	• Major enhancement of aquifer

With respect to baseline information and the detail of Table A7.6.6:

- The Regionally Important Karst Aquifer is mapped by the GSI as having an area of 127.6 km^2, which is broadly equivalent to 127,600,000 m^2.
- The application area is 12.5 ha, equivalent to 125,000 m^2.
- The area of the site relative to the area of the aquifer is 0.1%.
- For a combined area representing the operational and proposed lateral extension, the area total relative to the area of the aquifer is 0.2%.

The use of criteria listed in Table A7.6.6 suggests that the proposed development may have a Potential Impact of 'Adverse', rather than 'Beneficial' and the Magnitude of Impact on the Hydrogeological Attribute (Regionally Important Aquifer), could be concluded, as 'Small' based on the potential for removal of a 'small proportion of aquifer'.

The conclusion on the potential Magnitude of Impact on Hydrogeology is 'Small, Adverse'.

Step 3

Using the IGI's (2013) Assessment Tables, the outcomes of Tables A7.6.5 and Table A7.6.6 are used to rate the potential significance of the impact on the aquifer.

RECEIVED: 17/12/2025

Table A7.6.7: Criteria for Estimating Magnitude of Impact on Hydrogeological Attribute (IGI, 2013, Table C6)

Importance of Attribute	Magnitude of Impact			
	Negligible	Small	Moderate	Large
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/significant	Profound
High	Imperceptible	**Moderate/slight**	Significant/moderate	Severe/significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/moderate

Using Table A7.6.7, the overall potential outcome on hydrogeological receptors, in the absence of Mitigation Measures, could be 'Moderate/Slight.

The application of criteria, as outlined in Tables A7.6.1 to Table A.7.6.6 to the specifics of the study area provides a framework for general screening of the likely impact to the hydrological and hydrogeological environment. The methodology involves the identification of all the potential receptors within the site boundary and surrounding environment. This information is gathered during the desk study, site walkover, site investigation and monitoring phases of the study.

Upon collation and consideration of all project information for the site and macro scale, an Impact Assessment is completed and reported under headings, as follows:

- Potential Impacts
- Mitigation Measures
- Residual Impacts
- Do Nothing
- Cumulative Impacts
- Transboundary Impacts
- Dewatering Impact Appraisal (UK Environment Agency)
- SAC Protection Measures

Refer to the Main Body of the EIAR for the detail of the Impact Assessment specific to the site under consideration.

A description of the UK Environment Agency's Dewatering Impact Appraisal is provided separately in the next Appendix.

RECEIVED: 17/12/2025

Appendix 7.7

Dewatering Impact Appraisal Methodology (UK EA)

In addition to the application of Irish Guidelines as outlined in EPA (2022) and NRA (2008), and in the absence of Irish Guidance specifically focussed on quarries and hydrogeology, the work presented in this EIAR Section has also applied UK practical guidance as published by the UK Environment Agency (the public body equivalent of the Irish EPA). The UK Guidance provides a 'Hydrogeological impact appraisal for dewatering abstractions' (Boak, R. et. al. (2007) and the approach is succinctly outlined by the EA as follows:

"The methodology for hydrogeological impact appraisal (HIA) is designed to fit into the Environment Agency's abstraction licensing process. It is also designed to operate within the Environment Agency's approach to environmental risk assessment, so that the effort involved in undertaking HIA in a given situation can be matched to the risk of environmental impact associated with the dewatering. The HIA methodology can be summarised in terms of the following 14 steps:

- Step 1: Establish the regional water resource status.
- Step 2: Develop a conceptual model for the abstraction and the surrounding area.
- Step 3: Identify all potential water features that are susceptible to flow impacts.
- Step 4: Apportion the likely flow impacts to the water features.
- Step 5: Allow for the mitigating effects of any discharges, to arrive at net flow impacts.
- Step 6: Assess the significance of the net flow impacts.
- Step 7: Define the search area for drawdown impacts.
- Step 8: Identify all features in the search area that could be impacted by drawdown.
- Step 9: For all these features, predict the likely drawdown impacts.
- Step 10: Allow for the effects of measures taken to mitigate the drawdown impacts.
- Step 11: Assess the significance of the net drawdown impacts.
- Step 12: Assess the water quality impacts.
- Step 13: If necessary, redesign the mitigation measures to minimise the impacts.
- Step 14: Develop a monitoring strategy.

The steps are not intended to be prescriptive, and the level of effort expended on each step can be matched to the situation. Some steps will be a formality for many applications, but it is important that the same thought-process occurs every time, to ensure consistency. The methodology depends heavily on the development of a good conceptual model of the dewatering operation and the surrounding aquifer. The steps of the methodology are followed iteratively, within a structure with three tiers, and the procedure continues until the required level of confidence is achieved. Advice is also given on how to undertake HIA in karstic aquifers and fractured crystalline rocks." Boak, R. et. al. (2007).

Hydro-G has applied the UK Environment Agency's step wise process in order to present a Step Wise assessment of the potential for impact that might arise in response to the proposed development and its interaction with the water environment and Conservation Objective sites of the region.

RECEIVED: 17/12/2025

Appendix 7.8

EPA WFD Reports (2019, 2024)

RECEIVED: 17/12/2025

WFD Cycle 2

Catchment Lee, Cork Harbour and Youghal Bay

Subcatchment Tibbotstown_SC_010

Code 19_2



© Ordnance Survey Ireland. All rights reserved. Licence Number EN 0059208

Generated on: 08 Jan 2019

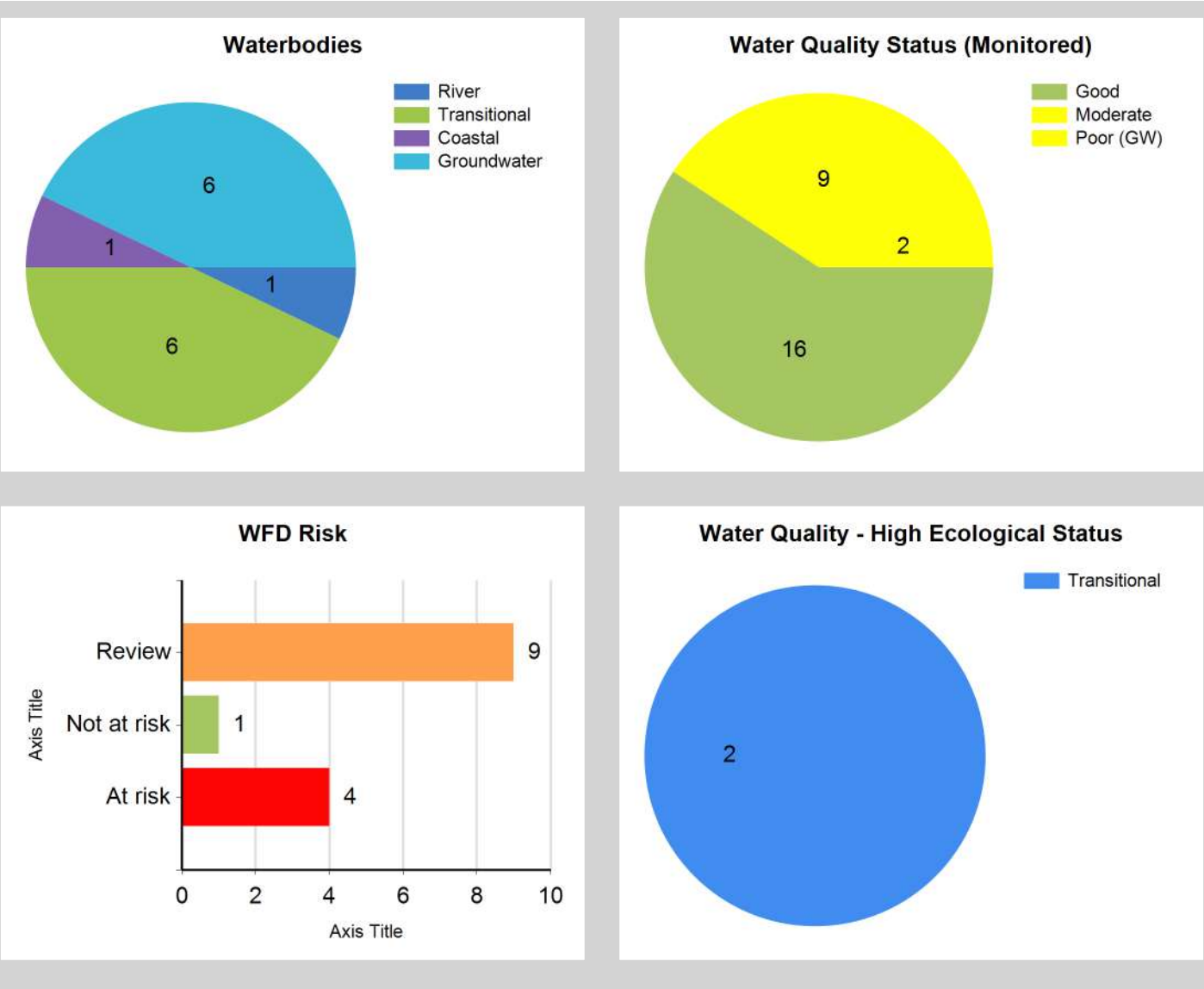
Generated by WFD Application

RECEIVED: 17/12/2025

Assessment Purpose

This assessment has been produced as part of the national characterisation programme undertaken for the second cycle of Water Framework Directive river basin management planning. It has been led by the EPA, with input from Local Authorities and other public bodies, and with support from RPS consultants.

The characterisation assessments are automatically generated from the information stored in the WFD Application. They are based on information available to the end of 2015 but may be subject to change until the final 2018-21 river basin management plan is published. Users should ensure that they have the most up to date information by downloading the latest assessment before use.



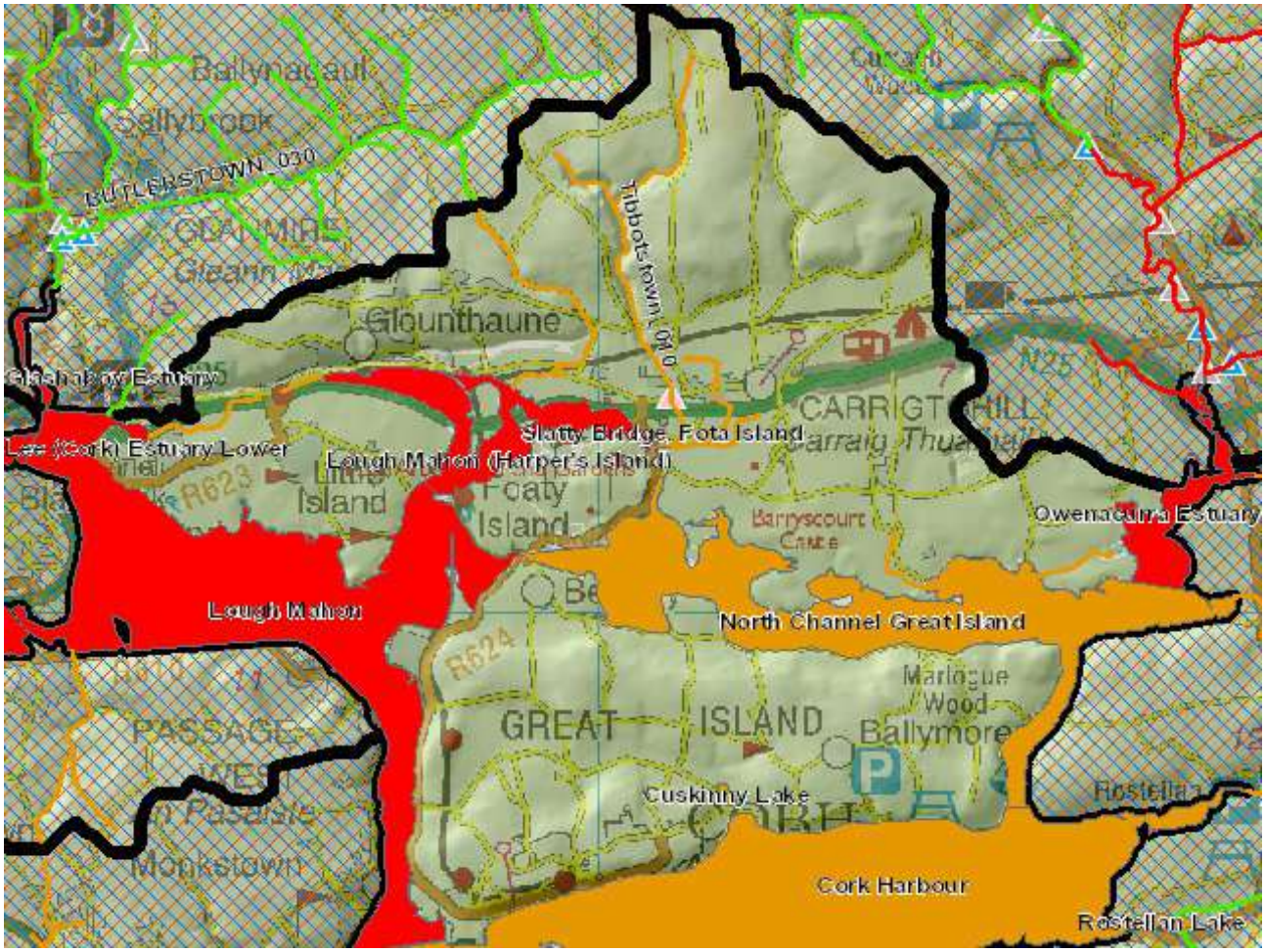
Evaluation of PrioritySubcatchment Issues

There is just one river water body in this subcatchment which is under REVIEW due to its reassigned status, Tibbotstown_010.

Further investigation is required so as to determine whether any issues exist within this water body.

RECEIVED: 17/12/2025

Map Subcatchment Risk Map



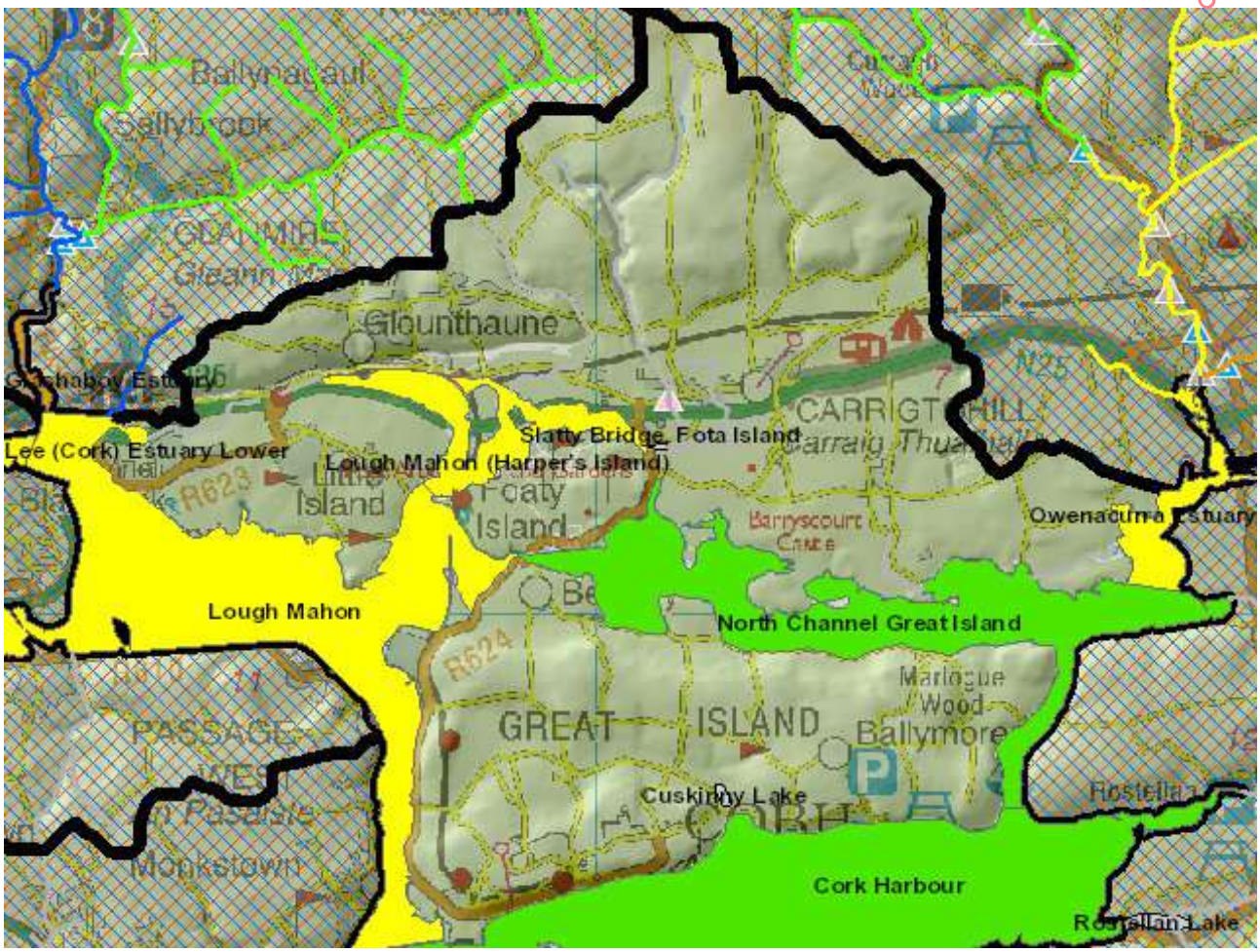
River And Lake Waterbodies: WFD Risk

The following river and lake waterbodies are in the subcatchment.

RECEIVED: 17/12/2025

Code	Name	Type	WFD Risk	Significant Pressure
IE_SW_19T250870	Tibbotstown_010	River	Review	Yes

Map Subcatchment Water Quality Status Map



River And Lake Waterbodies: Water Quality Status

The water quality status of river and lake waterbodies in the subcatchment is as follows.

Code	Name	Type	2007-09	2010-12	2010-15
IE_SW_19T250870	Tibbotstown_010	River	Unassigned	Unassigned	Unassigned

Potentially Dependent Transitional and Coastal Waterbodies

RECEIVED: 17/12/2025

The Transitional and Coastal waterbodies listed below intersect spatially with river and lake waterbodies in the subcatchment …

Code	Name	Type	Local Authority	WFD Risk
IE_SW_060_0000	Cork Harbour	Coastal	Cork County Council	Review
IE_SW_060_0200	Cuskinny Lake	Transitional	Cork County Council	Review
IE_SW_060_0300	North Channel Great Island	Transitional	Cork County Council	Review
IE_SW_060_0400	Owenacurra Estuary	Transitional	Cork County Council	At risk
IE_SW_060_0600	Slatty Bridge, Fota Island	Transitional	Cork County Council	Review
IE_SW_060_0700	Lough Mahon (Harper's Island)	Transitional	Cork County Council	At risk
IE_SW_060_0750	Lough Mahon	Transitional	Cork County Council	At risk

Potentially Dependent Groundwater Waterbodies

The groundwaters listed below interset spatially with river and lake waterbodies in the subcatchment …

Code	Name	Type	Local Authority	WFD Risk
IE_SW_G_004	Ballinhassig East	Groundwater	Cork County Council	Review
IE_SW_G_046	Knockadoon West	Groundwater	Cork County Council	Review
IE_SW_G_058	Midleton	Groundwater	Cork County Council	Review
IE_SW_G_089	Industrial Facility (P0016-02)	Groundwater	Cork County Council	Not at risk
IE_SW_G_090	LittleIsland	Groundwater	Cork County Council	Review
IE_SW_G_092	Industrial Facility (P0028-01)	Groundwater	Cork County Council	At risk

Protected Areas intersecting River and Lake Waterbodies

The Protected Areas listed below intersect spatially with river and lake waterbodies in the subcatchment …

Code	Name	Type	Waterbody Name	Association Type
IE0001058	Great Island Channel SAC	SAC	Tibbotstown_010	Overlapping / partly within Protected Area
IE0004030	Cork Harbour SPA	SPA	Tibbotstown_010	Overlapping / partly within Protected Area
IEPA2_0049	Cork Great Island North Channel	Shellfish Area	Tibbotstown_010	Overlapping / partly within Protected Area
IETW_SW_2004_0041	Lee Estuary / Lough Mahon	Nutrient Sensitive Area	Tibbotstown_010	Overlapping / partly within Protected Area
IETW_SW_2004_0042	Owennacurra Estuary / North Channel	Nutrient Sensitive Area	Tibbotstown_010	Overlapping / partly within Protected Area

Pressures

RECEIVED 17/12/2025

Below is a list of all significant pressures identified in the subcatchment.

Code	Name	WFD Risk	Pressure Category	Pressure Sub Category
IE_SW_060_0400	Owenacurra Estuary	At risk	Industry	IE
IE_SW_060_0400	Owenacurra Estuary	At risk	Urban Run-off	Diffuse Sources Run-Off
IE_SW_060_0400	Owenacurra Estuary	At risk	Urban Waste Water	Combined Sewer Overflows
IE_SW_060_0700	Lough Mahon (Harper's Island)	At risk	Urban Run-off	Diffuse Sources Run-Off
IE_SW_060_0700	Lough Mahon (Harper's Island)	At risk	Urban Waste Water	Agglomeration PE > 10,000
IE_SW_060_0750	Lough Mahon	At risk	Urban Waste Water	Agglomeration PE > 10,000
IE_SW_060_0750	Lough Mahon	At risk	Urban Waste Water	Combined Sewer Overflows
IE_SW_060_0750	Lough Mahon	At risk	Urban Waste Water	Agglomeration PE of 2,001 to 10,000
IE_SW_G_092	Industrial Facility (P0028-01)	At risk	Industry	IPC
IE_SW_060_0000	Cork Harbour	Review	Anthropogenic Pressures	Unknown
IE_SW_060_0200	Cuskinny Lake	Review	Anthropogenic Pressures	Unknown
IE_SW_060_0300	North Channel Great Island	Review	Anthropogenic Pressures	Unknown
IE_SW_060_0600	Slatty Bridge, Fota Island	Review	Anthropogenic Pressures	Unknown
IE_SW_19T250870	Tibbotstown_010	Review	Urban Run-off	Diffuse Sources Run-Off
IE_SW_19T250870	Tibbotstown_010	Review	Urban Waste Water	Agglomeration PE > 10,000
IE_SW_G_004	Ballinhassig East	Review	Anthropogenic Pressures	Unknown
IE_SW_G_046	Knockadoon West	Review	Anthropogenic Pressures	Unknown
IE_SW_G_058	Midleton	Review	Anthropogenic Pressures	Unknown
IE_SW_G_090	LittleIsland	Review	Anthropogenic Pressures	Unknown

Further Characterisation Actions

The following further characterisation actions have been identified. These are necessary to help understand more fully issues in the subcatchment and their likely cause.

Code	Name	Action	Responsible Organisation
IE_SW_19T250870	Tibbotstown_010	IA6 Multiple Sources in Large Urban Area	Cork County Council
IE_SW_19T250870	Tibbotstown_010	IA3 Determination of Water Quality (unassigned waterbody)	Cork County Council



RECEIVED: 17/12/2025

Cycle 3

HA 19 Lee, Cork Harbour and Youghal Bay Catchment Report, May 2024

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Introduction
Water Quality Summary
High Status Objectives
Water Quality Changes
WFD Risk
Significant Pressures
Action
Summary Information

Introduction

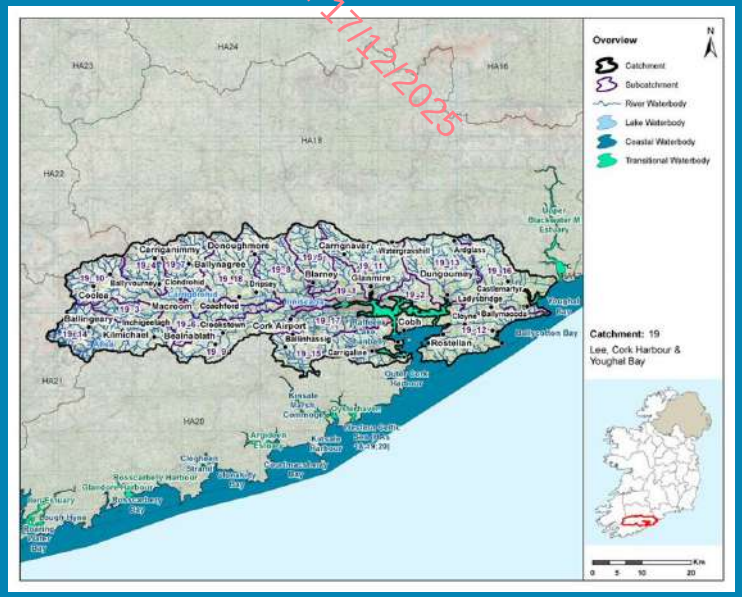
This report provides an overview of the water quality in the Lee, Cork Harbour and Youghal Bay Catchment and the pressures impacting on water quality. This report is based on data up to 2021. The latest water quality data, dashboards and maps throughout this report are available on catchments.ie and EPA Water Map.

RECEIVED: 17/12/2025

The Lee, Cork Harbour and Youghal Bay Catchment includes the area drained by the River Lee and all streams entering tidal water in Cork Harbour and Youghal Bay and between Knockaverry and Templebreedy Battery, Co. Cork, draining a total area of 2,153km². The largest urban centre in the catchment is Cork City. The other main urban centres in this catchment are Ballincollig, Macroom, Carrigaline, Crosshaven, Blarney, Glanmire, Midleton, Carrigtohill, Cobh, Passage West and Belvelly.

The Lee, Cork Harbour and Youghal Bay catchment is divided into 18 subcatchments with 92 river waterbodies, three lakes, 13 transitional, six coastal and 22 groundwater bodies.

View the Lee, Cork Harbour and Youghal Bay Catchment on the EPA Water Map



Overview of Subcatchments in the Lee, Cork Harbour and Youghal Bay Catchment

Previous Catchment Assessments

Previous catchment assessments, which provide additional historic context and information, are archived on catchments.ie:

- Cycle 2 Catchment Assessments – published September 2018
- Cycle 3 Draft Catchment Assessments – published September 2021

Online Dashboards

Links to online dashboards are provided in this report – these numbers may vary from those in this document as time progress and the online dashboards are updated based on the latest data and scientific assessments.

Introduction
Water Quality Summary
High Status Objectives
Water Quality Changes
WFD Risk
Significant Pressures
Action
Summary Information

Water Quality Summary

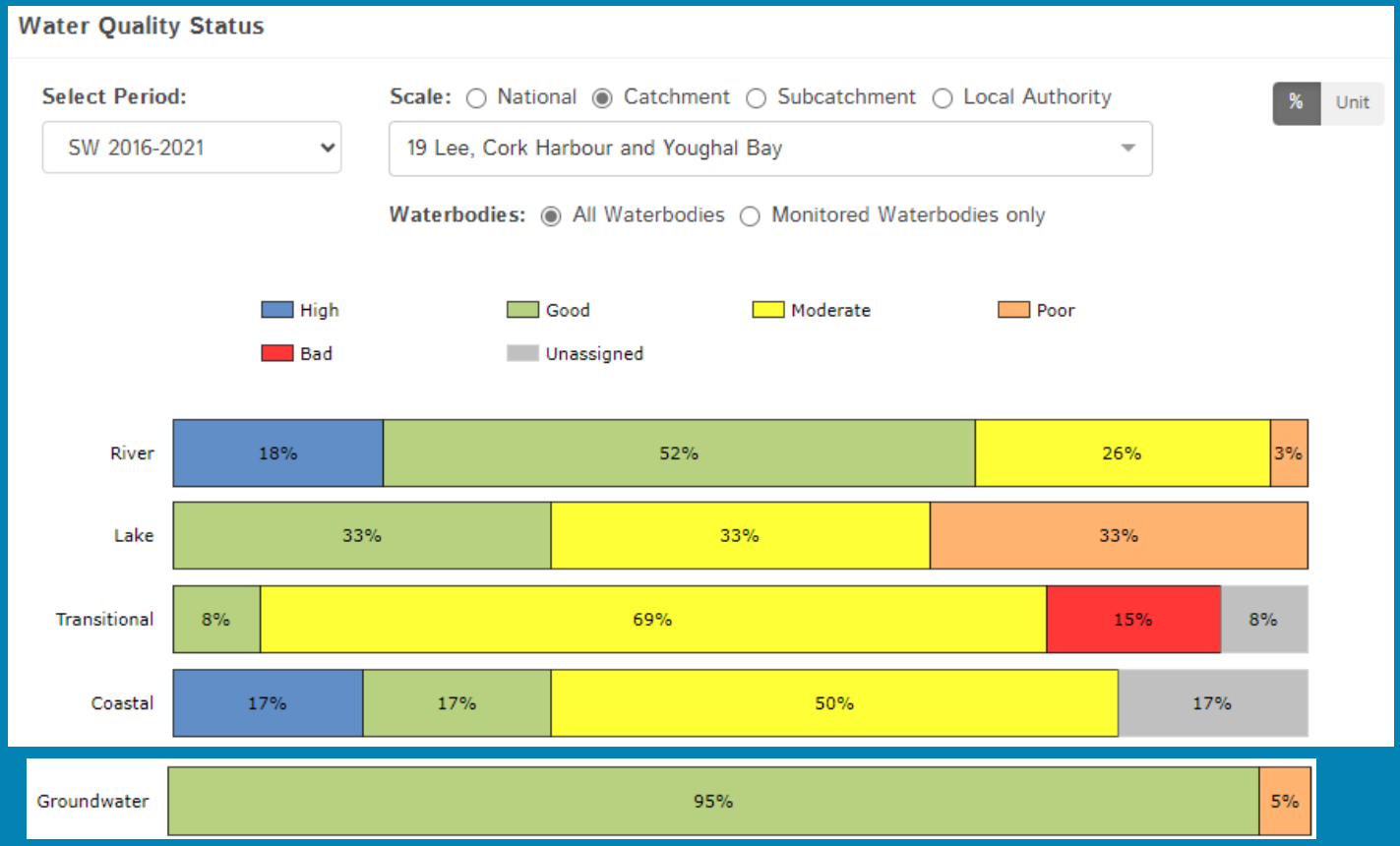
RECEIVED: 17/12/2025

The dashboard below provides a breakdown of water quality status for surface and groundwater bodies in the Lee, Cork Harbour and Youghal Bay Catchment.

A total of 61% of surface waterbodies were at Good or High Ecological Status in the 2016-2021 monitoring period. Ninety-five percent of groundwater bodies were at Good status.

Go to EPA Water Maps for WFD Status

EPA Water Map



Water quality status 2016-2021 for the Lee, Cork Harbour and Youghal Bay Catchment.
View Online Dashboard: *https://www.catchments.ie/data/#/dashboard/waterquality*

Introduction

Water Quality Summary

High Status Objectives

Water Quality Changes

WFD Risk

Significant Pressures

Action

Summary Information

High Status Objective Waterbodies

RECEIVED 17/12/2025

High status waters are prioritised for protection and action.

There are 25 waterbodies with a **High Ecological Status Objective** (HSO) in the Lee, Cork Harbour and Youghal Bay Catchment, with 10 currently not meeting their environmental objective of High.

Grants for septic tank upgrades may be available in high status objective catchment areas - you can learn more and check your Eircode for eligibility here: https://www.gov.ie/en/publication/6cc1e-domestic-waste-water-treatment-systems-septic-tanks

View HSO river waterbodies in this catchment.
See *Status and Risk / High Status Objective* for other waterbody types.

	SW 2007-2009	SW 2010-2012	SW 2010-2015	SW 2013-2018	SW 2016-2021
AWBOY_010 (River)	High	High	High	Good	High
BRIDE (LEE)_030 (River)	High	High	High	Good	Good
BUTLERSTOWN_020 (River)	Good	High	High	High	Good
DISSOUR_010 (River)	Moderate	Good	High	High	High
DOUGLAS (SULLANE)_010 (River)	High	High	High	High	High
DRIPSEY_020 (River)	Good	High	High	Good	High
FOHERISH_010 (River)	High	High	High	Good	High
FOHERISH_020 (River)	High	Good	Good	Good	High
FOHERISH_040 (River)	High	High	High	High	High

Water quality status for High Ecological Status Objective waterbodies.
View Online Dashboard: https://www.catchments.ie/data/#/dashboard/waterquality

Introduction
Water Quality Summary
High Status Objectives
Water Quality Changes
WFD Risk
Significant Pressures
Action
Summary Information

High Status Objective Waterbodies

RECEIVED 17/12/2025

	SW 2007-2009	SW 2010-2012	SW 2010-2015	SW 2013-2018	SW 2016-2021
LANEY_010 (River)	Good	High	High	High	Good
LANEY_020 (River)	High	High	High	High	High
LANEY_030 (River)	High	High	High	High	High
LANEY_040 (River)	High	High	High	Good	High
LEE (CORK)_040 (River)	Good	High	High	High	Good
MARTIN_030 (River)	Good	High	High	Good	Good
OWENNACURRA_010 (River)	Good	Good	High	High	Good
OWENNACURRA_020 (River)	Good	Good	High	High	High
SHOURNAGH_020 (River)	High	High	High	Good	High
SHOURNAGH_030 (River)	Good	High	High	Moderate	Moderate
SHOURNAGH_040 (River)	Good	High	High	Moderate	Good
SULLANE_010 (River)	Good	High	High	Good	Good
SULLANE_020 (River)	Good	High	High	Good	Good
SULLANE_030 (River)	Unassigned	Unassigned	High	High	High
SULLANE_040 (River)	High	High	Good	Good	High
SULLANE_050 (River)	High	High	High	High	High

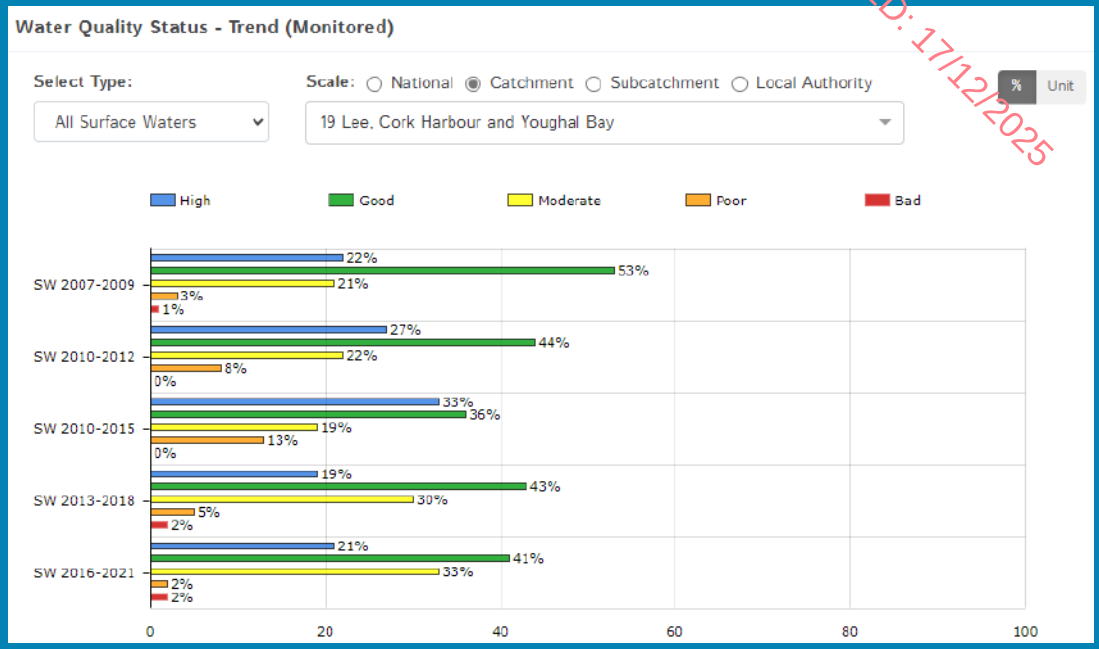
Water quality status for High Ecological Status Objective waterbodies.
View Online Dashboard: https://www.catchments.ie/data/#/dashboard/waterquality

Introduction
Water Quality Summary
High Status Objectives
Water Quality Changes
WFD Risk
Significant Pressures
Action
Summary Information

Water Quality Changes

Below illustrates the changes in ecological status in monitored surface waterbodies over the last five monitoring cycles in the Lee, Cork Harbour and Youghal Bay Catchment. Nationally while there have been improvements in some waterbodies, these have been offset by declines elsewhere.

RECEIVED: 17/12/2025



Ecological status trends for monitored surface waterbodies over the last five monitoring cycles in the Lee, Cork Harbour and Youghal Bay Catchment.

View online dashboard: https://www.catchments.ie/data/#/dashboard/waterquality

A total of 81 (60%) waterbodies are currently meeting their environmental objective of Good or High Ecological Status.

	Total	Achieving Environmental Objectives (2016-2021)	High Status Environmental Objectives Waterbodies	Achieving High Status Environmental Objectives (2016-2021)
Rivers	92	56 (*61%*)	25	15 (*60%*)
Canals	-	-	-	-
Lakes	3	1 (*33%*)	0	0 (*0%*)
Transitional	13	1 (*8%*)	0	0 (*0%*)
Coastal	6	2 (*33%*)	0	0 (*0%*)
Groundwater	22	21 (*95%*)	0	0 (*0%*)

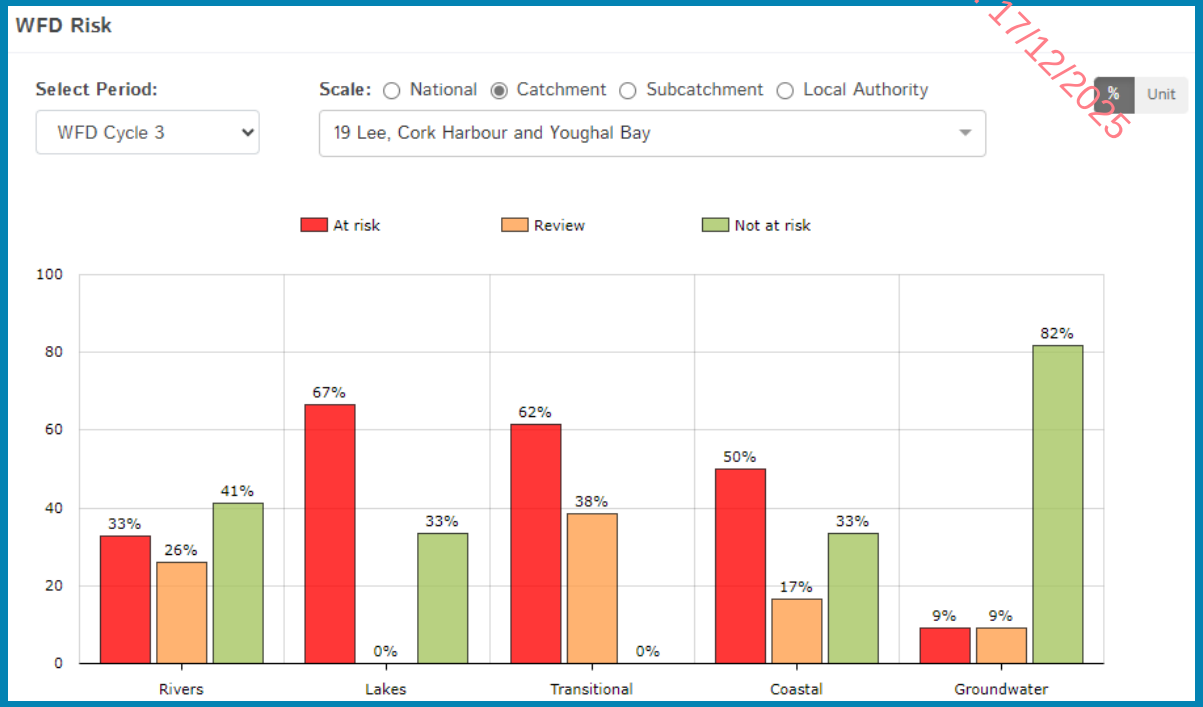
Introduction
Water Quality Summary
High Status Objectives
Water Quality Changes
WFD Risk
Significant Pressures
Action
Summary Information

WFD Risk

A total of 45 (33%) waterbodies are *At Risk* of not meeting their environmental objective in the Lee, Cork Harbour and Youghal Bay Catchment, while 32 (24%) are under *Review* and 59 (43%) are *Not At Risk.*

Go to EPA Water Map to see WFD Risk for this catchment

RECEIVED: 17/12/2025



WFD Risk for the , Cork Harbour and Youghal Bay Catchment based on 2016-2021 data.
View Online Dashboard: https://www.catchments.ie/data/#/dashboard/waterquality

There are currently five heavily modified water bodies (HMWBs) in the Lee, Cork Harbour and Youghal Bay Catchment:

- Cork Harbour (*At Risk*)
- Lough Mahon (*At Risk*)
- Lee (Cork) Estuary Lower (*At Risk*)
- Inniscarra (*Not at Risk*)
- Carrigdrohid (*At Risk*)

There are no artificial waterbodies in the Lee, Cork Harbour and Youghal Bay Catchment.

The EPA's characterisation outcome report has more information on WFD Risk

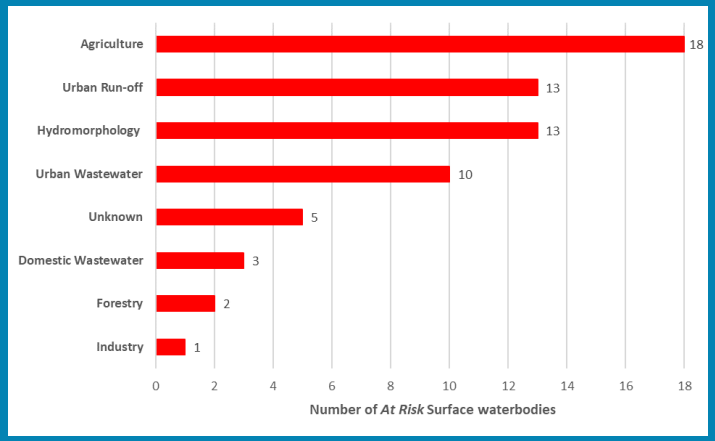
Introduction
Water Quality Summary
High Status Objectives
Water Quality Changes
WFD Risk
Significant Pressures
Action
Summary Information

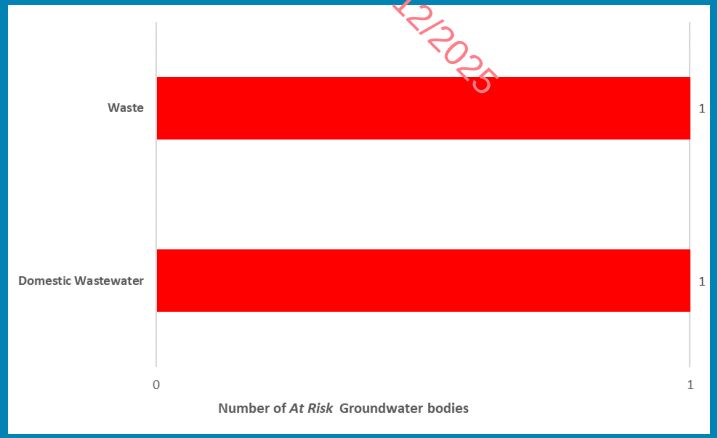
Significant Pressures driving risk

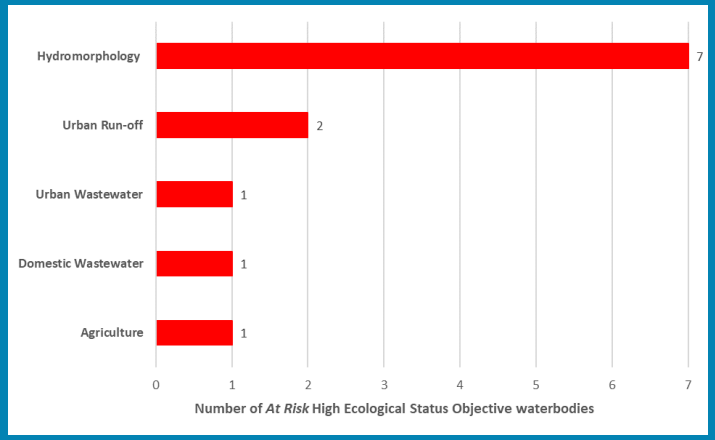
Click here for more information on significant pressures

RECEIVED: 17/12/2025

Significant pressure types impacting the 43 *At Risk* surface waterbodies and two groundwater bodies are broken down in the figures below, including significant pressure information for the nine *At Risk* High Ecological Status Objective waterbodies.







The issues driven by these pressures are mainly nutrient pollution, organic pollution and altered morphological condition (habitat) impacts for surface water, and chemical quality diminution for surface water and nutrient pollution for groundwaters. For more information, see https://www.catchments.ie/data/#/dashboard/pressure?_k=i351zs.

Go to the Summary Information section to get significant pressure and issue data for At Risk waterbodies within the Lee, Cork Harbour and Youghal Bay Catchment.

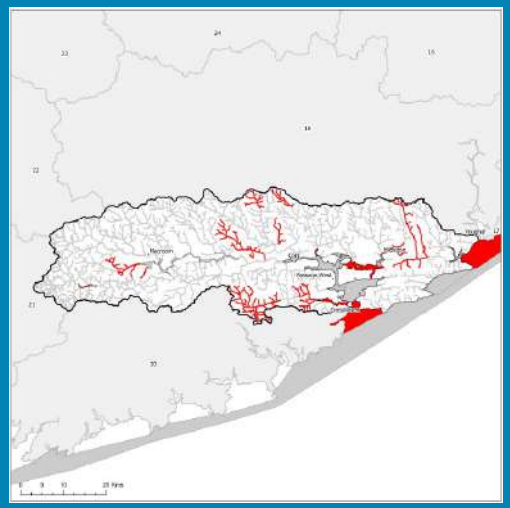
Introduction
Water Quality Summary
High Status Objectives
Water Quality Changes
WFD Risk
Significant Pressures
Action
Summary Information

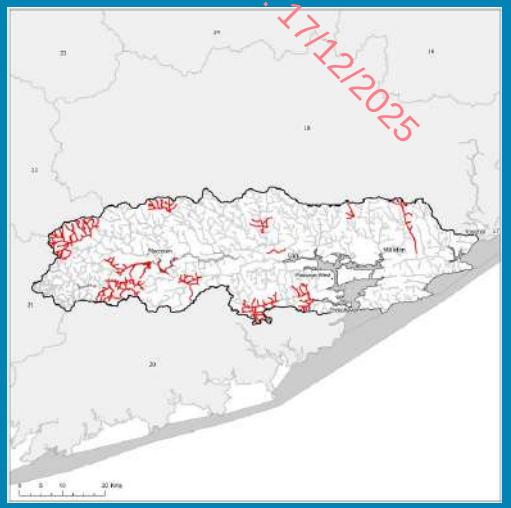
Significant Pressures

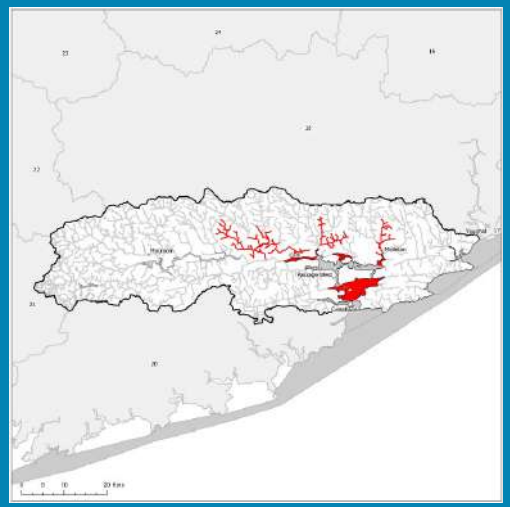
Agriculture is the top significant pressure impacting 40% of the 45 *At Risk* waterbodies within the Lee, Cork Harbour and Youghal Bay Catchment, followed by 29% impacted by both hydromorphological pressures and urban run-off.

RECEIVED: 17/12/2025

River Waterbody
Significant Pressure in Waterbody *At Risk*
Other Waterbodies
Lake, Coastal and Transitional Waterbody
Significant Pressure in Waterbody *At Risk*
Other Waterbodies







The catchments.ie dashboards will show all significant pressures identified for this catchment.

www.catchments.ie/data/#/dashboard/pressure

Go to the EPA Water Maps for the locations of all significant pressure types identified for this catchment

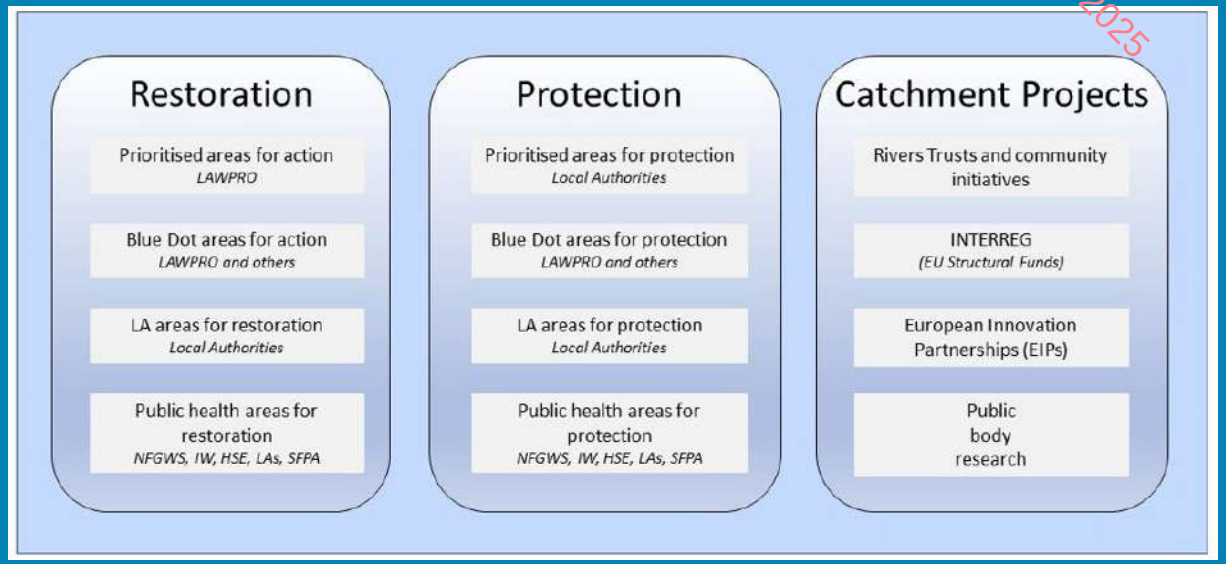
Locations of At Risk surface waterbodies impacted by i) Agriculture, ii) Hydromorphological Pressures and iii) Urban Run-off.

Introduction
Water Quality Summary
High Status Objectives
Water Quality Changes
WFD Risk
Significant Pressures
Action
Summary Information

Priority Areas for Action

RECEIVED: 17/12/2025

A number of waterbodies have been prioritised through the selection of Areas for Action. There were seven Priority Areas for Action identified for the second river basin management planning cycle in the Lee, Cork Harbour and Youghal Bay Catchment. This has increased to a total of 13 Areas for Restoration, two Areas for Protection and one Catchment Project for the third cycle. ***Go to the summary information section to get Area for Action information for waterbodies within the Lee, Cork Harbour and Youghal Bay Catchment.***



Types of Areas for Action under the third cycle River Basin Management Plan

- View the current progress of Areas for Action and Summary Reports completed by LAWPRO, on catchments.ie and the EPA Water Map:
  - https://www.catchments.ie/data/#/areaforaction
  - https://gis.epa.ie/EPAMaps/default?easting=?&northing=?&lid=EPA:WFD_AreasForAction
- LAWPRO have also published detailed desktop studies on Prioritised Areas for Action (PAAs) which are available their website: https://lawaters.ie/desktop-studies/
- Information on Areas for Action for the second cycle is available in Cycle 2 Catchment Assessments which have been archived on catchments.ie: https://www.catchments.ie/download/cycle-2-catchment-assessments-published-september-2018/

Introduction
Water Quality Summary
High Status Objectives
Water Quality Changes
WFD Risk
Significant Pressures
Action
Summary Information

Summary information for all waterbodies in the Lee, Cork Harbour and Youghal Bay Catchment

RECEIVED: 14/11/2025

The next page provides a table with a breakdown of key information for all waterbodies in this catchment. The key is provided below. Additional information for each waterbody is available on https://www.catchments.ie/data, including a breakdown of status, a monitoring schedule for monitored waterbodies and downloadable chemistry results, where available.

Protected Area categories	BW: Bathing Water DW: Drinking Water Fish: Salmonid Waters NSA: Nutrient Sensitive Areas SAC: Special Area of Conservation, Natura 2000 (water dependent habitats and species) SF: Shellfish Area SPA: Special Area of Protection, Natura 2000 (water dependent habitat and species)
Significant pressure* types categories ** For At Risk waterbodies only*	Ab: Abstractions Ag: Agriculture Aq: Aquaculture At: Atmospheric DWW: Domestic Wastewater For: Forestry HPS: Historically polluted sites HYMO: Hydromorphology Ind: Industry IS: Invasive Species M+Q: Mines and Quarries Peat: Peat Drainage and Extraction UR: Urban Run-Off UWW: Urban Wastewater Was: Waste WT: Water Treatment

Catchment Code	Waterbody (WB) Code	WB Name	WB Type	Local Authority	Protected Area	Status 10-15	Status 13-18	Status 16-21	Environmental Objective	Environmental Objective Date	WFD Risk 16-21	Significant Issue(s)	Significant Pressure(s)	Area for Action (AFA)	AFA (lead, type)	Link to WB page on catchments.ie	Link to WB on EPA Water Map
17, 19, 20	IE_SW_010_0000	Western Celtic Sea (HAs 18;19;20)	Coastal	Cork County Council	BW; SAC; SPA;	Unassigned	High	High	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
17, 18, 19	IE_SW_020_0000	Youghal Bay	Coastal	Cork County Council	BW; SAC; SPA; SF; NSA;	Good	Moderate	Moderate	Good	2022-2027	At risk	Nutrients, Organic	Ag			View WB Page	View WB on EPA Water Map
19	IE_SW_040_0000	Ballycotton Bay	Coastal	Cork County Council	BW; SPA;	Unassigned	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19, 20	IE_SW_050_0000	Outer Cork Harbour	Coastal	Cork County Council	BW; SPA;	Good	Good	Moderate	Good	2022-2027	At risk	Nutrients	Ag			View WB Page	View WB on EPA Water Map
19	IE_SW_060_0000	Cork Harbour	Coastal	Cork County Council	SPA; SF; NSA;	Good	Moderate	Moderate	Good	2022-2027	At risk	Nutrients, Organic	UR, UWW			View WB Page	View WB on EPA Water Map
19	IE_SW_060_1000	Raffeen Lake, Shanbally	Coastal	Cork County Council	SPA;	Unassigned	Unassigned	Unassigned	Good	Unknown	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_G_002	Ballincollig	Groundwater	Cork County Council	DWPA	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
18, 19, 20	IE_SW_G_004	Ballinhassig East	Groundwater	Cork County Council	DWPA; SAC	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
18, 19, 20, 21, 22	IE_SW_G_005	Ballinhassig West	Groundwater	Cork County Council	DWPA; SAC	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_G_009	Waste Facility (W0023-01)	Groundwater	Cork County Council	DWPA	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19, 20, 21, 22	IE_SW_G_019	Beara Sneem	Groundwater	Kerry County Council	DWPA; SAC	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
18, 19, 21, 22	IE_SW_G_022	Cahersiveen	Groundwater	Kerry County Council	DWPA; SAC	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_G_028	Cloyne	Groundwater	Cork County Council	DWPA	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
17, 18, 19, 22	IE_SW_G_037	Glenville	Groundwater	Cork County Council	DWPA; SAC	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_G_045	Knockadoon East	Groundwater	Cork County Council	DWPA; SAC	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_G_046	Knockadoon West	Groundwater	Cork County Council	DWPA; SAC	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
18, 19	IE_SW_G_058	Midleton	Groundwater	Cork County Council	DWPA; SAC	Good	Good	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_G_072	Ringaskiddy	Groundwater	Cork County Council	DWPA	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_G_079	Whitegate	Groundwater	Cork County Council	DWPA	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_G_083	Haulbowline Island	Groundwater	Cork County Council	DWPA	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19, 20, 21	IE_SW_G_086	Bandon	Groundwater	Cork County Council	DWPA; SAC	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19, 20	IE_SW_G_087	Brinny Gravels East	Groundwater	Cork County Council	DWPA	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19, 20	IE_SW_G_088	Brinny Gravels West	Groundwater	Cork County Council	DWPA	Good	Good	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_G_089	Industrial Facility (P0016-02)	Groundwater	Cork County Council	DWPA	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_G_090	LittleIsland	Groundwater	Cork County Council	DWPA; SAC	Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_G_091	Waste Facility (W0012-03)	Groundwater	Cork City Council	DWPA	Poor	Poor	Poor	Good	2022-2027	At risk	ChemicalQualityDiminutionForSW, Nutrients	Was			View WB Page	View WB on EPA Water Map
19	IE_SW_G_092	Industrial Facility (P0028-01)	Groundwater	Cork County Council	DWPA; SAC	Poor	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_G_094	Lee Valley Gravels	Groundwater	Cork County Council	DWPA	Good	Good	Good	Good	2021 or earlier	At risk	ChemicalQualityDiminutionForSW, Nutrients	DWTS			View WB Page	View WB on EPA Water Map
19	IE_SW_19_138	Inniscarra	Lake	Cork County Council	Fish;	Moderate	Moderate	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19_139	Carrigdrohid	Lake	Cork County Council	SAC; Fish; SPA;	Poor	Moderate	Moderate	Good	2022-2027	At risk	Hydrological, Morphological, Nutrients	HYMO, Unknown	Carrigdrohid	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19_4	Allua	Lake	Cork County Council		Poor	Poor	Poor	Good	2022-2027	At risk	Nutrients, Organic	Ag, For, UWW	Allua	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19A020300	AUGHNABOY (CORK)_010	River	Cork County Council		Good	Good	Moderate	Good	2022-2027	At risk	Nutrients, Organic	Ag, DWTS	Owenboy	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19A030200	AWBOY_010	River	Cork County Council		High	Good	High	High	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19A200870	Ardnahinch_010	River	Cork County Council		Unassigned	Poor	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19A220720	Ardra More_010	River	Cork County Council		Unassigned	Moderate	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19B020500	BLARNEY_010	River	Cork County Council		Good	Moderate	Moderate	Good	2022-2027	At risk	Nutrients, Organic	Ag, UWW	Blarney	Cork County Council, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19B040400	BRIDE (LEE)_010	River	Cork County Council		Good	High	Good	Good	2021 or earlier	Not at risk			Bride (Lee)	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19B040610	BRIDE (LEE)_020	River	Cork County Council		Moderate	Good	Moderate	Good	2022-2027	Review			Bride (Lee)	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19B040900	BRIDE (LEE)_030	River	Cork County Council		High	Good	Good	High	2022-2027	At risk	Morphological	HYMO	Bride (Lee)	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map

RECEIVED: 17/12/2025

19	IE_SW_19B041300	BRIDE (LEE)_040	River	Cork County Council		Poor	Poor	Moderate	Good	2022-2027	At risk	Nutrients	DWTS	Bride (Lee)	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19B041600	BRIDE (LEE)_050	River	Cork County Council		High	Good	Good	Good	2021 or earlier	Review			Bride (Lee)	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19B060200	BUTLERSTOWN_010	River	Cork County Council		Moderate	Moderate	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19B060500	BUTLERSTOWN_020	River	Cork County Council	DWPA;	High	High	Good	High	2022-2027	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19B060800	BUTLERSTOWN_030	River	Cork County Council		Good	Good	Moderate	Good	2022-2027	At risk	Nutrients, Organic	UR			View WB Page	View WB on EPA Water Map
19	IE_SW_19B140110	BRIDE (Cork City)_010	River	Cork County Council		Unassigned	Moderate	Moderate	Good	2022-2027	At risk	Hydrological, Morphological, Nutrients, Organic	UR, HYMO	Bride (Cork City)	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19B140300	BRIDE (Cork City)_020	River	Cork City Council	NSA;	Unassigned	Moderate	Poor	Good	2022-2027	At risk	Nutrients, Organic	UR	Bride (Cork City)	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19C010200	CUSLOURA_010	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19C020500	CUMMER_010	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19C020800	CUMMER_020	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Not at risk			Carrigdrohid	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19C120740	CURRAGHEEN (Cork City)_010	River	Cork County Council		Unassigned	Moderate	Moderate	Good	2022-2027	At risk	Nutrients	Unknown			View WB Page	View WB on EPA Water Map
19	IE_SW_19D030200	DISSOUR_010	River	Cork County Council		High	High	High	High	2021 or earlier	Not at risk			Dissour	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19D030600	DISSOUR_020	River	Cork County Council		High	Good	Moderate	Good	2022-2027	Review			Dissour	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19D040700	DOUGLAS (SULLANE)_010	River	Cork County Council		High	High	High	High	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19D060150	DRIPSEY_010	River	Cork County Council		Poor	Good	Moderate	Good	2022-2027	At risk	Acidification	For			View WB Page	View WB on EPA Water Map
19	IE_SW_19D060400	DRIPSEY_020	River	Cork County Council		High	Good	High	High	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19D070500	DUNGOURNEY_010	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Review			Middleton	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19D070700	DUNGOURNEY_020	River	Cork County Council	NSA;	Poor	Poor	Poor	Good	2022-2027	At risk	Nutrients, Organic	Ag, Ind	Middleton	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19E040700	East Ballyvergan_010	River	Cork County Council	SAC; SPA;	Unassigned	Good	Good	Good	2021 or earlier	Review			East Ballyvergan	Cork County Council, Protection	View WB Page	View WB on EPA Water Map
19	IE_SW_19F010300	FINNOW (FOHERISH)_010	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19F020100	FOHERISH_010	River	Cork County Council		High	Good	High	High	2021 or earlier	Review			Keel Foherish	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19F020300	FOHERISH_020	River	Cork County Council		Good	Good	High	High	2021 or earlier	Not at risk			Keel Foherish	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19F020400	FOHERISH_030	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19F020600	FOHERISH_040	River	Cork County Council		High	High	High	High	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19F110740	Farrannamanagh_010	River	Cork County Council	SPA;	Unassigned	Moderate	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19G010200	GLASHABOY (LOUGH MAHON)_010	River	Cork County Council		Good	Moderate	Moderate	Good	2022-2027	At risk	Nutrients, Organic	Ag			View WB Page	View WB on EPA Water Map
19	IE_SW_19G010400	GLASHABOY (LOUGH MAHON)_020	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19G010600	GLASHABOY (LOUGH MAHON)_030	River	Cork County Council	DWPA; NSA;	High	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19G030200	GARRANE (LEE)_010	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Not at risk			Keel Foherish	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19G040700	GLASHEEN (Cork City)_010	River	Cork City Council	NSA;	Unassigned	Poor	Poor	Good	2022-2027	At risk	Nutrients	Unknown			View WB Page	View WB on EPA Water Map
19	IE_SW_19G840560	Gortavadda_010	River	Cork County Council	SAC; SPA;	Unassigned	Moderate	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19G880990	GLENNAMOUGHT TRIB BRIDE_010	River	Cork County Council		Unassigned	Moderate	Moderate	Good	2022-2027	Review			Bride (Cork City)	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19H050470	HILLTOWN_010	River	Cork County Council		Unassigned	Moderate	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19K020200	KEEL_010	River	Cork County Council		Poor	Good	Good	Good	2021 or earlier	Review			Keel Foherish	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19K580980	KILLMACAHILL_010	River	Cork County Council	SPA;	Unassigned	Moderate	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19K620850	KILNAGLERY_010	River	Cork County Council	SPA;	Unassigned	Poor	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19K630910	KNOCKNAMADDEREE_010	River	Cork County Council	SAC; SPA; NSA;	Unassigned	Poor	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19L010100	LANEY_010	River	Cork County Council		High	High	Good	High	2022-2027	At risk	Morphological	HYMO			View WB Page	View WB on EPA Water Map
19	IE_SW_19L010200	LANEY_020	River	Cork County Council		High	High	High	High	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19L010400	LANEY_030	River	Cork County Council		High	High	High	High	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19L010500	LANEY_040	River	Cork County Council		High	Good	High	High	2021 or earlier	Review			Carrigdrohid	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map

RECEIVED: 17/12/2025

19	IE_SW_19L030040	LEE (CORK)_010	River	Cork County Council	Fish;	Good	High	Good	Good	2021 or earlier	Not at risk			Allua	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19L030100	LEE (CORK)_020	River	Cork County Council	Fish;	Moderate	Moderate	High	Good	2021 or earlier	Not at risk			Allua	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19L030200	LEE (CORK)_030	River	Cork County Council	DWPA; Fish;	Good	Good	Good	Good	2021 or earlier	Not at risk			Allua	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19L030300	LEE (CORK)_040	River	Cork County Council	Fish;	High	High	Good	High	2022-2027	At risk	Morphological	HYMO	Carrigdrohid	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19L030360	LEE (CORK)_050	River	Cork County Council	SAC; Fish; SPA;	Unassigned	Good	Moderate	Good	2022-2027	At risk	Sediment, Nutrients	Ag, HYMO	Carrigdrohid	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19L030400	LEE (CORK)_060	River	Cork County Council	Fish;	Unassigned	Good	High	Good	2021 or earlier	Not at risk			Carrigdrohid	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19L030500	LEE (CORK)_070	River	Cork County Council		Unassigned	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19L030600	LEE (CORK)_080	River	Cork County Council	DWPA; Fish;	Moderate	Moderate	Good	Good	2021 or earlier	Not at risk			Farran	NFGWS, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19L030800	LEE (CORK)_090	River	Cork County Council	DWPA; Fish; NSA;	Moderate	Moderate	Good	Good	2021 or earlier	Not at risk			Bride (Lee)	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19M010200	MARTIN_010	River	Cork County Council		Poor	Poor	Moderate	Good	2022-2027	At risk	Nutrients, Organic	Ag	Martin	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19M010300	MARTIN_020	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Not at risk			Martin	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19M010400	MARTIN_030	River	Cork County Council		High	Good	Good	High	2022-2027	At risk	Hydrological, Morphological	HYMO	Martin	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19M010600	MARTIN_040	River	Cork County Council		Moderate	Moderate	Moderate	Good	2022-2027	At risk	Nutrients, Organic	UR	Martin	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19M290850	MOANLAHAN_010	River	Cork County Council		Unassigned	Moderate	Moderate	Good	2022-2027	Review			Womanagh	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19M300900	MONEYGURNEY_010	River	Cork County Council	SPA; NSA;	Unassigned	Moderate	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19O010400	OWENBOY (CORK)_010	River	Cork County Council		Good	Moderate	Moderate	Good	2022-2027	At risk	Nutrients	Ag	Owenboy	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19O010800	OWENBOY (CORK)_020	River	Cork County Council		Poor	Moderate	Moderate	Good	2022-2027	At risk	Sediment, Nutrients, Organic	Ag, HYMO	Owenboy	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19O011000	OWENBOY (CORK)_030	River	Cork County Council		Unassigned	Moderate	Moderate	Good	2022-2027	Review			Owenboy	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19O011400	OWENBOY (CORK)_040	River	Cork County Council		Poor	Moderate	Moderate	Good	2022-2027	At risk	Morphological, Nutrients	HYMO, Ag	Owenboy	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19O030050	OWENNACURRA_010	River	Cork County Council		High	High	Good	High	2022-2027	At risk	Morphological	HYMO			View WB Page	View WB on EPA Water Map
19	IE_SW_19O030220	OWENNACURRA_020	River	Cork County Council		High	High	High	High	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19O030400	OWENNACURRA_030	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19O030500	OWENNACURRA_040	River	Cork County Council	DWPA; NSA;	Moderate	Moderate	Moderate	Good	2022-2027	At risk	Nutrients, Organic	UR	Middleton	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19R450050	Rathcoola_010	River	Cork County Council		Moderate	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19S010100	SHOURNAGH_010	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Not at risk			Shournagh	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19S010200	SHOURNAGH_020	River	Cork County Council		High	Good	High	High	2021 or earlier	Not at risk			Shournagh	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19S010300	SHOURNAGH_030	River	Cork County Council		High	Moderate	Moderate	High	2022-2027	At risk	Nutrients	UR, UWW	Shournagh	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19S010500	SHOURNAGH_040	River	Cork County Council		High	Moderate	Good	High	2022-2027	At risk	Nutrients	UR, Ag, DWTS	Shournagh	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19S020100	SULLANE_010	River	Cork County Council		High	Good	Good	High	2022-2027	At risk	Morphological	HYMO			View WB Page	View WB on EPA Water Map
19	IE_SW_19S020170	SULLANE_020	River	Cork County Council	SAC;	High	Good	Good	High	2022-2027	At risk	Hydrological, Morphological	HYMO			View WB Page	View WB on EPA Water Map
19	IE_SW_19S020200	SULLANE_030	River	Cork County Council		High	High	High	High	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19S020300	SULLANE_040	River	Cork County Council		Good	Good	High	High	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19S020400	SULLANE_050	River	Cork County Council		High	High	High	High	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19S020480	SULLANE_060	River	Cork County Council	DWPA;	Good	Good	Good	Good	2021 or earlier	Not at risk			Carrigdrohid	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19S270790	SHANAGARRY_010	River	Cork County Council	SPA;	Unassigned	Moderate	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19S290720	SCHOOLGARDENS_010	River	Cork County Council		Unassigned	Moderate	Good	Good	2021 or earlier	Not at risk			Kilcreden	NFGWS, Protection	View WB Page	View WB on EPA Water Map
19	IE_SW_19T010100	TEMPLEBODAN_010	River	Cork County Council		Good	High	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19T020700	TOON_010	River	Cork County Council		Good	Good	Good	Good	2021 or earlier	Not at risk					View WB Page	View WB on EPA Water Map
19	IE_SW_19T050890	TWO POT (Cork City)_010	River	Cork County Council		Unassigned	Moderate	Moderate	Good	2022-2027	At risk	Nutrients	Unknown			View WB Page	View WB on EPA Water Map
19	IE_SW_19T250870	Tibbotstown_010	River	Cork County Council	DWPA; SAC; SPA; NSA;	Unassigned	Moderate	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_19W011000	WOMANAGH_010	River	Cork County Council	DWPA;	Moderate	Moderate	Moderate	Good	2022-2027	At risk	Morphological, Nutrients, Organic	Unknown, Ag, HYMO	Womanagh	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_19W011300	WOMANAGH_020	River	Cork County Council		Good	Moderate	Moderate	Good	2022-2027	At risk	Nutrients, Organic	Ag, UWW	Womanagh	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map

RECEIVED: 17/12/2025

19	IE_SW_19W011400	WOMANAGH_030	River	Cork County Council	SAC; SPA;	Unassigned	Moderate	Good	Good	2021 or earlier	Review			Womanagh	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_030_0100	Womanagh Estuary	Transitional	Cork County Council	SAC; SPA;	Unassigned	Moderate	Moderate	Good	2022-2027	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_060_0100	Rostellan Lake	Transitional	Cork County Council	SPA;	Unassigned	Bad	Moderate	Good	2022-2027	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_060_0200	Cuskinny Lake	Transitional	Cork County Council		Unassigned	Bad	Bad	Good	2022-2027	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_060_0300	North Channel Great Island	Transitional	Cork County Council	SAC; SPA; SF; NSA;	Good	Moderate	Moderate	Good	2022-2027	At risk	Nutrients	Ag			View WB Page	View WB on EPA Water Map
19	IE_SW_060_0400	Owenacurra Estuary	Transitional	Cork County Council	SAC; SPA; NSA;	Moderate	Moderate	Moderate	Good	2022-2027	At risk	Morphological, Nutrients, Organic	UWW, UR	Middleton	LAWPRO, Restoration	View WB Page	View WB on EPA Water Map
19	IE_SW_060_0600	Slatty Bridge, Fota Island	Transitional	Cork County Council	SAC; SPA;	Unassigned	Moderate	Unassigned	Good	Unknown	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_060_0700	Lough Mahon (Harper's Island)	Transitional	Cork County Council	SAC; SPA; NSA;	Moderate	Moderate	Moderate	Good	2022-2027	At risk	Nutrients, Organic, UnknownImpactType	UR, UWW			View WB Page	View WB on EPA Water Map
19	IE_SW_060_0750	Lough Mahon	Transitional	Cork County Council	SAC; SPA; NSA;	Moderate	Moderate	Moderate	Good	2022-2027	At risk	Nutrients, Organic	UWW			View WB Page	View WB on EPA Water Map
19	IE_SW_060_0800	Glashaboy Estuary	Transitional	Cork County Council	SPA; NSA;	Poor	Good	Bad	Good	2022-2027	At risk	Nutrients, UnknownImpactType	UR, Ag			View WB Page	View WB on EPA Water Map
19	IE_SW_060_0900	Lee (Cork) Estuary Lower	Transitional	Cork City Council	SPA; NSA;	Moderate	Moderate	Moderate	Good	2022-2027	At risk	Nutrients, Organic, UnknownImpactType	UR, UWW			View WB Page	View WB on EPA Water Map
19	IE_SW_060_0950	Lee (Cork) Estuary Upper	Transitional	Cork City Council	NSA;	Moderate	Moderate	Moderate	Good	2022-2027	At risk	Nutrients, Organic	UWW, UR			View WB Page	View WB on EPA Water Map
19	IE_SW_060_1100	Lough Beg / Curraghbinny	Transitional	Cork County Council	SPA;	Unassigned	Poor	Good	Good	2021 or earlier	Review					View WB Page	View WB on EPA Water Map
19	IE_SW_060_1200	Owenboy Estuary	Transitional	Cork County Council	SPA;	Unassigned	Moderate	Moderate	Good	2022-2027	At risk	Nutrients	Ag			View WB Page	View WB on EPA Water Map

RECEIVED: 17/12/2025

RECEIVED: 17/12/2025

Appendix 7.9

GSI GWB Descriptor Sheet

Midleton GWB: Summary of Initial Characterisation.

RECEIVED 17/12/2009

Hydrometric Area Local Authority	Associated surface water features	Associated terrestrial ecosystem(s)	Area (km^2)
19 Cork Co. Co.	**Rivers:**.Dower, Owennacurra, Dungourney, Womanagh, Dissour. **Lakes:** Aderry, Ballyhonock, Ballybutler.	Ballyvergan Marsh (000078), Ballyquirk Pond (001235), Clasharinka Pond (001183), Loughs Aderry and Ballybutler (000446)	136

Topography	This GWB occupies the floor of an elongate east west trending valley in east Cork. The valley is bounded to the north and south by parallel east west trending ridges which comprise the Ballinhassig and Knockadoon GWBs respectively. The valley floor is generally flat to gently undulating. Ground elevations range from 2–30 m OD. Areas of higher ground occur along the centre of the valley (20-30 m OD) but ground is generally lower along the valley margins, and in the east of the body near the coast (<20 m OD). The ready weathering & erosion of the thin shaly limestones which occur at the margins of the body is thought to be responsible for the topographic lows along the edges of the valley. In the west of the body large surface water channels extending to Lough Mahon intersect the body partially surrounding Little Island and Fota Island. These areas are considered to have sufficiently similar hydrogeology to be described as part of the Midleton GWB.	
Geology and Aquifers	**Aquifer categories**	The main aquifer category in this GWB is: **Rkd**: Regionally important karstified aquifer dominated by diffuse flow. A narrow area (12 km^2 in total) around the margins of the body has an aquifer category of: **Ll:** Locally important aquifer, moderately productive only in local zones
	Main aquifer lithologies	The main aquifer lithology in this GWB is Dinantian Pure Unbedded Limestones (primarily Waulsortian Limestone Formation). Some Dinantian Pure Bedded Limestones occur in the centre of the body. A narrow area (12 km^2 in total) around the margins of the body is composed of Dinantian Lower Impure Limestones.
	Key structures	During the Variscan Orogeny, rocks in South Munster were compressed from the south into a series of folds on east west axes. Subsequent erosion stripped the more soluble Carboniferous Limestones from the fold crests or ridges (anticlines) exposing the harder, more resistant sandstones underneath. The Carboniferous Limestones were preserved in the fold troughs (synclines) which today line elongate east-west trending valleys separated by the intervening sandstone ridges. This body lies in the east of the Cork Syncline. Extensive fracturing and faulting accompanied the folding of the rocks. The ridges and valleys are cut by series of shear faults trending approximately north-south and a series of thrust faults with a general east-west trend. The major north-south shear faults are paralleled by a very well developed system of vertical or near-vertical north-south joints which are very evident in exposures in quarries and caves in East Cork. These joints are commonly spaced at intervals of about 0.5 to 2 metres (Wright, 1979).
	Key properties	The pure unbedded limestones of the South Munster region are highly productive. Faults and joints were enlarged by karstification as groundwater moved through the limestones. There are numerous surface karst features in these limestones, (e.g. swallow holes, collapse features and closed depressions) and extensive cave systems (e.g. Carrigtohill, Midleton and Cloyne). The strong structural influence on the development of karstification is demonstrated by cave plans from Southeast Cork (e.g. Poulnahorka Caves, Castlemartyr, Co Cork) where the main passages or 'galleries' have developed along north-south joints in the order of 1 to 6 metres apart (Wright 1979). Transmissivity in the pure unbedded limestones can range up to a few thousand m^2/d. Pumping tests in the same rock type in the Cloyne GWB to this south of this body gave a range of transmissivity of 200 to over 2000 m^2/day, and 900 - 13,000 m^2/d for a water supply borehole near Dungarvan, Co Waterford (Dungarvan GWB, SERBD). Groundwater gradients within the pure unbedded limestones are low, around 0.001-0.002. (Wright & Gately 2002). There are a large number of wells with Excellent (>400 m^3/d) and Good (100-400 m^3/d) yields and the large "Dower Spring" occurs in this GWB. Springs in the pure unbedded limestone range in size from small to large, but have reliable discharges. Tracer tests carried out within this GWB recorded groundwater flow velocities of 30 m/h between Carrignashinny swallow hole and Dower Spring and 16.5 m/h between Dower Ford swallow hole and Dower Spring (Wright & Gately 2002). The pure bedded limestones are also highly productive although less evidence of extensive karstification is currently recorded. In the impure limestones, transmissivities are lower; they will generally be in the range 5-20 m^2/d but may be higher where karstification has occurred. Storativity is low in all bedrock aquifers. Groundwater storage may be enhanced by overlying sand and gravel deposits which are in continuity with the underlying limestone.

	Thickness	The Dinantian Pure Unbedded Limestones (Waulsortian Limestone) are at least 600m thick in the Cork Syncline (Sleeman & Pracht, 1994). Most groundwater flow may occur in an epikarstic layer a couple of metres thick and in a zone of interconnected solutionally-enlarged fissures and conduits that extends approximately 30 m below this. However deeper flows can occur. Boreholes have intersected major zones of fissuring at depth at Cloyne (Cloyne GWB), where a major zone of fissuring occurs at approximately 41 m below ground level, i.e. approximately 20 m below OD, and at Ringaskiddy (Carrigaline GWB), where major water inflows occur down to 40 m below OD (Wright, 1979). In the past sea level is estimated to have been approximately 50-60 m below present day OD, the level to which the now infilled channel of the River Lee was eroded (Farrington, 1959) enabling karstification at depth. Today this region is an example of a drowned karst terrain. In the Impure Limestones at the margins of this GWB, most groundwater flow occurs in an upper weathered layer of a few metres and a zone of interconnected fissures often not extending more than 15 m from the top of the rock, although occasional deep inflows associated with major faults can be encountered. Impure limestones are also much less susceptible to karstification.
Overlying Strata	**Lithologies**	This GWB is primarily covered by glacial till of varying permeability. West of Castlemartyr, and in some smaller areas east of Castlemartyr, the subsoil is generally of 'moderate' permeability. East of Castlemartyr there are areas with 'low' permeability subsoil. Sand and gravel deposits ('high' permeability) also occur in many areas within this GWB. Several small surface sand and gravel deposits have been identified within this GWB by Teagasc mapping, the most extensive being south of Ballynacorra. Drilling has revealed extensive sand and gravel deposits at Carrigtohill (Carrigtohill GWB) and in the northeast of the GWB between Youghal and Killeagh over 10 m of gravel was recorded beneath 8 m of clayey till. Frequent areas of rock outcrop and shallow rock occur in this GWB, particularly in the centre and towards the west of the body. *Subsoil Types identified in Midleton GWB by Teagasc Parent Material Mapping (Draft): Alluvium (A); Sandstone sands and gravels (Devonian) (GDSs); Marine sands and gravels (MGs); Made Ground (Made); Beach/raised beach sand (Mbs); Estuarine sediments (silts/clays) (Mesc); Marine Silts (Msi); Rock outcrop and rock close to surface (Rck); Till – Devonian Sandstone Till (TDSs), Limestone Till (TLs).*
	Thickness	There are many areas with subsoils of <3m where rock outcrop is common, particularly along the centre of the body, east of Castlemartyr, around Midleton and much of Little Island. Along the northern side of the GWB, between Killeagh and Youghal, is an area of deep subsoil where depths of >20 m are recorded. East of Carrigtohill and north of Fota Island up to 60 m of sand and gravel have been recorded (Carrigtohill GWB). Elsewhere subsoil depths of 5-10m are frequently recorded, although isolated points of deep and shallow subsoil do occur. The underlying pure unbedded limestone in this valley is highly karstified and likely to have a very irregular bedrock surface. Subsoil depths in these areas can therefore be highly variable within short distances.
	% area aquifer near surface	
	Vulnerability	This GWB has many areas of Extreme Vulnerability, particularly along the centre of the valley, in an area east of Castlemartyr, around Midleton and on Little Island. The remainder of the body west of Castlemartyr is generally of High Vulnerability. East of Castlemartyr there are some areas of Extreme and High Vulnerability coinciding with areas of shallower subsoil, but in general where subsoil depths are >3 m the remaining area is of Moderate Vulnerability.
Recharge	**Main recharge mechanisms**	The sandstone ridges to the north and south of this GWB (Ballinhassig & Knockadoon GWBs), provide abundant runoff which recharges the limestone aquifer in the valley. A small volume of groundwater may cross as through-flow from the sandstones into this GWB. In the GWB itself both point and diffuse recharge will occur. Swallowholes and collapse features provide the means for point recharge to the karstified aquifer. Diffuse recharge will occur over the entire GWB via rainfall percolating through the subsoil. The lack of surface drainage in several parts of this GWB indicates that potential recharge readily percolates into the groundwater system. There are some low-lying areas with a high water table, where a proportion of the effective rainfall is rejected due to lack of storage space in the aquifer. Groundwater in this body generally shows a rapid response to recharge. Where gravels overlie the karstified aquifer they provide a permeable pathway for recharge. They can also augment storage in the aquifer. The generally 'moderate' permeability subsoils in the west of the body will generally not restrict percolation of recharge. In the east of the body where some areas of 'low' permeability subsoil occur percolation of recharge may be restricted. However, variability in subsoil depths due to the underlying karstified limestone means that even in areas with lower permeability subsoil, opportunities for recharge to areas of shallower limestone can still occur.
	Est. recharge rates	

RECEIVED: 21/12/2025

RECEIVED: 17/12/2025

Discharge	**Large springs and high yielding wells (m^3/d)**	*Note: The following data need to be checked and updated by RBD Project Consultants.* Data from GSI Well Database: Dower Spring (Whitegate RWSS) - Estimated average discharge 32,880 m^3/day (1979); Average abstraction (4545 m^3/d). Knockgriffin, Dawn Meats (IMP), Midleton – (1200 m^3/d) Knockgriffin, Frioscandia Building – (1200 m^3/d) Ballycrenane Beg, Imokilly Co-Op Creamery , Mogeely – (1091 m^3/d) Ballintubbrid West TW3 (Carrigtohill Industrial Estate) - (852 m^3/d) Additional data from EPA Groundwater Sources List: Rossmore (W Ellis & Sons) spring (909 m3/d) Carrigtohill (John A Wood Ltd) bore (909 m3/d)
	Main discharge mechanisms	Groundwater discharges to springs within the GWB and to the rivers and streams crossing the GWB. Rivers overlying the limestones in the South Munster Synclines have relatively high dry weather flows representing contributions from the underlying aquifer.
	Hydrochemical Signature	The groundwater in this body is dominated by calcium and bicarbonate ions. Hardness can range from moderately hard to very hard (200 to >400 mg/l (as $CaCO_3$). Spring waters tend to be softer as throughput is quicker and there is less time for the dissolution of minerals into the groundwater. Groundwater alkalinity is high, up to 400 mg/l (as $CaCO_3$). Alkalinity is generally less than hardness, indicating that ion exchange (where calcium or magnesium are replaced by sodium) is not significant. These hydrochemical signatures are characteristic of clean limestone. Like hardness and alkalinity, electrical conductivities (EC) can vary greatly. Typical limestone water conductivities are of the order of 500-700 µS/cm. Lower values suggest that the residence times of some of the sources are very short, for example at the Dower Spring (Midleton GWB) where conductivities average 396 µS/cm. This value reflects a karstic system with rapid flow velocities. Chloride levels in groundwater in this body can be elevated near the coast. Due to the high level of interaction between groundwater and surface water in karstic aquifers, microbial pollution can travel very quickly from the surface into the groundwater system. The normal filtering and protective action of the subsoil is often bypassed in karstic aquifers due to the number of swallow holes, dolines and large areas of shallow rock. The hydrochemical signature of groundwater from public supply wells in the same rock type in the nearby Cloyne GWB is demonstrated in an expanded Durov plot in Figure 2 below.
Groundwater Flow Paths		These rocks are devoid of intergranular permeability. Groundwater flow occurs in the many faults and joints, enlarged by karstification. Past depression of the sea level enabled karstification at depth, which further enhances the permeability of these rocks. Because of the high frequency of fissures in this region, overall groundwater flow is thought to be diffuse, although solutionally enlarged conduits and cave systems occur. Groundwater flow occurs in an upper shallow highly karstified weathered zone in which groundwater moves quickly in rapid response to recharge. Below this is a deeper zone where there are two components to groundwater flow. Groundwater flows through interconnected, solutionally enlarged conduits and cave systems that are controlled by structural deformation. In addition there is a more dispersed slow groundwater flow component in smaller fractures and joints outside the larger conduits. The water table is generally within 10 m of the surface, except for the more elevated parts of the limestone aquifers, and the typical annual fluctuation of the water table ranges up to 6 or 7 m (Wright 1979). Hydrographs for two wells within this GWB, Attiquin (4 km west of Dower Spring) and Ballyquirk (3 km northeast of Dower Spring) (Figures 1 and 2) show annual fluctuation of water levels in the limestone of about 3-5 metres. At Dower Spring the natural water level normally varies by less than half a metre from winter to summer, although extreme flood events can add a further 0.3 m or so to this figure (Wright & Gately, 2002). Groundwater is generally unconfined. The highly permeable aquifer supports a regional scale flow system. Groundwater flow paths can be up to several kilometres long, but may be significantly shorter in areas where the water table is very close to the surface. Regional groundwater flow is towards the rivers draining the valley, to the sea in the east and to Lough Mahon and the surface water channels to the west and south west of the body. The limestones in this body are frequently overlain by sand and gravel deposits in hydraulic continuity with the underlying bedrock. Where present they provide a permeable pathway for recharge to the karstic aquifer and where saturated provide additional storage for the underlying bedrock aquifer. At Carrigtohill, the deposits are large enough, with sufficient saturated thickness, to be a locally important gravel aquifer (Lg) (Carrigtohill Gravel GWB).
Groundwater & Surface water interactions		The nature of the karstic system leads to rapid interchanges of water between surface and underground. Swallow holes and caves receive surface water, and groundwater is discharged to surface as springs or as baseflow to rivers crossing the groundwater body. Several ponds and small lakes with fluctuating water levels and exposed mud edges in summer, that appear to be at least partially fed by groundwater, occur in this GWB: (Ballyquirk Pond (001235), Clasharinka Pond (001183), Loughs Aderry and Ballybutler (000446). Near the coast tidal effects may be experienced in boreholes or springs, and brackish water may be encountered. Ballyvergan Marsh (000078) a freshwater coastal marsh near Youghal is unlikely to be dependent on water from the limestone aquifer as it occurs in an area of deep subsoil where low permeability clayey till overlies gravel.

RECEIVED 2/11/2004

Conceptual model	• This GWB occupies the floor of an elongate east west trending valley in east Cork. The body is generally flat to gently undulating (2-30 mAOD) with ground elevation at centre of the valley often higher than at the valley margins. • The GWB is bounded to the north and south by the contact with the low permeability sandstones and mudstones of the Ballinhassig and Knockadoon GWBs respectively. It is bounded to the east by the coast and to the west by Lough Mahon and the large urban development of Cork City. • The GWB is composed mainly of diffusely karstified, highly permeable pure limestones with a narrow underlying layer of less permeable impure limestone around the margins of the body. To the north and south of the body are ridges of low permeability sandstones. • The regional structural deformation that created the characteristic South Munster sandstone ridge (anticline)-limestone valley (syncline) topography was accompanied by intense fracturing and high frequency jointing (N-S jointing dominates) within the limestone synclines. Subsequent karstification of these openings has significantly enhanced the permeability of the pure limestones. Karst features such as cave systems, sinking streams, springs, swallow holes and other collapse features are common in this GWB. Karstification is known to extend well below present sea levels, and is estimated to extend to depths of 50 to 60 m below O.D. Malin Head. • Groundwater flows through the many faults and joints formed by deformation that were subsequently enlarged by karstification. Most groundwater flow occurs in an upper shallow highly karstified weathered zone of a few metres thick in which groundwater moves quickly in rapid response to recharge. Below this is a deeper zone where there are two components to groundwater flow. Groundwater flows through interconnected, solutionally enlarged conduits and cave systems that are controlled by structural deformation (influence of N-S jointing). In addition there is a more dispersed slow groundwater flow component in smaller fractures and joints outside the larger conduits. Generally this connected fractured zone extends to about 30 mbgl in pure limestones, however in the pure bedded limestones of the South Munster region, deep inflows from major zones of fissuring have been encountered to 40-50 mbgl. • Groundwater in this body is unconfined. The water table is generally less than 10 metres below the surface with an average annual fluctuation up to 6 metres. Groundwater gradients are very flat in the permeable limestones (0.001-0.002). The highly permeable aquifer can support regional scale flow systems. Groundwater flow paths can be up to several kilometres long, but may be significantly shorter in areas where the water table is very close to the surface. Overall groundwater flow is to the rivers draining the valley and ultimately to the sea in the east and to Lough Mahon and the surface water channels to the west and south west of the body. • Recharge to this GWB is both point and diffuse. The ridges to the north and south of this GWB (Knockadoon & Whitegate GWBs) provide runoff which supplies recharge to the limestone aquifer in the valley. Swallow holes, collapse features and sinking streams provide the means for point recharge to the karstified aquifer. Diffuse recharge will occur over the entire GWB via rainfall percolating through the subsoil. The lack of surface drainage in much of this GWB indicates that potential recharge readily percolates into the groundwater system. Some areas of low permeability subsoil in the east of the body may restrict percolation of recharge in areas where they are present in sufficient thickness. A relatively small volume of groundwater may cross as through-flow into this GWB from the adjacent low transmissivity GWBs. • There are many areas of Extreme Vulnerability within this GWB, particularly along the centre of the valley, in an area east of Castlemartyr, around Midleton and on Little Island. Outside areas of Extreme Vulnerability the remainder of the body west of Castlemartyr is generally of High vulnerability, while east of Castlemartyr there are areas of Moderate Vulnerability due to the presence of > 5 m 'low' permeability subsoils. In a highly karstified aquifer such as this GWB the underlying limestone will have a very irregular surface. Subsoil depths in this GWB can therefore be highly variable within short distances. • The limestones in this body are frequently overlain by sand and gravel deposits which are in hydraulic continuity with the underlying bedrock. Where present they provide a permeable pathway for recharge to the karstic aquifer and where saturated provide additional storage for the underlying bedrock aquifer. At Carrigtohill, the deposits are large enough, with sufficient saturated thickness, to be a locally important gravel aquifer (Lg) (Carrigtohill Gravel GWB) • There is a high degree of interaction between surface water and groundwater in this GWB. Swallow holes and caves receive surface water, and groundwater is discharged to surface as springs or as baseflow to rivers crossing the groundwater body.
Attachments	Hydrochemical Signature (Figure 1); Groundwater Hydrograph (Figure 2)
Instrumentation	**Stream gauges:** 19002, 19003, 19005, 19019, 19022, 19025, 19029, 21016. **EPA Water Level Monitoring boreholes:** Ballyquirk (COS 73), Ballynabointra (COS 74). **EPA Representative Monitoring points:** None
Information Sources	Farrington A (1959) The Lee Basin Part one: glaciation. Proc. R. Ir. Acad. 60B (3), 135-166. Kelly C (2000) Conna Water Supply Scheme (village bore): Groundwater Source Protection Zones. Report to Cork County Council (Northern Division). Geological Survey of Ireland. Sleeman AG, Pracht M (1994) *Geology of South Cork. A geological description of South Cork to accompany the Bedrock Geology 1:100,000 Map Series, Sheet 25.* Geological Survey of Ireland, 59pp Wright G, Gately C (2002) *Whitegate Regional WaterSupply Scheme (Dower Springs)*. Groundwater Source Protection Zones. Geological Survey of Ireland Report, 19pp. Wright G (1979) Groundwater in the South Munster Synclines. In: Hydrogeology in Ireland, Proceedings of a Hydrogeological Meeting and associated Field Trips held in the Republic of Ireland from 22 to 27 May, 1979. Published by the Irish National Committee of the International Hydrological Programme.
Disclaimer	Note that all calculation and interpretations presented in this report represent estimations based on the information sources described above and established hydrogeological formulae

RECEIVED: 17/12/2025

Figure 1: Hydrochemical signature
(GSI Monitoring as part of Source Protection Report)

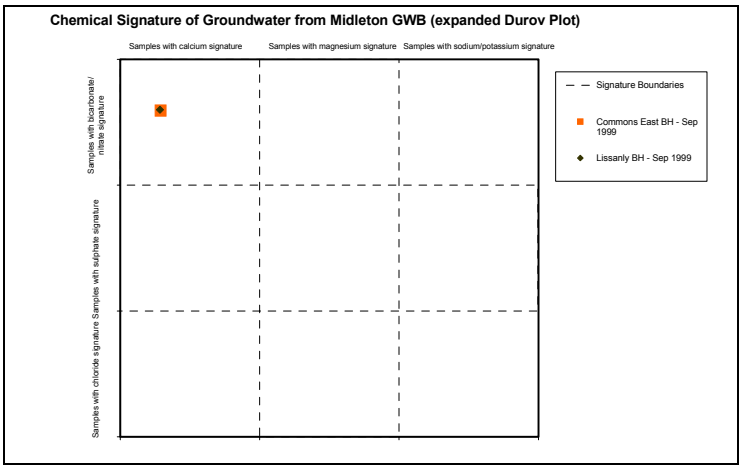
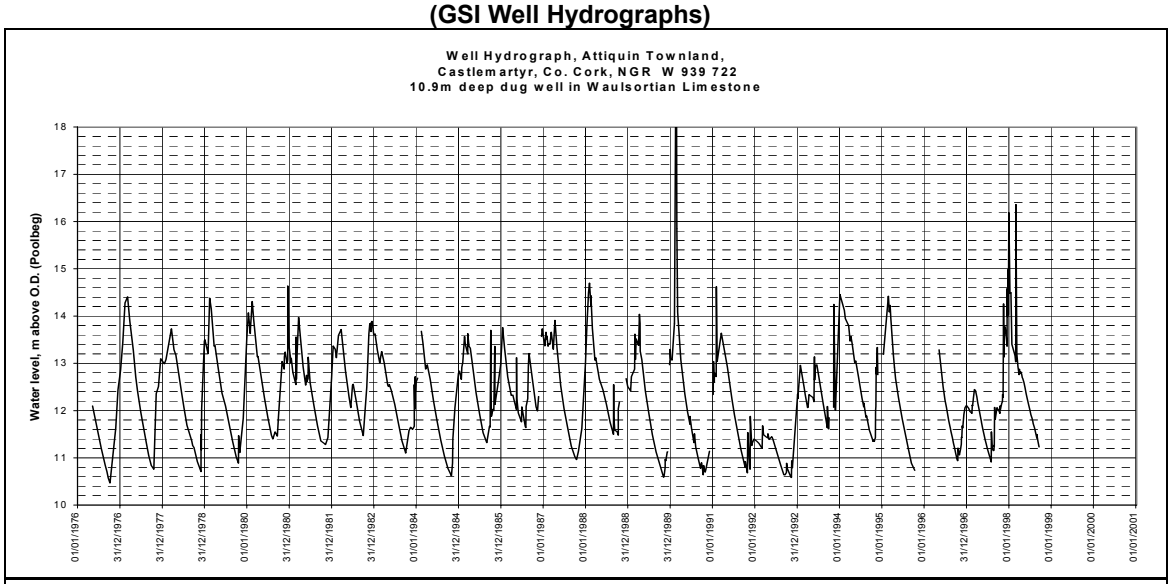
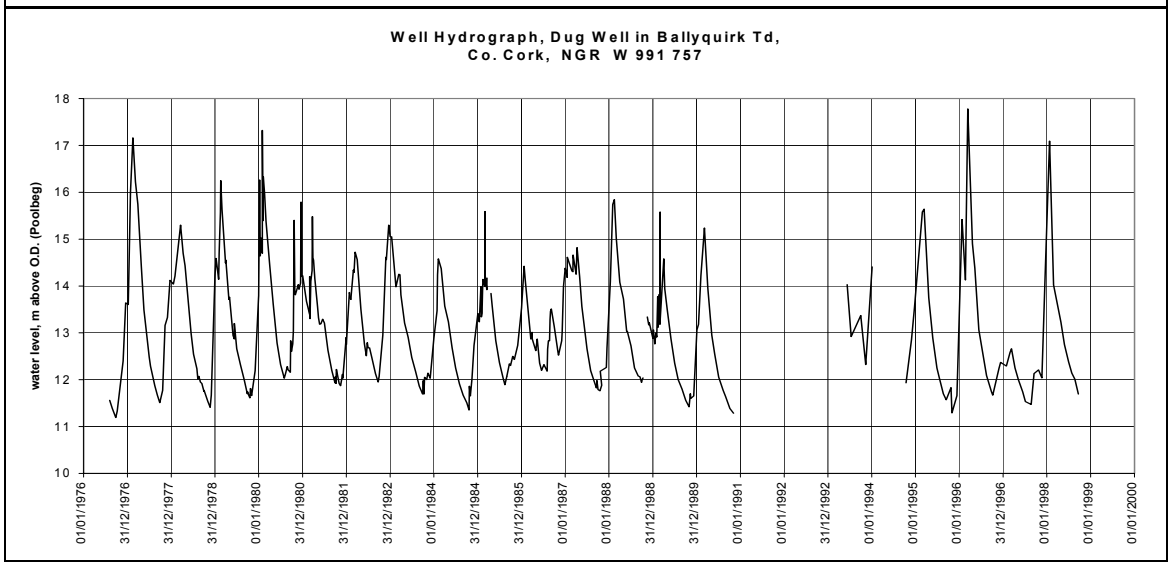


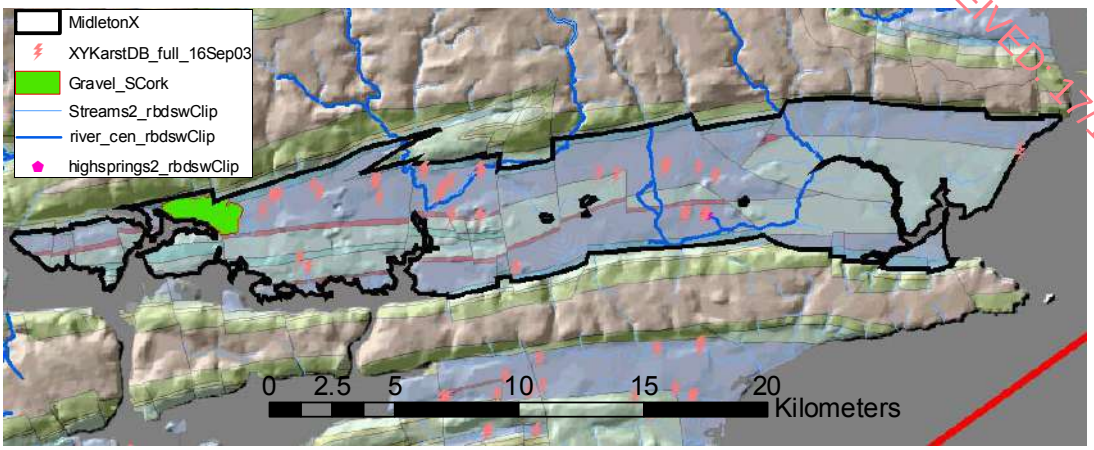
Figure 2: Groundwater hydrographs
(GSI Well Hydrographs)





RECEIVED: 17/12/2025

Midleton GWB (For Reference)



List of Rock units in Midleton GWB

Rock unit name and code	Description	Rock unit group
Clashavodig Formation (CV)	Oolitic, peloidal, cherty fine limestone	Dinantian Pure Bedded Limestones
Little Island Formation (Ll)	Massive and crinoidal fine limestone	Dinantian Pure Unbedded limestones
Cork Red Marble Formation (CK)	Red brecciated calcilutite limestone	Dinantian Pure Bedded Limestones
Waulsortian Limestones (WA)	Massive unbedded fine-grained limestone	Dinantian Pure Unbedded limestones
Ballysteen Formation (BA)	Fossiliferous dark-grey muddy limestone	Dinantian Lower Impure Limestones

RECEIVED: 17/12/2025

Appendix 7.10

WFD Assessment

RECEIVED: 17/12/2025

Appendix 7.11

Borehole Logs

RECEIVED: 17/12/2025

Geotechnical & Environmental Services
Campus Innovation Centre,
Green Rd.,
Carlow.
Ph: 059-9130314
Fax: 059-9140499

Borehole Log
BH A
Sheet 1 of 1

Method:	Date:	Site:
Rotary	31/07/05	Carrigtwohill

Dia.mm:	Coords:	G.L.mO.D.	Client:
140			Healy Brothers

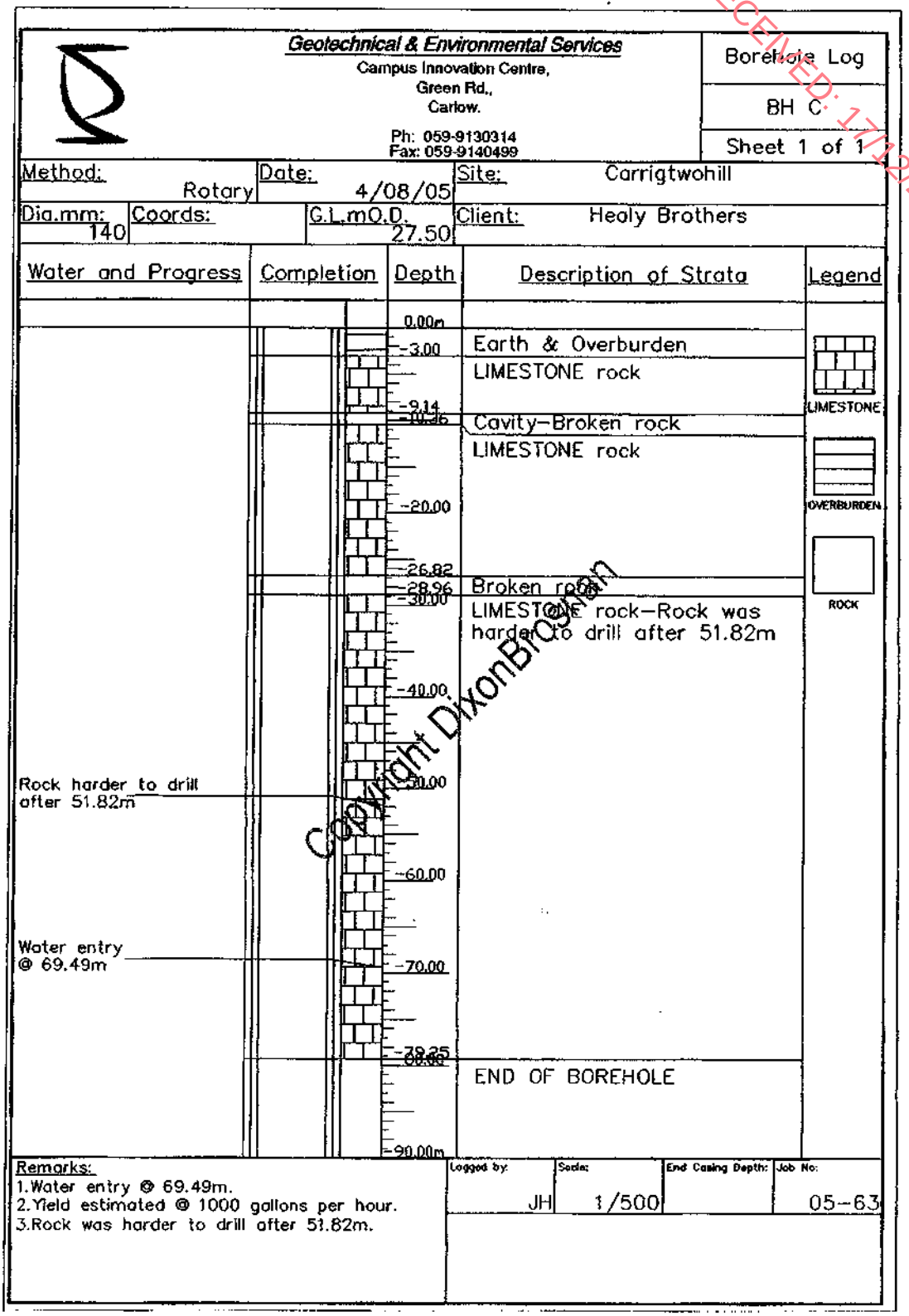
Water and Progress	Completion	Depth	Description of Strata	Legend
		0.00m		
		-3.35	OVERBURDEN	LIMESTONE
		-10.00	LIMESTONE rock	
		-17.68		
		-19.81	Fractured LIMESTONE	OVERBURDEN
			LIMESTONE rock	
		-30.00		
		-40.00		
Water entry @ 51.82m (with sand)		-50.00		
		-51.82	END OF BOREHOLE	
		-60.00		
		-70.00		
		-80.00		
		-90.00m		

Copyright DixonBrosnan

Remarks:
1. Yield estimated @ 2000 gallons per hour.

Logged by:	Scale:	End Casing Depth:	Job No:
JH	1/500		05-63

RECEIVED: 17/12/2025



Copyright DixonBrosnan

RECEIVED: 17/12/2025

Rossmore Trial Well Drilling Summary Results March 2022
2 Trial Wells

BH 1, east of farm shed. (Fenced with 4 steel corner posts)

- Started 1st March
- Total well depth - 108m
- 6" steel casing from 0 - 6m
- 0 - 5m Brown sand and gravels.
- 5 - 42m Dark Limestone.
- 42m Very small clay section, possible small water strike. Too little to see with air lift < 1m^3/day
- 42 - 60m Dark Limestone.
- 60 – 64m White broken soft limestone.
- 64 - 72m Dark Limestone.
- 72 – 73m Dark Limestone with large and medium sized cobble
- 73 - 108m Dark Limestone.
- COMPLETED WITH Above ground casing
- (6", painted oxide red, 4 metal fence posts set in concrete)
- CONCLUSION: Not enough water for the development, keep for an observation BH for Pump Test on successful BHs, of found.

BH 2, west of bungalow. Directly beside garage.

- Started Monday 7th March
- Total well depth - 112m
- 6" steel casing from 0 - 6m
- 0 - 5m Brown sand and gravels.
- 5 - 20m Dark Limestone.
- 20 - 33m Dark limestone.
- 34m Brown mudstone/sandstone. Some water here ~ 12 m^3/day.
- 34 - 55m Dark limestone/shale.
- 55 – 59m White limestone, possible more water here < 1m^3/day
- 59 - 80m Dark limestone/shale.
- 80 – 99m White limestone some calcite.
- 99m - 99.5mYellow clay cavity. Massive amount of water in this zone. Developed for 3 solid hours, measured with bunded pipe and overflow = > required project amount.
- 99.5 -112m Dark limestone.
- CONCLUSION = PUMP TEST
- **MAIN WATER STRIKE ZONE = 99m bgl.**
- Constraints = we can't put in plastic liner yet because the Trial Well is 6" diameter and the only casing we could set in this would be 5" diameter and left loose in the hole. However, the 5" casing would not accommodate all of the pump test infrastructure (we would not get a datalogger or dip tube into it with the rising main and electrical cables). ALSO, the subsurface reveals that there is mudstone past 30m and there is some water here. We can't put the pump intake down farther than 25m. However, the water strike was deep. So ? we can try pump test to get samples to demonstrate that the water is suitable for concrete production. If it is, we will need to Overdrill, ream out, put in a deep pump chamber to allow deeper set of business operational pump.

RECEIVED: 17/12/2025

BH 3, at very corner with field at back of farmyard.
5m to the NW of historic BH C.

- Total well depth - 100m
- Amount of 6" steel casing - 6m
- 6" steel casing from 0 - 6m
- 0 - 5m Brown sand and gravels.
- 5 - 16m White Limestone.
- 16 - 19m Cavity of soft yellow sandstone staying open. Very soft
- 19m - 72m Dark limestone.
- 72 - 73m Red mudstone, Large water strike.
- 73 - 82m Light limestone lots of small cavities in this area, Some Large rocks being returned. Definite water increase in returns
- 82 – 86m Lighter coloured calcified limestone. Water in this zone.
- 86 – 100m Light limestone.
- **MAIN WATER STRIKE ZONE = >72m bgl.**
- **Conclusion = Worth Pump testing to provide a second operational BH for standby and also to try to keep the zone of contribution away from the coast.**

ENVIROLOGIC
HYDROGEOLOGICAL · HYDROLOGICAL CONSULTING

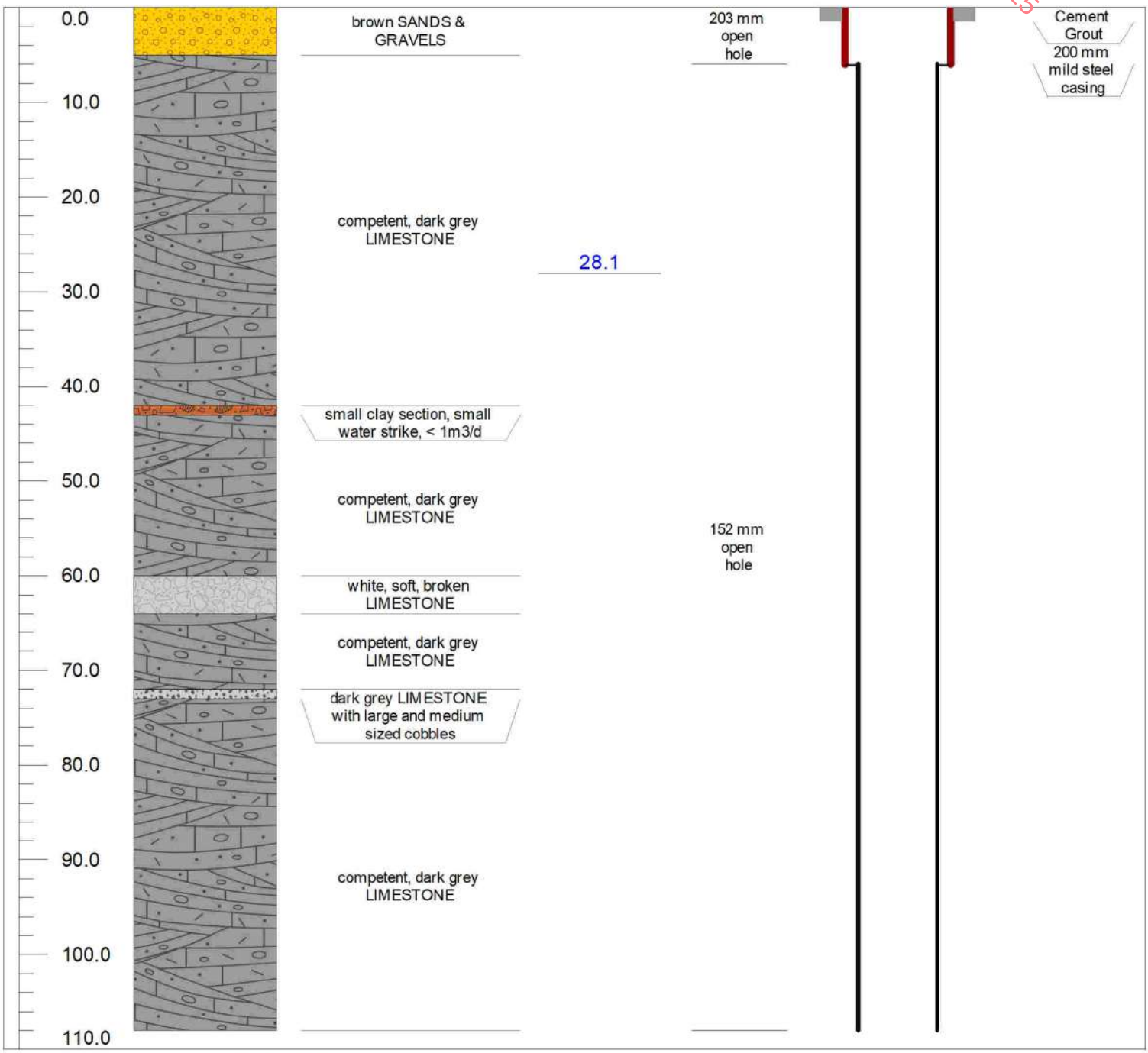
Client: Breedon
Project: Trial Well Drilling
Location: Rossmore, Carrigtwohill, Co. Cork

Borehole No.
BBH22-1

RECEIVED: 17/12/2025

Coordinates:	582,644 / 571,530	Drilled Date:	Mar 2022	Borehole Diameter:	203 mm (8") / 152 mm (6")
Ground Elevation:	27.34 mOD	Borehole Depth:	108 m	Casing Diameter:	152 mm (6") steel
Top of Casing Elevation:	27.64 mOD	Base Elevation:	-80.66 mOD	Depth to bedrock:	6.0 mbgl

GWL 09/09/25: -0.46 mOD



Site Map



Driller:	Briody Well Drilling Ltd.
Drilling Rig:	Knebel HY-97-T-BR
Drilling Method:	Air Rotary
Supervision:	P. Bartley, Hydro-G Ltd.
Log drawn by:	C. O'Reilly
Project Ref.:	3055

ENVIROLOGIC
HYDROGEOLOGICAL · HYDROLOGICAL CONSULTING

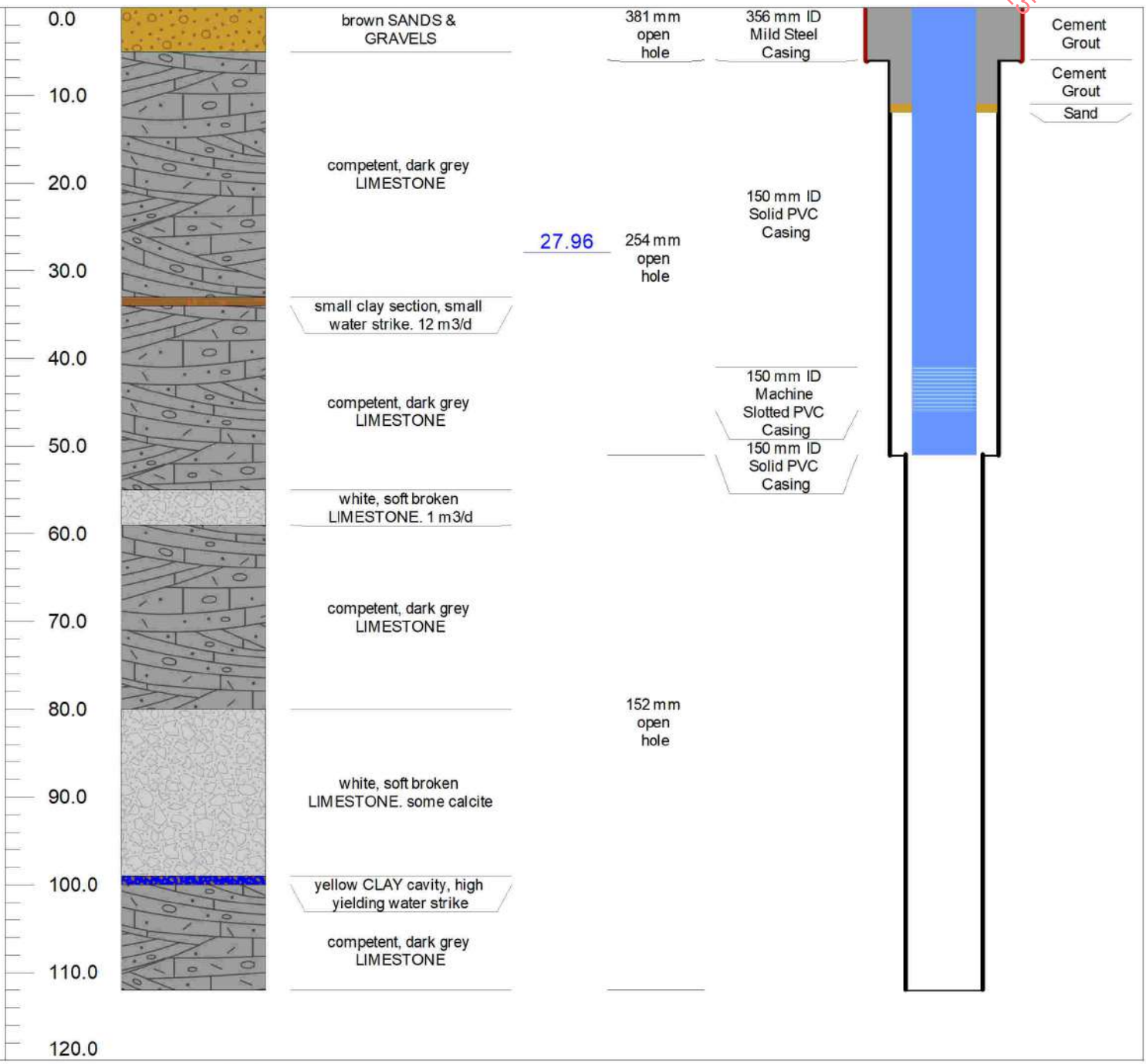
Client: Breedon
Project: Trial Well Drilling
Location: Rossmore, Carrigtwohill, Co. Cork

Borehole No.
BBH22-2

RECEIVED: 17/12/2025

Coordinates:	582,559 / 571,549	Drilled Date:	Mar 2022	Borehole Diameter:	356 mm (14") / 254 mm (10") / 152 mm 6"
Ground Elevation:	24.62 mOD	Borehole Depth:	112 m	Casing Diameter:	152 mm (6") steel
Top of Casing Elevation:	25.39 mOD	Base Elevation:	-87.38 mOD	Depth to bedrock:	5.0 mbgl
		GWL 09/09/25:	-2.57 mOD		

DEPTH **DESCRIPTION** **BOREHOLE CONSTRUCTION**



Site Map



Driller:	Briody Well Drilling Ltd.
Drilling Rig:	Knebel HY-97-T-BR
Drilling Method:	Air Rotary
Supervision:	P. Bartley, Hydro-G Ltd.
Log drawn by:	C. O'Reilly
Project Ref.:	3055

ENVIROLOGIC
HYDROGEOLOGICAL · HYDROLOGICAL CONSULTING

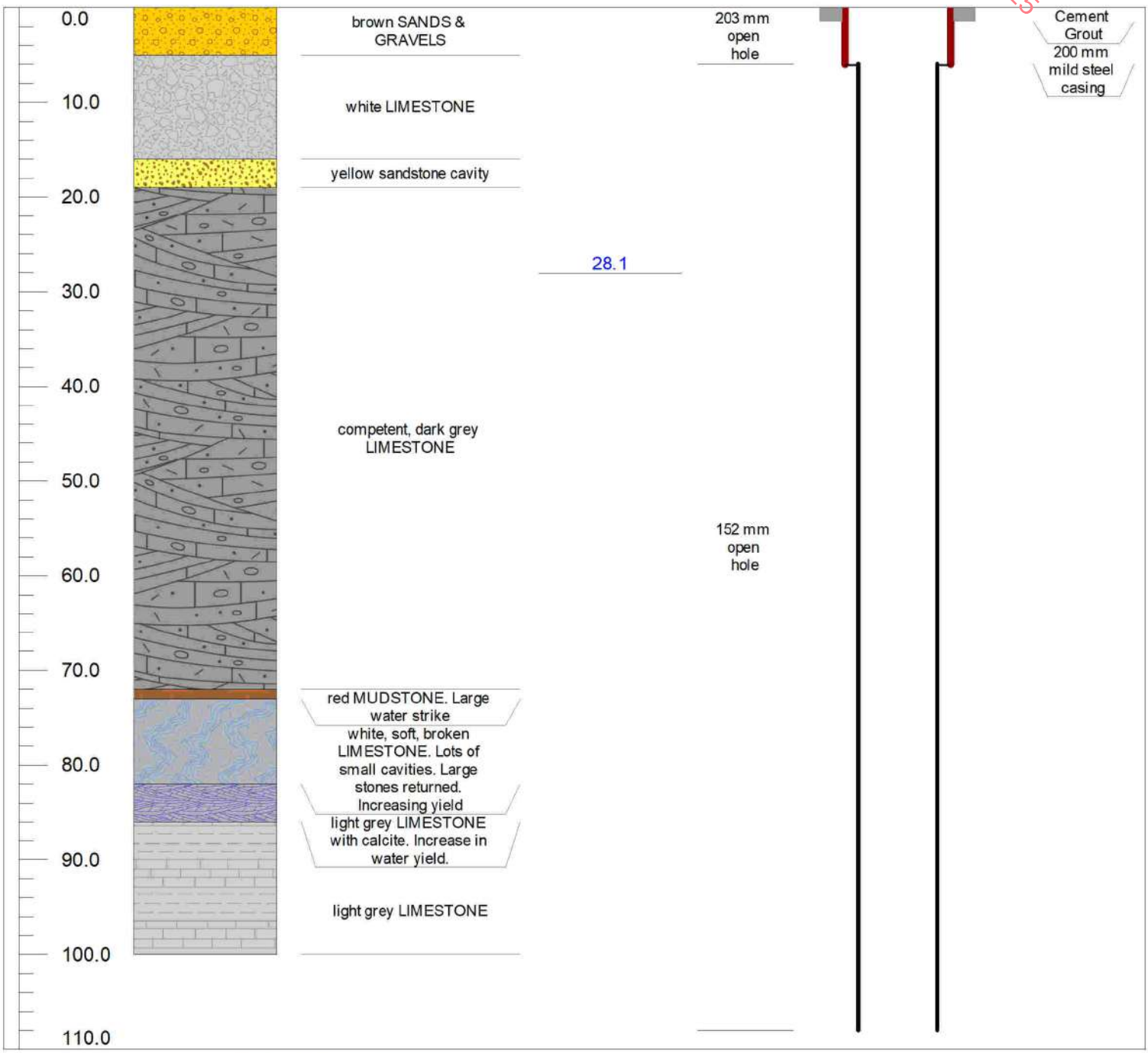
Client: Breedon
Project: Trial Well Drilling
Location: Rossmore, Carrigtwohill, Co. Cork

Borehole No.
BBH22-3

RECEIVED: 17/12/2025

Coordinates:	582,633 / 571,514	Drilled Date:	Mar 2022	Borehole Diameter:	203 mm (8") / 152 mm (6")
Ground Elevation:	30 mOD	Borehole Depth:	100 m	Casing Diameter:	152 mm (6") steel
Top of Casing Elevation:		Base Elevation:	-70 mOD	Depth to bedrock:	6.0 mbgl

DEPTH	DESCRIPTION	GWL 09/09/25:	BOREHOLE CONSTRUCTION



Site Map



Driller:	Briody Well Drilling Ltd.
Drilling Rig:	Knebel HY-97-T-BR
Drilling Method:	Air Rotary
Supervision:	P. Bartley, Hydro-G Ltd.
Log drawn by:	C. O'Reilly
Project Ref.:	3055

Petersen Drilling Services Ltd. on behalf of Breedon — Rotary Drilling Log

RECEIVED: 17/12/2025

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
0.00	Soft to firm		RO		0.00	80.00		0000		100	grey											0.00	0.00
0.40	Firm reddish brown silty sandy CLAY																						
2.60	Firm to stiff reddish brown silty gravelly CLAY with medium cobble content																						
3.70	Medium strong light grey LIMESTONE with frequent clay filled fractures																						
13.50	Medium strong dark grey LIMESTONE MUDSTONE with frequent kalside veins																						

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
0800			
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)
1855			

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
C	140.00	0.00	4.00					Sim. Casing			
RO	154.00	0.00	4.00				DTH Button Bit		115	Air	No
RO	120.00	4.00	80.00				DTH Button Bit			Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)
0815	35.00	4.00	Seepage	0.00	0.00	0.00	0.00	N/S
0915	51.00	4.00	Medium	0.00	0.00	0.00	0.00	N/S

Backfill (m)

Type	From (m)	To (m)
Collapse	80.00	79.00

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
0800		CAT Scanned: Yes
0800		Permit Completed: Yes
		DREM (7.40m - 7.70m): fractured rock zone, with some clay infill
		DREM (8.50m - 8.90m): fractured rock zone, with some clay infill
		DREM (11.00m - 13.20m): highly fractured rock with clay infill
		General; Cleared borehole blockage at 29 m
1855	0045	Dayworks: Airlift development of well

SPT I.D. Number	PD1	Calibration Date	01/02/2021
SPT Rod Type	2 3/8 Regular	SPT Energy Ratio	0.00
Drilling Crew Details			CSCS No
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer			
Lead Driller's signature			

Project Title

Rossmore Quarry

Weather	Variable	Project No	24-Jun
Date	20/02/2024	Day	Tuesday
Rig type	Knebel HY79	Borehole Number	
Inclination		Orientation	SP 1
Sheet	1 of 1	Completed	Y

AGS

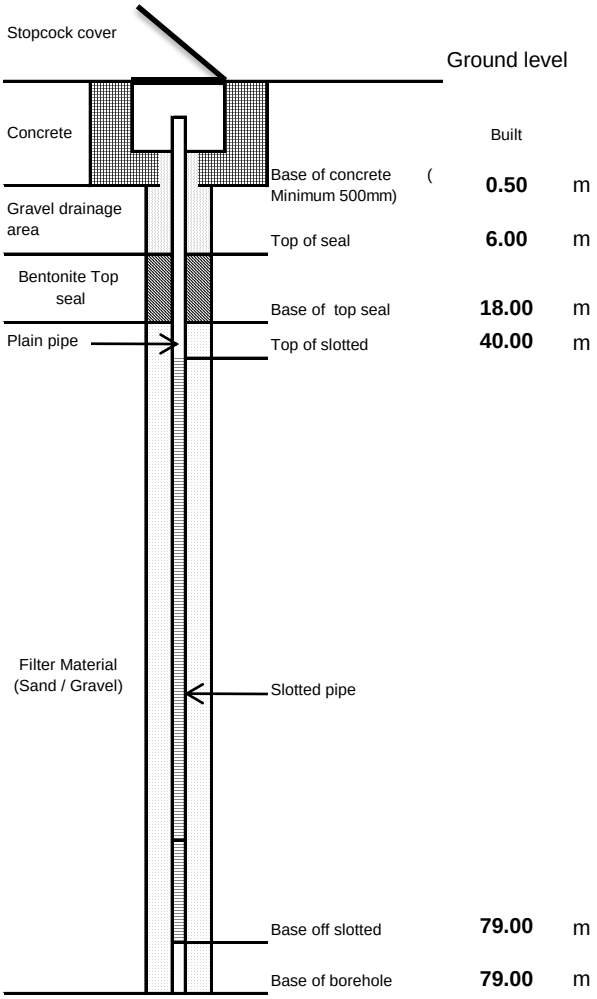
Produced by KeyLogbook

Petersen Drilling Services Ltd.

Summary of Standpipe Installation

RECEIVED: 17/12/2025

Schematic Diagram (not to scale)



Installation Details

Standpipe diameter (id)	50	mm
Borehole diameter	120	mm
Slot size	1	mm
Geosock	No	
Gas tap	None	
Filter type	Gravel	
Type of cover	Upright	
Initial reading	0.00	m
Time of Initial reading	1550	hhmm

	Base (m)	Top (m)
Concrete	0.50	GL
Gravel drainage	6.00	0.50
Borehole seal top	18.00	6.00
Filter zone	79.00	18.00
Plain pipe	40.00	GL
Slotted zone	79.00	40.00
Base of borehole	79.00	

Remarks

Rig type	Knebel HY79	**Project Title**			
Drilling Crew Details		Rossmore Quarry			
Support Operative	John Whyte				
Lead Driller	Stephan Petersen	**Project No**		24-Jun	
Site category	Green	**Day**	Tuesday	**Date**	February 20, 2024
Engineer				**Borehole Number**	
Lead Driller's signature				**SP 1**	

Petersen Drilling Services Ltd. on behalf of Breedon — Rotary Drilling Log

RECEIVED: 17/12/2025

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
0.00	Hardcore MADE GROUND																						
0.25	Firm reddish brown very sandy gravelly CLAY																						
4.20	Very weak highly weathered light brown LIMESTONE																						
5.80	Strong to Very strong brownish grey LIMESTONE with occasional fractures																						
18.00	Strong to Very strong light grey LIMESTONE occasional fractures																						

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
1105			
Finish time (hhmm)	**Hole (m)**	**Water (m)**	**Casing (m)**
1710	45.00	0.00	6.50

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
C	140.00	0.00	6.50					Sim. Casing			
RO	154.00	0.00	6.50				DTH Button Bit		115	Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)
1515	29.00	6.50	Very Slow	0.00	0.00	0.00	0.00	N/S

Backfill (m)

Type	From (m)	To (m)

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
1105		CAT Scanned: Yes
1105		Permit Completed: Yes
		DREM (12.50m - 14.00m): highly fractured rock with clay infill
		DREM (28.50m - 29.00m): minor fracture, change in flush to brown

SPT I.D. Number	PD1	**Calibration Date**	01/02/2021
SPT Rod Type	2 3/8 Regular	**SPT Energy Ratio**	0.00
Drilling Crew Details			**CSCS No**
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer			
Lead Driller's signature			

Project Title

Rossmore Quarry

Weather	Fine	**Project No**	24-Jun
Date	05/03/2024	**Day**	Tuesday
Rig type	**Knebel HY79**	**Borehole Number**	
Inclination		**Orientation**	SP 2
Sheet	1 of 2	**Completed**	Y

AGS

Petersen Drilling Services Ltd. on behalf of Breedon — Rotary Drilling Log

RECEIVED: 17/12/2025

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
			RO		0.00	85.00		0000		100	grey											0.00	0.00
79.00	Strong to Very strong brownish grey LIMESTONE with frequent fractures and kalside																						

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
0805	45.00	25.00	6.50
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)
1730			

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
RO	120.00	6.50	85.00				DTH Button Bit			Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)
1005	60.00	6.50	Fast	0.00	0.00	0.00	0.00	N/S
1205	79.50	6.50	Slow	0.00	0.00	0.00	0.00	N/S

Backfill (m)

Type	From (m)	To (m)

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
1530	0030	Dayworks: Airlift development of well

SPT I.D. Number	PD1	Calibration Date	01/02/2021
SPT Rod Type	2 3/8 Regular	SPT Energy Ratio	0.00
Drilling Crew Details			CSCS No
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer			
Lead Driller's signature			

Project Title

Rossmore Quarry

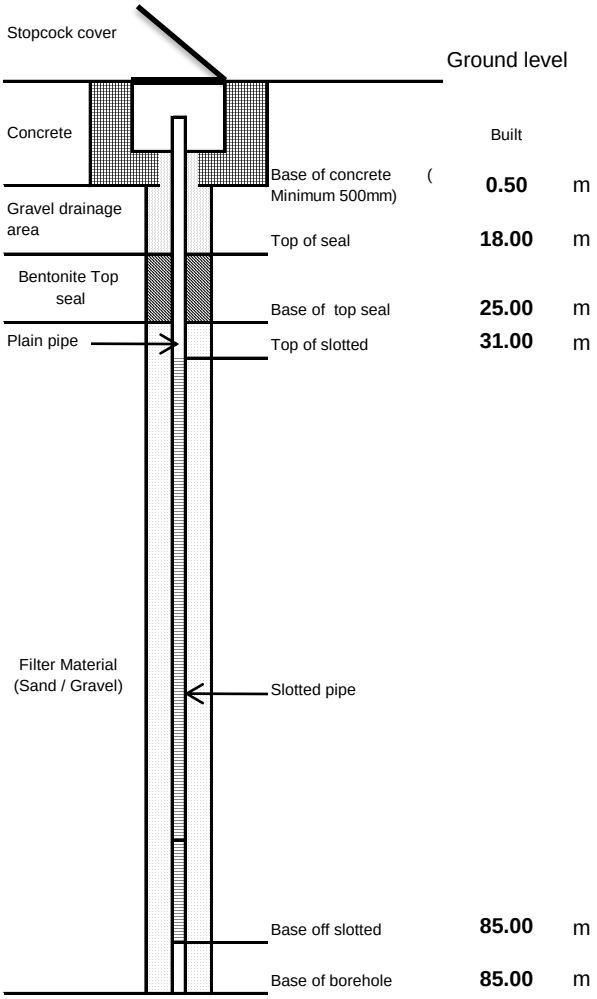
Weather	Variable	Project No	24-Jun
Date	06/03/2024	Day	Wednesday
Rig type	Knebel HY79	Borehole Number	
Inclination		Orientation	SP 2
Sheet	2 of 2	Completed	Y

KeyLogbook

Summary of Standpipe Installation

RECEIVED: 17/12/2025

Schematic Diagram (not to scale)



Installation Details

Standpipe diameter (id)	50	mm
Borehole diameter	120	mm
Slot size	1	mm
Geosock	No	
Gas tap	None	
Filter type	Gravel	
Type of cover	Upright	
Initial reading	28.50	m
Time of Initial reading	1620	hhmm

	Base (m)	Top (m)
Concrete	0.50	GL
Gravel drainage	18.00	0.50
Borehole seal top	25.00	18.00
Filter zone	85.00	25.00
Plain pipe	31.00	GL
Slotted zone	85.00	31.00
Base of borehole	85.00	

Remarks

Rig type		**Project Title**			
Drilling Crew Details		Rossmore Quarry			
Support Operative	John Whyte				
Lead Driller	Stephan Petersen	**Project No**		24-Jun	
Site category	Green	**Day**	Wednesday	**Date**	March 6, 2024
Engineer				**Borehole Number**	
Lead Driller's signature				**SP 2**	

Petersen Drilling Services Ltd. on behalf of Breedon — Rotary Drilling Log

RECEIVED: 17/12/2025

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
0.00	Firm brown sandy gravelly TOPSOIL																						
0.30	Firm reddish brown very sandy gravelly CLAY medium cobble content																						
6.20	Weak weathered brownish grey LIMESTONE																						
7.90	Medium strong brownish grey LIMESTONE occasional fractures																						
21.00	Medium strong weathered brownish grey shaley LIMESTONE with frequent clay infill																						
28.00	Strong to Very strong grey LIMESTONE																						

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
0915			
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)
1700	69.00	0.00	6.50

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
C	140.00	0.00	6.50					Sim. Casing			
RO	154.00	0.00	6.50				DTH Button Bit		115	Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)
1250	24.00	6.50	Slow	0.00	0.00	0.00	0.00	N/S
1500	27.50	6.50	Medium	0.00	0.00	0.00	0.00	N/S

Backfill (m)

Type	From (m)	To (m)

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
0915		CAT Scanned: Yes
0915		Permit Completed: Yes
		DREM (12.50m - 15.00m): highly fractured rock with clay infill
		DREM (21.50m - 24.00m): highly fractured rock with clay infill
		DREM (56.50m - 58.00m): minor fractured zone

SPT I.D. Number	PD1	**Calibration Date**	01/02/2021
SPT Rod Type	2 3/8 Regular	**SPT Energy Ratio**	0.00
Drilling Crew Details			**CSCS No**
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer			
Lead Driller's signature			

Project Title

Rossmore Quarry

Weather	Variable	**Project No**	24-Jun
Date	11/03/2024	**Day**	Monday
Rig type	**Knebel HY79**	**Borehole Number**	
Inclination		**Orientation**	SP 3
Sheet	1 of 2	**Completed**	Y

AGS

Petersen Drilling Services Ltd. on behalf of Breedon — Rotary Drilling Log

RECEIVED: 17/12/2025

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
			RO		0.00	75.00		0000		100	brown											0.00	0.00

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
0805	69.00	0.00	6.50
Finish time (hhmm)	**Hole (m)**	**Water (m)**	**Casing (m)**
1415			

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
RO	120.00	6.50	75.00				DTH Button Bit			Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)

Backfill (m)

Type	From (m)	To (m)
Collapse	75.00	24.00

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
1315	0030	General; Borehole collapse at 24m due to highly unstable formation tried to clear blockage repeatedly without success Dayworks: Airlift development of well

SPT I.D. Number	PD1	**Calibration Date**	01/02/2021
SPT Rod Type	2 3/8 Regular	**SPT Energy Ratio**	0.00
Drilling Crew Details		**CSCS No**	
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer			
Lead Driller's signature			

Project Title

Rossmore Quarry

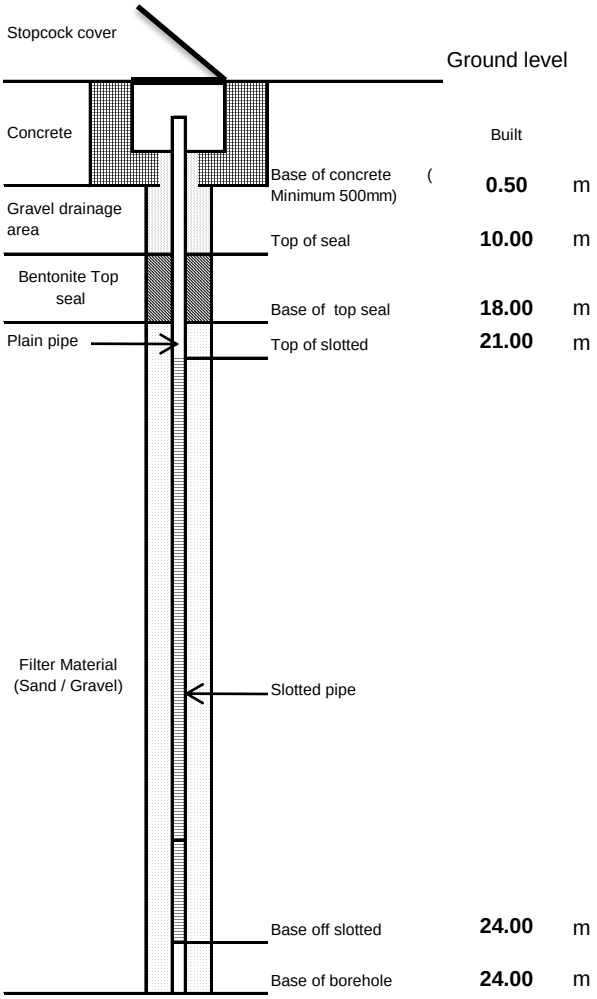
Weather	Variable	**Project No**	24-Jun
Date	12/03/2024	**Day**	Tuesday
Rig type	**Knebel HY79**	**Borehole Number**	
Inclination		**Orientation**	SP 3
Sheet	2 of 2	**Completed**	Y

Petersen Drilling Services Ltd.

Summary of Standpipe Installation

RECEIVED: 17/12/2025

Schematic Diagram (not to scale)



Installation Details

Standpipe diameter (id)	50	mm
Borehole diameter	120	mm
Slot size	1	mm
Geosock	No	
Gas tap	None	
Filter type	Gravel	
Type of cover	Upright	
Initial reading	19.50	m
Time of Initial reading	1410	hhmm

	Base (m)	Top (m)
Concrete	0.50	GL
Gravel drainage	10.00	0.50
Borehole seal top	18.00	10.00
Filter zone	24.00	18.00
Plain pipe	21.00	GL
Slotted zone	24.00	21.00
Base of borehole	24.00	

Remarks

Rig type	Knebel HY79	**Project Title**			
Drilling Crew Details		Rossmore Quarry			
Support Operative	John Whyte				
Lead Driller	Stephan Petersen	**Project No**		24-Jun	
Site category	Green	**Day**	Tuesday	**Date**	March 12, 2024
Engineer				**Borehole Number**	
Lead Driller's signature				**SP 3**	

Petersen Drilling Services Ltd. on behalf of Breedon — Rotary Drilling Log

RECEIVED: 17/12/2025

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
0.00	Soft to firm brown TOPSOIL																						
0.30	Firm reddish brown very sandy gravelly CLAY																						
2.30	Very weak highly weathered greyish brown LIMESTONE																						
3.10	Strong to Very strong brownish grey LIMESTONE with occasional fractures and clay infill																						
18.00	Strong to Very strong light grey LIMESTONE rare fractures frequent kalside veins																						

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
0805			
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)
1700	72.00	0.00	3.50

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
C	140.00	0.00	3.50					Sim. Casing			
RO	154.00	0.00	3.50				DTH Button Bit		115	Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)
1210	37.50	3.50	Medium	0.00	0.00	0.00	0.00	N/S

Backfill (m)

Type	From (m)	To (m)

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
0805		CAT Scanned: Yes
0805		Permit Completed: Yes
		DREM (12.50m - 16.00m): highly fractured rock with clay infill
		DREM (37.00m - 38.50m): minor fracture, change in flush to brown
		General; 100%flush loss after stoping for lunch. Flush seamed to escape into voided area at 13m

SPT I.D. Number	PD1	**Calibration Date**	01/02/2021
SPT Rod Type	2 3/8 Regular	**SPT Energy Ratio**	0.00
Drilling Crew Details			**CSCS No**
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer			
Lead Driller's signature			

Project Title

Rossmore Quarry

Weather	Variable	**Project No**	24-Jun
Date	07/03/2024	**Day**	Thursday
Rig type	**Knebel HY79**	**Borehole Number**	
Inclination		**Orientation**	SP 4
Sheet	1 of 2	**Completed**	Y

AGS

Petersen Drilling Services Ltd. on behalf of Breedon — Rotary Drilling Log

RECEIVED: 17/12/2025

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
			RO		0.00	75.00		0000		0	No return											0.00	0.00

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
0805	72.00	0.00	3.50
Finish time (hhmm)	**Hole (m)**	**Water (m)**	**Casing (m)**
1045			

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
RO	120.00	3.50	75.00				DTH Button Bit			Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)

Backfill (m)

Type	From (m)	To (m)
Collapse	75.00	49.00

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
1100	0100	Dayworks: Airlift development of well

SPT I.D. Number	PD1	**Calibration Date**	01/02/2021
SPT Rod Type	2 3/8 Regular	**SPT Energy Ratio**	0.00
Drilling Crew Details			**CSCS No**
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer			
Lead Driller's signature			

Project Title

Rossmore Quarry

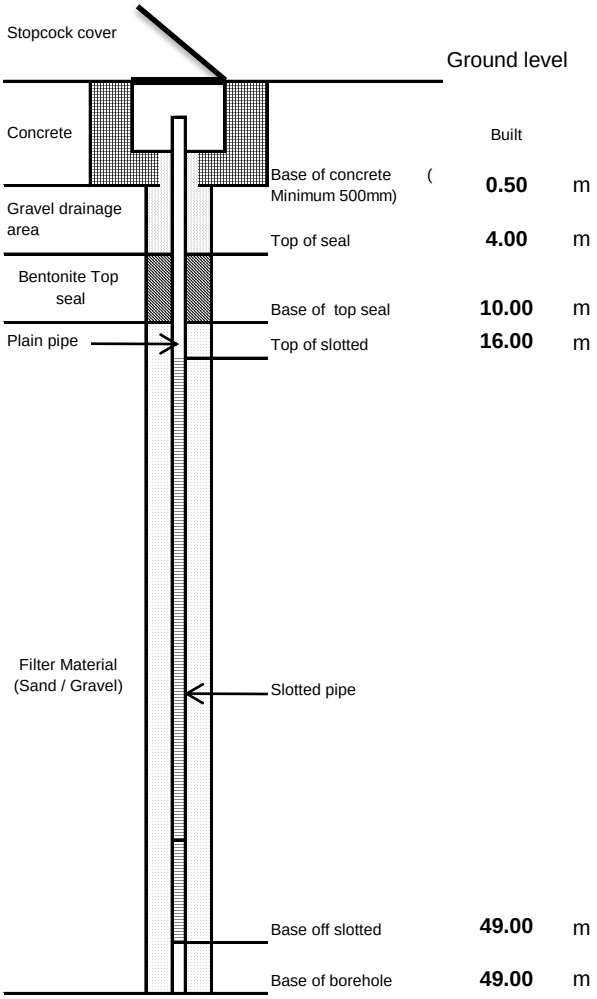
Weather	Variable	**Project No**	24-Jun
Date	08/03/2024	**Day**	Friday
Rig type	**Knebel HY79**	**Borehole Number**	
Inclination		**Orientation**	SP 4
Sheet	2 of 2	**Completed**	Y

Petersen Drilling Services Ltd.

Summary of Standpipe Installation

RECEIVED: 17/12/2025

Schematic Diagram (not to scale)



Installation Details

Standpipe diameter (id)	50	mm
Borehole diameter	120	mm
Slot size	1	mm
Geosock	No	
Gas tap	None	
Filter type	Gravel	
Type of cover	Upright	
Initial reading	0.00	m
Time of Initial reading	1125	hhmm

	Base (m)	Top (m)
Concrete	0.50	GL
Gravel drainage	4.00	0.50
Borehole seal top	10.00	4.00
Filter zone	49.00	10.00
Plain pipe	16.00	GL
Slotted zone	49.00	16.00
Base of borehole	49.00	

Remarks

Rig type	Knebel HY79	**Project Title**			
Drilling Crew Details		Rossmore Quarry			
Support Operative	John Whyte				
Lead Driller	Stephan Petersen	**Project No**		24-Jun	
Site category	Green	**Day**	Friday	**Date**	March 8, 2024
Engineer				**Borehole Number**	
Lead Driller's signature				**SP 4**	

Petersen Drilling Services Ltd. on behalf of Breedon — Rotary Drilling Log

RECEIVED: 17/12/2025

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
0.00	Soft to firm brown TOPSOIL																						
0.30	Firm reddish brown very sandy gravelly CLAY medium cobble content																						
4.10	Weak highly weathered brownish grey LIMESTONE																						
5.50	Strong grey LIMESTONE with very frequent karst layers with clay infill																						
21.00	Medium strong brownish grey shaley LIMESTONE																						
30.00	Strong to Very strong light grey LIMESTONE																						

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
1245			
Finish time (hhmm)	**Hole (m)**	**Water (m)**	**Casing (m)**
1755	48.00	0.00	5.00

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
C	140.00	0.00	5.00					Sim. Casing			
RO	154.00	0.00	5.00				DTH Button Bit		115	Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)
1630	32.00	5.00	**Medium**	0.00	0.00	0.00	0.00	N/S

Backfill (m)

Type	From (m)	To (m)

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
1245		CAT Scanned: Yes
1245		Permit Completed: Yes
		DREM (6.50m - 6.90m): minor fractured zone
		DREM (8.50m - 9.00m): minor fracture, change in flush to brown
		DREM (12.00m - 14.00m): karst limestone with some voids and clay infill

SPT I.D. Number	PD1	**Calibration Date**	01/02/2021
SPT Rod Type	2 3/8 Regular	**SPT Energy Ratio**	0.00
Drilling Crew Details		**CSCS No**	
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer			
Lead Driller's signature			

Project Title

Rossmore Quarry

Weather	Variable	**Project No**	24-Jun
Date	12/03/2024	**Day**	Tuesday
Rig type	**Knebel HY79**	**Borehole Number**	
Inclination		**Orientation**	SP 5
Sheet	1 of 2	**Completed**	Y

AGS

Produced by KeyLogbook

Petersen Drilling Services Ltd. on behalf of Breedon — Rotary Drilling Log

RECEIVED: 17/12/2025

Depth of Stratum Top (m)	Driller's Stratum Description	Sample / Hole / Test Details: No	Type	Insitu test	From (m)	To (m)	Liner Dia (mm)	Drilling Details: Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Standard Penetration Test: Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
			RO		0.00	57.00		0000		50	brown											0.00	0.00

Shift details

Start time (hhmm)	Hole (m)	Water (m)	Casing (m)
0810	48.00	0.00	5.00
Finish time (hhmm)	**Hole (m)**	**Water (m)**	**Casing (m)**
1455	0.00		

Drilling Equipment Details

Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit Type	Casing Type	Bit serial No	Flush	Polymer
RO	120.00	5.00	57.00				DTH Button Bit			Air	No

Ground Water Record

Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)
0910	49.00	5.00	**Fast**	0.00	0.00	0.00	0.00	N/S
1235	52.00	5.00	**Medium**	0.00	0.00	0.00	0.00	N/S

Backfill (m)

Type	From (m)	To (m)
Arisings	57.00	0.00

Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks
		DREM (48.00m - 49.00m): karst limestone with some voids and clay infill
		DREM (51.50m - 52.00m): minor fractured zone
		General; 50% flush loss from 54m. Flush seams to enter into voided areas above
		General; Substantial increase of silt and clay washout from 49m due to increased volumes of water
		General; Cleared borehole blockage at 14.5m but unable to clear hole past 20m due to collapse and blow in silt from karst areas
		General; terminated borehole , backfilled with airrisings and bentonite plug 10 to 6m

SPT I.D. Number	PD1	**Calibration Date**	01/02/2021
SPT Rod Type	2 3/8 Regular	**SPT Energy Ratio**	0.00
Drilling Crew Details			**CSCS No**
Support Operative	John Whyte		
Lead Driller	Stephan Petersen		
Site category	Green		
Project Engineer			
Lead Driller's signature			

Project Title

Rossmore Quarry

Weather	Rain	**Project No**	24-Jun
Date	13/03/2024	**Day**	Wednesday
Rig type	**Knebel HY79**	**Borehole Number**	
Inclination	**Orientation**		SP 5
Sheet	2 of 2	**Completed**	Y

AGS

Produced by KeyLogbook

Work Log for Rossmore, Co.Cork

RECEIVED: 17/12/2025

Wednesday, 27/03/2024, 11:30-17:45=6hr 15min

- Move Rig to TW1 Location.
- Set-up auxiliary equipment on site.
- Set-up of drilling rig.
- Drilled 10” diameter hole to accommodate 8” steel casing.
- Installed 6m of 8” steel casing.

Thursday, 28/03/2024, 08:20-16:40=8hr 20min

- Proceeded to drill 8” diameter hole from 6m to 53m.
- Developed cavity at 53m.
- Continued to drill from 53m to 75m

Friday, 29/03/2024, 09:00-17:00=8hr

- Tripped out of TW1.
- Installed 5” PVC from 0m to 75m
- Secured well head with lock and lid.
- Formed a concrete plinth around well head.
- Moved auxiliary equipment to quarry yard.
- Moved drill rig to quarry yard

Tuesday, 02/04/2024, 08:45-17:00=8hr 15min

- Moved Rig to TW2 Location and set-up.
- Set-up auxiliary equipment on site.
- Drilled 10” diameter hole to accommodate 8” steel casing.
- Installed 12m of 8” steel casing

Wednesday, 03/04/2024, 09:00-17:00=8hr

- Proceeded to drill 8” diameter hole from 12m to 52m.
- Developed cavity at 52m.
- Continued to drill from 52m to 71m
- Developed cavity at 71m.
- Continued to drill from 71m to 80m

RECEIVED: 17/12/2025

Thursday, 04/04/2024, 08:40-16:55=8hr15min

- Tripped out of TW2.
- Installed 5" PVC from 0m to 80m
- Secured well head with lock and lid.
- Formed a concrete plinth around well head.
- Moved auxiliary equipment to TW 3.
- Moved drill rig to TW3.
- Set-up of drilling rig.

Friday, 05/04/2024, 08:50-16:50=8hr

- Drilled 10" diameter hole to accommodate 8" steel casing.
- Installed 16m of 8" steel casing
- Proceeded to drill 8" diameter hole from 16m to 45m.
- Borehole abandoned after 45m because 20m of CLAY from 25m bgl to 45m bgl – could not progress.
- Tripped out of TW3.
- Secured well head with lock and lid.
- Formed a concrete plinth around well head.

Monday, 08/04/2024, 09:15-16:35=7hr 20min

- Pulled 51m of 5" PVC from TW2 by making up tool to retrieve pvc casing.
- De-mobilised auxiliary equipment from site.
- De-mobilised drill rig from site

Total working time from 27th March/24 to 8th April/24 =62hrs = final day Monday not billed (see excel)

ENVIROLOGIC
HYDROGEOLOGICAL · HYDROLOGICAL CONSULTING

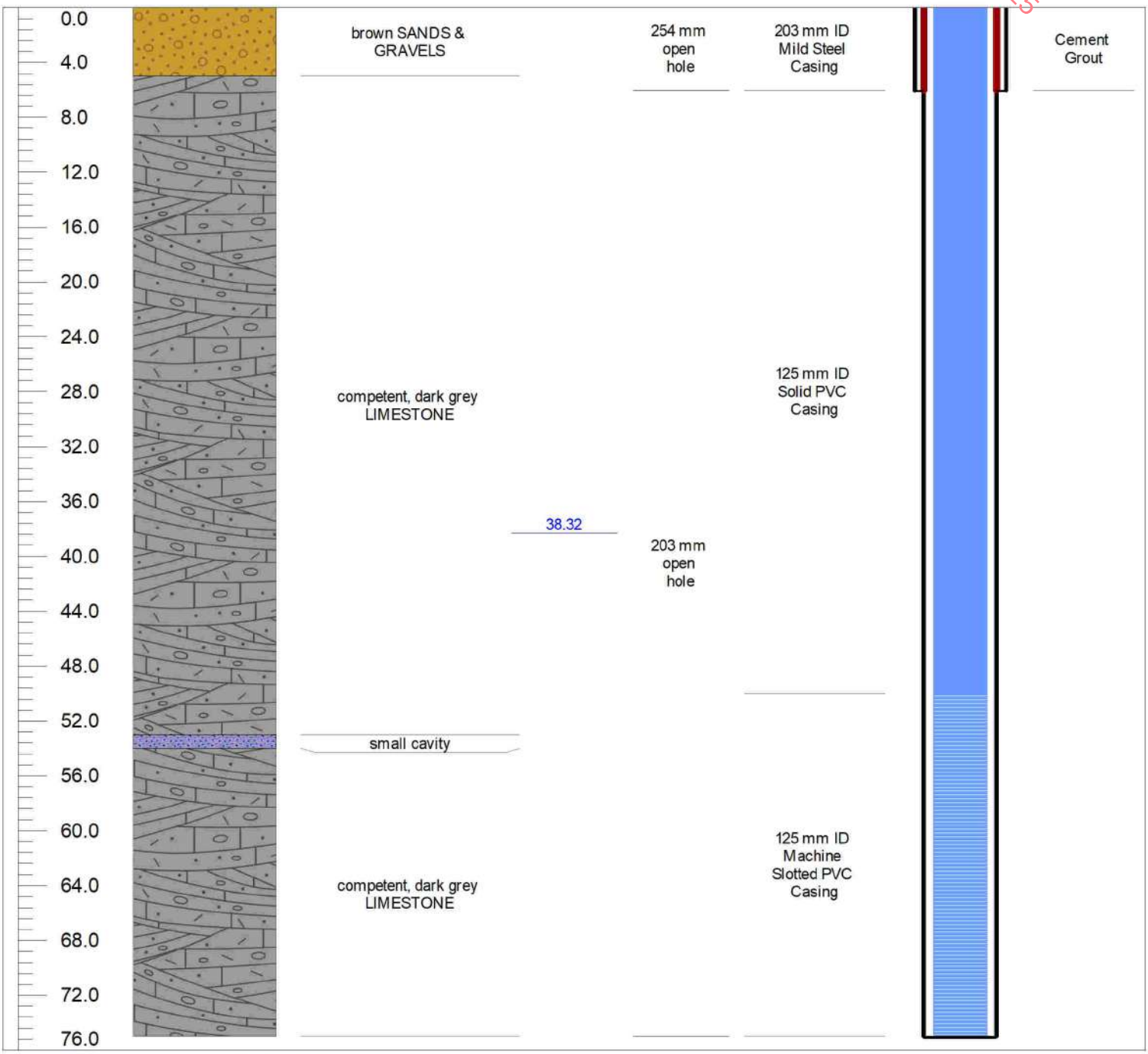
Client: Breedon
Project: Pumping Test Well Drilling
Location: Rossmore, Carrigtwohill, Co. Cork

Borehole No.
BBH1

RECEIVED: 17/12/2025

Coordinates:	582,511 / 571,320	Drilled Date:	Mar 2024	Borehole Diameter:	254 mm (10") / 203 mm (8")
Ground Elevation:	20.98 mOD	Borehole Depth:	75 m	Casing Diameter:	203 mm (8") steel
Top of Casing Elevation:	21.46 mOD	Base Elevation:	-54.03 mOD	Depth to bedrock:	5.0 mbgl

GWL 09/09/25: -16.86 mOD



Site Map



Driller:	Briody Well Drilling Ltd.
Drilling Rig:	Knebel HY-97-T-BR
Drilling Method:	Air Rotary
Supervision:	P. Bartley, Hydro-G Ltd.
Log drawn by:	C. O'Reilly
Project Ref.:	3055

ENVIROLOGIC
HYDROGEOLOGICAL · HYDROLOGICAL CONSULTING

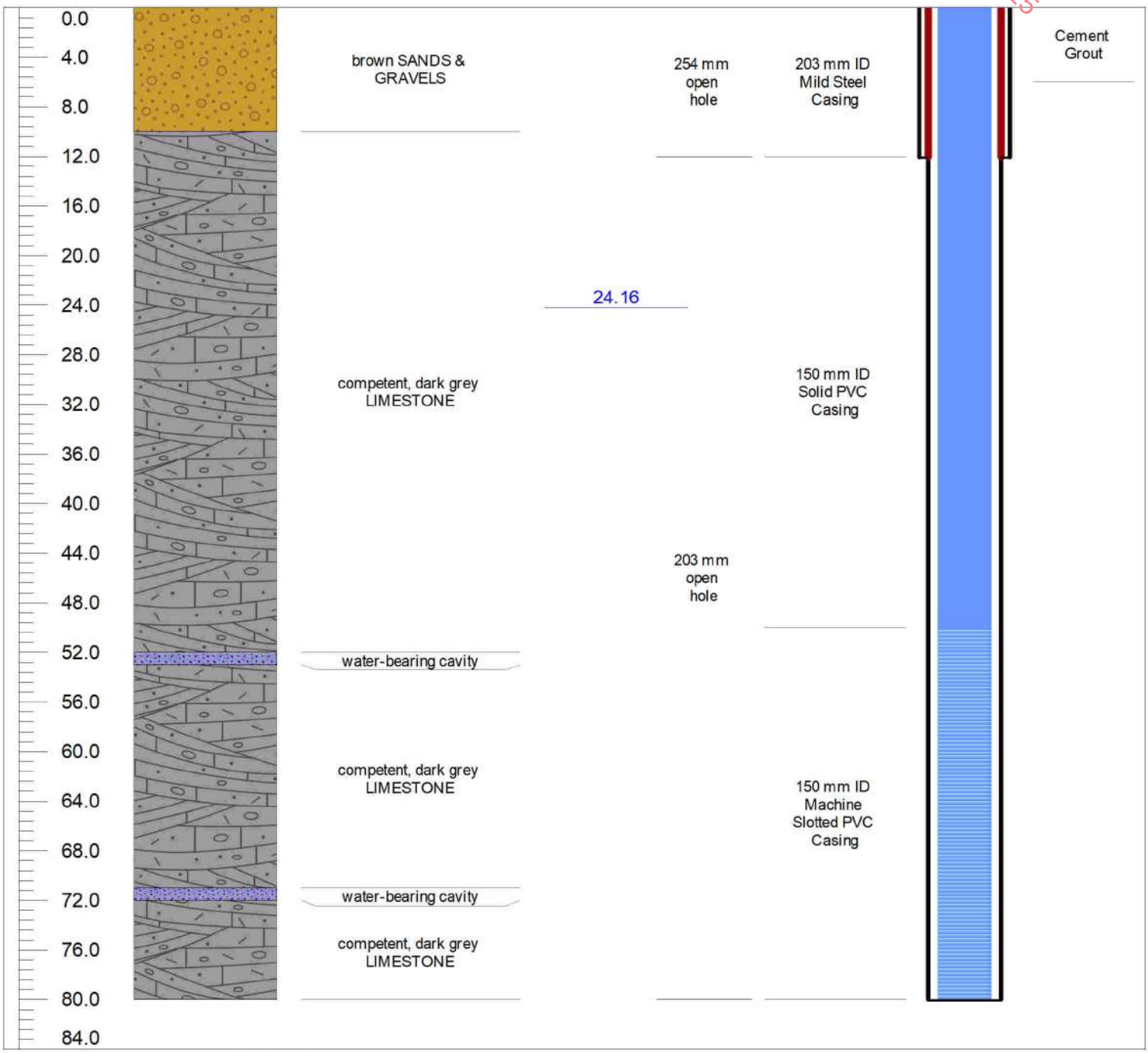
Client: Breedon
Project: Pumping Test Well Drilling
Location: Rossmore, Carrigtwohill, Co. Cork

Borehole No.
BBH2

RECEIVED: 17/12/2025

Coordinates:	582,721 / 571,034	Drilled Date:	Mar 2024	Borehole Diameter:	254 mm (10") / 203 mm (8") / 152 mm (6")
Ground Elevation:	21.07 mOD	Borehole Depth:	80 m	Casing Diameter:	203 mm (8") steel / 125 mm PVC
Top of Casing Elevation:	21.58 mOD	Base Elevation:	-58.93 mOD	Depth to bedrock:	5.0 mbgl
		GWL 09/09/25:	-2.57 mOD		

DEPTH **DESCRIPTION** **BOREHOLE CONSTRUCTION**



Site Map



Driller:	Briody Well Drilling Ltd.
Drilling Rig:	Knebel HY-97-T-BR
Drilling Method:	Air Rotary
Supervision:	P. Bartley, Hydro-G Ltd.
Log drawn by:	C. O'Reilly
Project Ref.:	3055

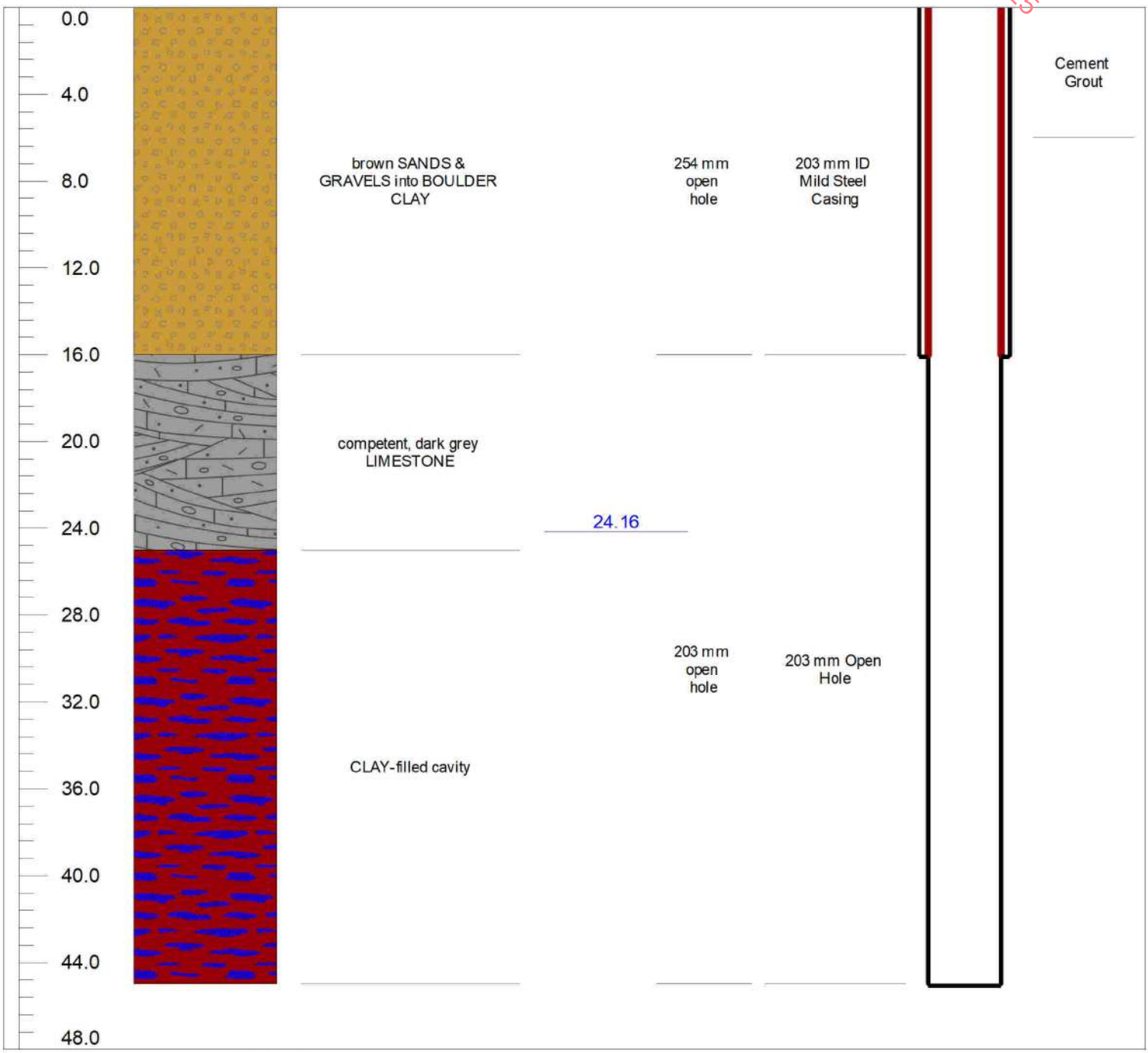
ENVIROLOGIC
HYDROGEOLOGICAL · HYDROLOGICAL CONSULTING

Client: Breedon
Project: Pumping Test Well Drilling
Location: Rossmore, Carrigtwohill, Co. Cork

Borehole No.
BBH3

RECEIVED: 17/12/2025

Coordinates:	582,721 / 571,034	Drilled Date:	Mar 2024	Borehole Diameter:	254 mm (10") / 203 mm (8")
Ground Elevation:	21.07 mOD	Borehole Depth:	80 m	Casing Diameter:	203 mm (8") steel / 125 mm PVC
Top of Casing Elevation:	21.58 mOD	Base Elevation:	-58.93 mOD	Depth to bedrock:	13.0 mbgl
		GWL 09/09/25:	-2.57 mOD		



Site Map



Driller:	Briody Well Drilling Ltd.
Drilling Rig:	Knebel HY-97-T-BR
Drilling Method:	Air Rotary
Supervision:	P. Bartley, Hydro-G Ltd.
Log drawn by:	C. O'Reilly
Project Ref.:	3055

RECEIVED 17/12/2025

Appendix 7.12

Bedrock Permeability Site Investigation & Synopsis of Field Data

RECEIVED: 17/12/2025

APPENDIX: BEDROCK PERMEABILITY TESTING

1.1 INTRODUCTION

Bedrock hydraulic response testing was carried out in 6 bedrock boreholes on a greenfield site that is being evaluated as having hard rock quarrying potential in Rossmore, Co. Cork.

Field work was completed with the objectives of:

i. Establishing the hydraulic properties of the limestone bedrock's formation in terms of Transmissivity and Saturated Hydraulic Conductivity (K_{sat}); along with

ii. Enabling development of a conceptual understanding of the groundwater regime at the site.

The tests planned included carrying out the following on small diameter (50 mm) monitoring wells and large diameter (200 mm) production scale test wells:

1. Constant rate pumping test = The constant discharge test is used to determine hydraulic properties of the well, and to investigate the potential for drawdown in nearby wells. Transmissivity (T) is the rate water is transmitted through the bedrock in terms of a unit width and a unit hydraulic gradient. The aquifer's hydraulic conductivity (permeability) multiplied by the aquifer thickness provides the T value.
2. Recovery test = Analysis of groundwater levels during water level recovery after the test pumping phase allows application of formulae to further characterise characteristics of the subsurface targeted by the boreholes.

1.2 APPROACH

1.2.1 Small Diameter Monitoring Wells

A series of small-scale pumping tests were performed at 4 of the boreholes at the site. Tests were completed by Envirologic personnel during March 2024.

The drilled diameter of each borehole was c.120 mm and each borehole was installed with industry standard 50 mm diameter piezometric BOODE casing used for Monitoring Wells.

A Grundfos MP1 submersible pump was used to abstract groundwater from each wall at a rate of 10 l/min. The pump inlet was positioned as close to the base of each borehole as was feasible. Flowrates were measured manually throughout the tests.

1.2.2 Large Diameter Monitoring Wells

A series of large-scale pumping tests were performed at 2 of the boreholes at the site. Tests were completed by Hickey Pumps Ltd. personnel during April 2024.

The drilled diameter of each borehole was c.200 mm and each borehole was completed as open hole through competent bedrock.

A four inch (BBH1) and six inch (BBH2) submersible pump were used in each of the production wells, pumping at rates of 1 m^3/r (24 m^3/d) and 37 m^3/hr (888 m^3/d),

1.3 METHODOLOGY

RECEIVED: 17/12/2025

Pumping continued until the water level in each well was brought down to reach the pump inlet or reached steady-state drawdown conditions. Groundwater levels were recorded with an automatic pressure transducer type groundwater level logger at 5 to 15 second intervals during the pumping phase and for a duration of up to 24 hours, upon cessation of pumping.

Field response tests to pumping and recovery were analysed using the Cooper-Jacob approach and the Bouwer-Rice method. The latter is considered to be more appropriate where not all test conditions were entirely satisfied, *e.g.* the achievement of steady-state pumping conditions; this is typical of Irish bedrock conditions.

General information for the installed wells is included in Table 1, with well locations illustrated in Figure 1. Summary information regarding pumping durations and pumping rates are stated in Table 2.

Groundwater level dataloggers have been deployed in a number of these wells for long-term monitoring.

Table 1 – Survey information for each monitoring well

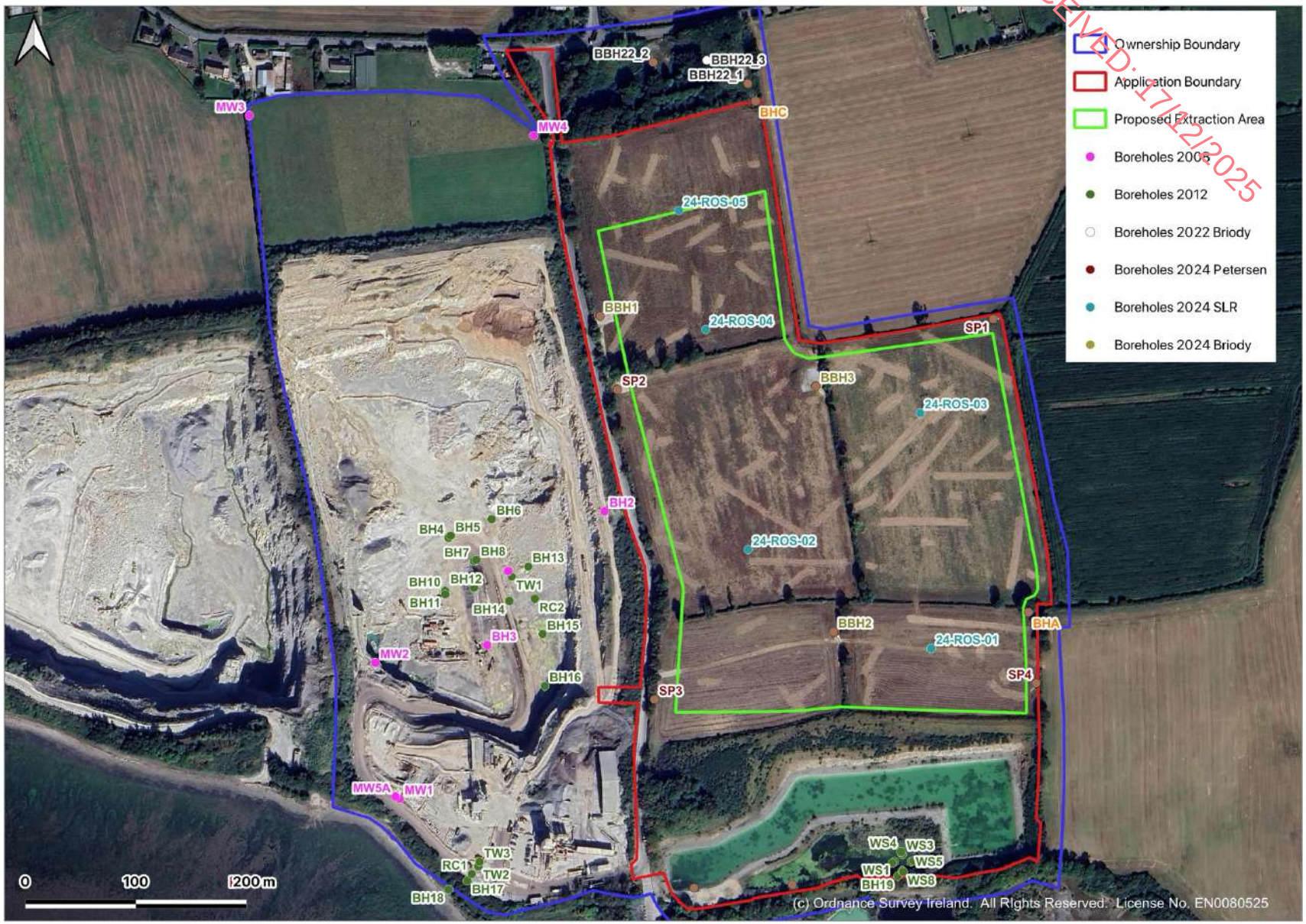
Well ID	Ground Elevation (mOD)	Top of Outer Casing (mOD)	Top of Inner Casing (mOD)	Well Depth, mbgl
SP1	29.57	30.22	30.18	79
SP2	20.84	21.44	21.34	85
SP3	19.03	19.62	19.44	24
SP4	19.43	19.95	19.91	49
BBH1	20.98	21.46		75
BBH2	21.07	21.58		80

Table 2 – Summary pumping test input data

Well ID	Pre-Test WL, mbtoc	Pumping rate, m^3/s	Pumping Duration, mins	Saturated Aquifer Thickness exposed by screen, m
SP1	27.12	0.00015	1.2	40
SP2	27.84	0.00018	60.57	54
SP3	19.11	0.00013	78.23	3
SP4	17.18	0.00016	16.9	33
BBH1	29.65	0.0167	1,363	45.35
BBH2	20.90	0.6167	28,655	58.42

RECEIVED: 17/12/2025

Figure 1 - Permeability Test Well Locations



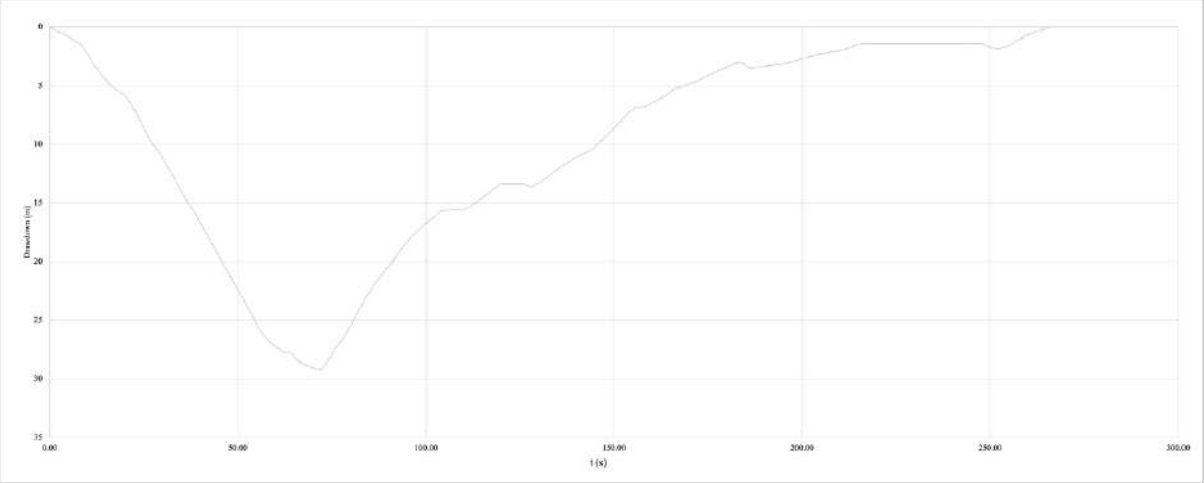
RECEIVED: 17/12/2025

2 MONITORING WELL PERMEABILITY TESTING ANALYSIS

2.1 SP1

Drawdown invoked during the pumping and recovery phase at SP1 is shown in Graph 1. The data shows that following cessation of pumping and removal of pump the water level in the borehole stabilised after approximately 7 hours.

Graph 1 – Small-scale pumping test drawdown and recovery over time at SP1

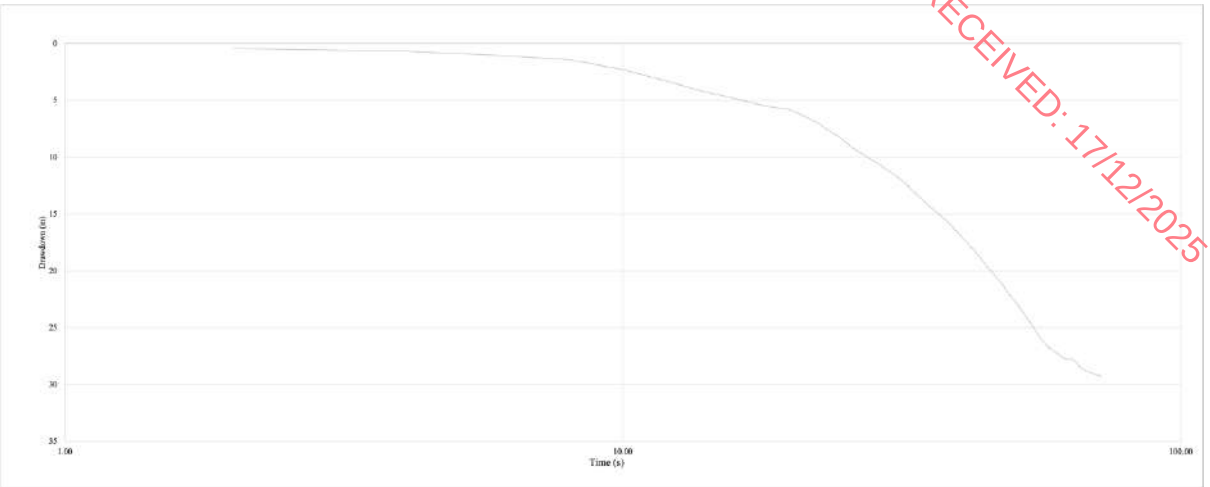


2.1.1 Pumping Phase

Drawdown of 29.25 m was reached over a pumping period of 1.2 minutes; steady-state drawdown conditions were not reached by the time water level had reached the pump inlet. The straight-line nature of drawdown over such a short timeframe suggests that the borehole was merely dewatered by pumping and that there was negligible recharge to the well during this phase.

Drawdown was plotted against time on a log scale (Graph 2) which shows drawdown over one log cycle to be 26.2 m.

Graph 2 – SP1 small-scale pumping test drawdown plotted against time on a log scale



RECEIVED: 17/12/2025

Transmissivity can be calculated using the Cooper Jacob Method (Cooper & Jacob, 1946):

$$T = (2.30\ Q) / (4\ \pi\ \Delta s)$$

where: Q = discharge = 0.00015 m^3/s

Δs = drawdown over one log cycle = x – y (6 - 60 secs) = 26.20 m

$$T = \frac{2.3 \times 0.00015}{4 \times \pi\ (26.20)}$$

$$T = 0.0000010\ m^2/s$$

$$T = 0.0864\ m^2/d$$

The saturated thickness for the screen section of well SP1 was 53.38 m at the start of testing, resulting in a hydraulic conductivity value for the pumping phase of:

$$K = T / \text{Saturated Thickness}$$

$$= 0.086\ m^2/d / 40\ m$$

$$K = 0.00215\ m/d$$

$$K = 2.5 \times 10^{-8}\ m/s$$

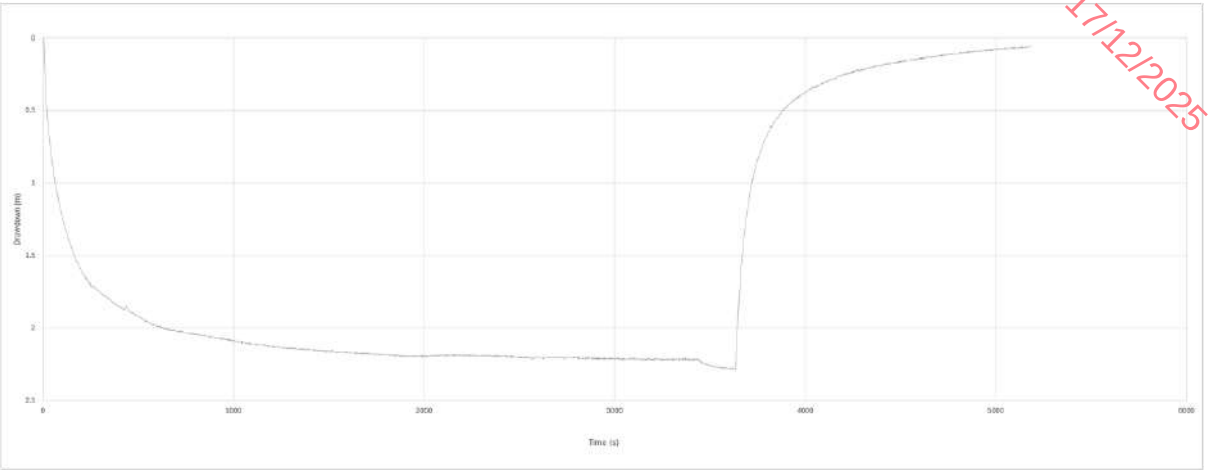
The above results correspond with the drilling log which suggests that the bedrock tested at SP1 is a competent, massive strong limestone. No significant water bearing zones, or potentially transmissive features were encountered during drilling. The rapid drawdown and slow recovery of water levels during testing is indicative of low permeability in the surrounding bedrock, correlating with the calculated permeability values.

2.2 SP2

RECEIVED: 17/12/2025

Drawdown invoked during the pumping and recovery phase at SP2 is shown in Graph 3.

Graph 3 – BH02 small-scale pumping test drawdown and recovery over time



2.2.1 Pumping Phase

The data shows that Steady-state drawdown of 2.29 m was reached over a pumping period of 60.57 minutes. Drawdown was plotted against time on a log scale which showed drawdown over one log cycle as being equivalent to 1.00 m (Graph 4).

Transmissivity can be calculated using the Cooper Jacob's Method (Cooper & Jacob, 1946):

$$T = (2.30\ Q) / (4\ \pi\ \Delta s)$$

where: Q = discharge = 0.00015 m^3/s

Δs = drawdown over one log cycle = x – y (10 - 100 secs) = 0.996 m

$$T = \frac{2.3 \times 0.00015}{4 \times \pi\ (1.00)}$$

$$T = 0.0000275\ m^2/s$$

$$T = 2.373\ m^2/d$$

Given the saturated thickness of well BH02 exposed by the well screen was 54 m at the start of testing the hydraulic conductivity value of the well arrived at for the pumping period is obtained from:

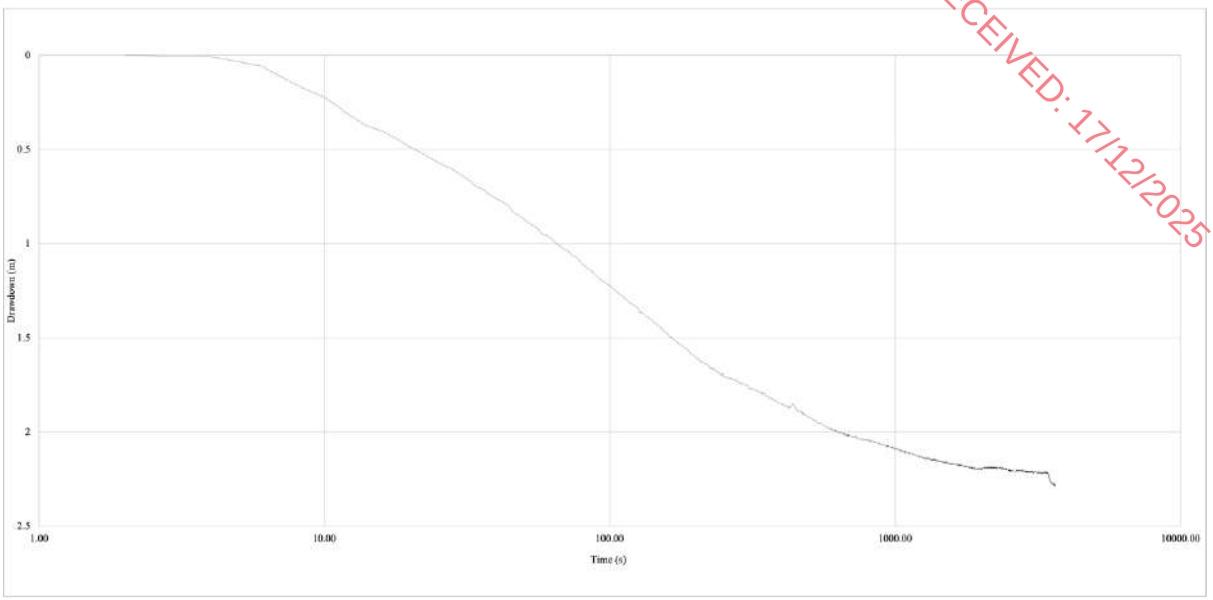
$$K = \frac{T\ (m^2/d)}{\text{Saturated Thickness (m)}}$$

$$K = 0.044\ m/d$$

$$K = 5.0 \times 10^{-7}\ m/s$$

Graph 4 – SP2 small-scale pumping test drawdown plotted against time on a log scale

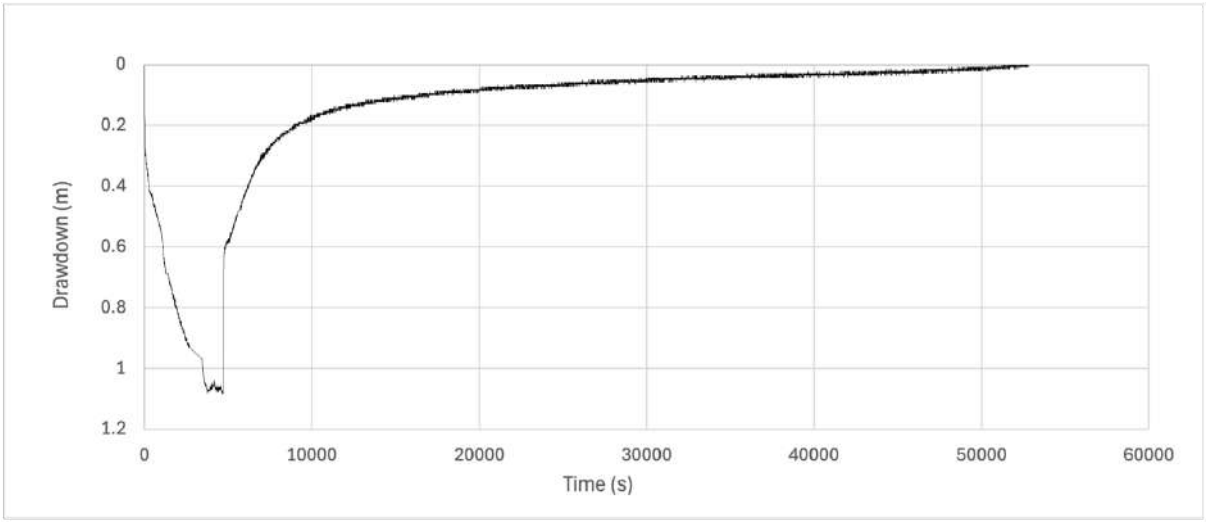
RECEIVED: 17/12/2025



2.3 SP3

Drawdown invoked during the pumping and recovery phase is shown in Graph 5.

Graph 5 – SP3 small-scale pumping test drawdown and recovery over time

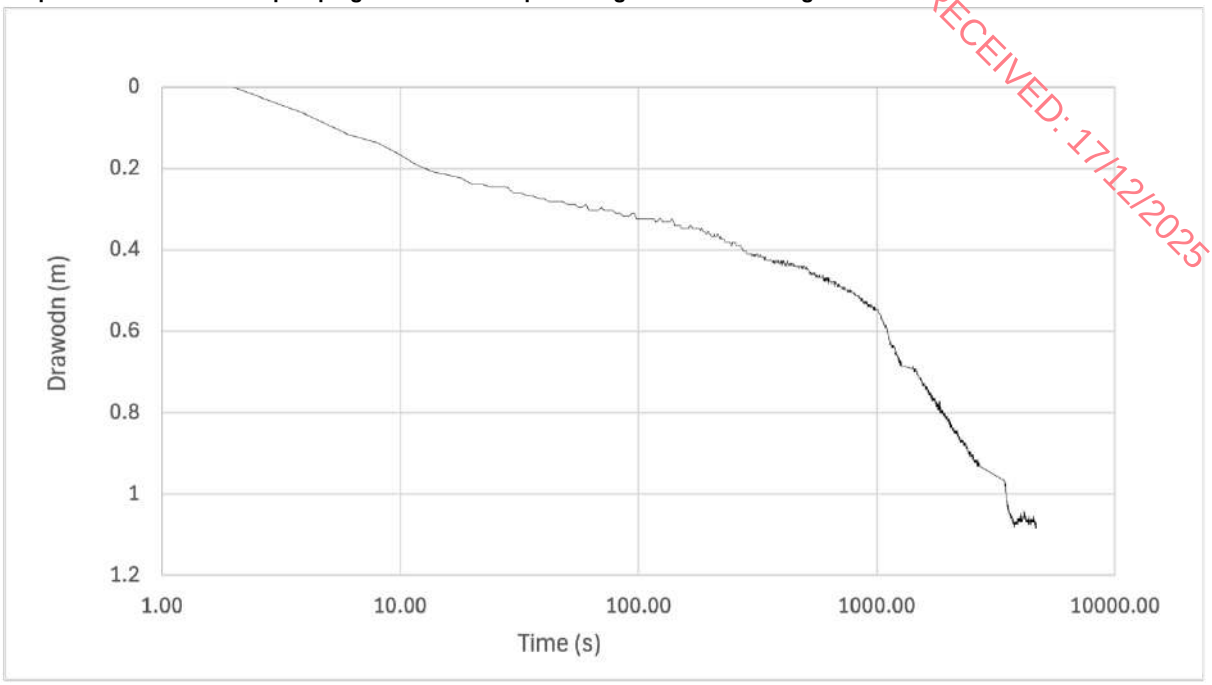


2.3.1 Pumping Phase

Steady-state drawdown at 1.0843 m was reached over a pumping period of 78.23 minutes. Drawdown was plotted against time on a log scale which showed drawdown over one log cycle as being equivalent to 0.158 m (Graph 6).

Graph 6 – SP3 small-scale pumping test drawdown plotted against time on a log scale

RECEIVED: 17/12/2025



Transmissivity was initially calculated using the Cooper Jacob's Method (Cooper & Jacob, 1946):

$$T = (2.30\ Q) / (4\ \pi\ \Delta s)$$

where: Q = discharge = 0.00013 m^3/s

Δs = drawdown over one log cycle = x – y (10 - 100 secs) = 0.1583 m

$$T = \frac{2.3 \times 0.00013}{4 \times \pi\ (0.1583)}$$

$$T = 0.0001445\ m^2/s$$

$$T = 12.5\ m^2/d$$

The saturated thickness for the screen section of well SP3 was 3 m at the time of testing, the hydraulic conductivity value of the well arrived at for the pumping period is:

$$K = \frac{T\ (m^2/d)}{\text{Saturated Thickness (m)}}$$

$$K = 4.17\ m/d$$

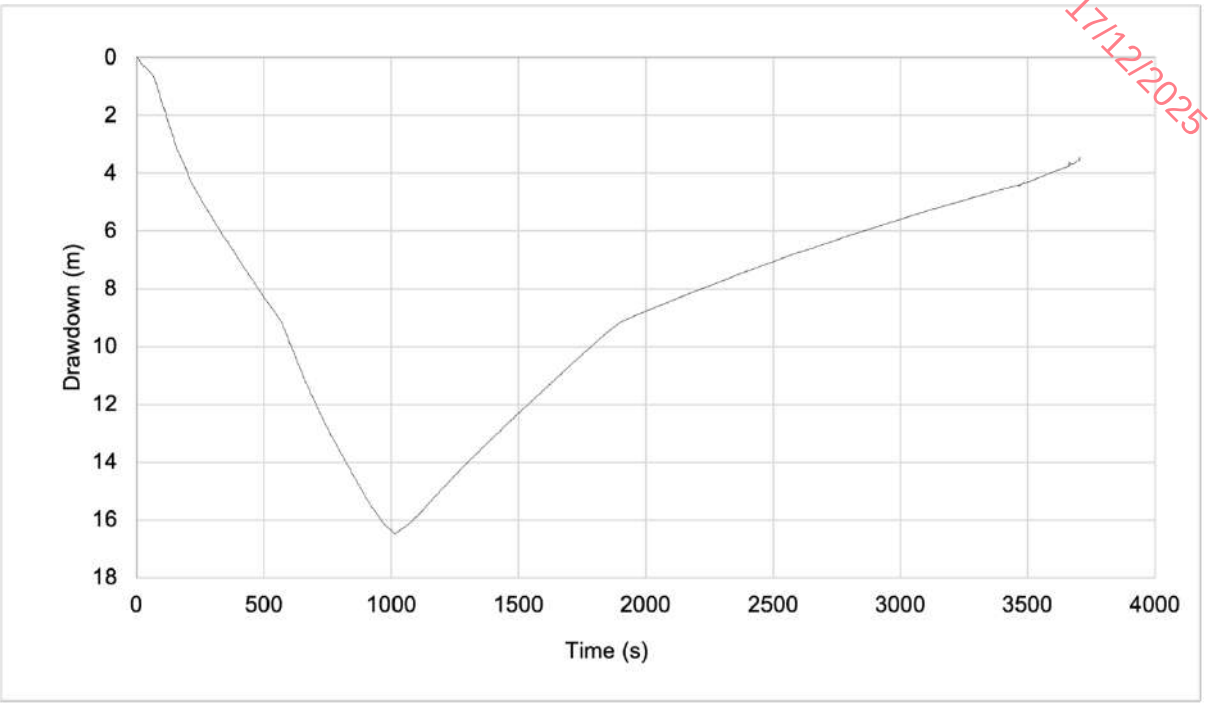
$$K = 4.8 \times 10^{-5}\ m/s$$

2.4 SP4

RECEIVED: 17/12/2025

Drawdown invoked during the pumping and recovery phase is shown in Graph 7.

Graph 7 – SP4 small-scale pumping test drawdown and recovery over time



2.4.1 Pumping Phase

Drawdown of 16.47 m was observed over a pumping period of 17 minutes. Drawdown was plotted against time on a log scale which showed drawdown over one log cycle as being equivalent to 14.8 m through the period 100 - 1,000 seconds (Graph 8). Caution should be treated with these results as steady-state drawdown conditions were not established. Transmissivity was estimated using the Cooper Jacob's Method (Cooper & Jacob, 1946):

$$T = (2.30\ Q) / (4\ \pi\ \Delta s)$$

where: Q = discharge = 0.00016 m^3/s

Δs = drawdown over one log cycle = x – y (100 – 1,000 secs) = 14.78 m

$$T = \frac{2.3 \times 0.00016}{4 \times \pi\ (14.78)}$$

$$T = 0.00000196\ m^2/s$$

$$T = 0.17\ m^2/d$$

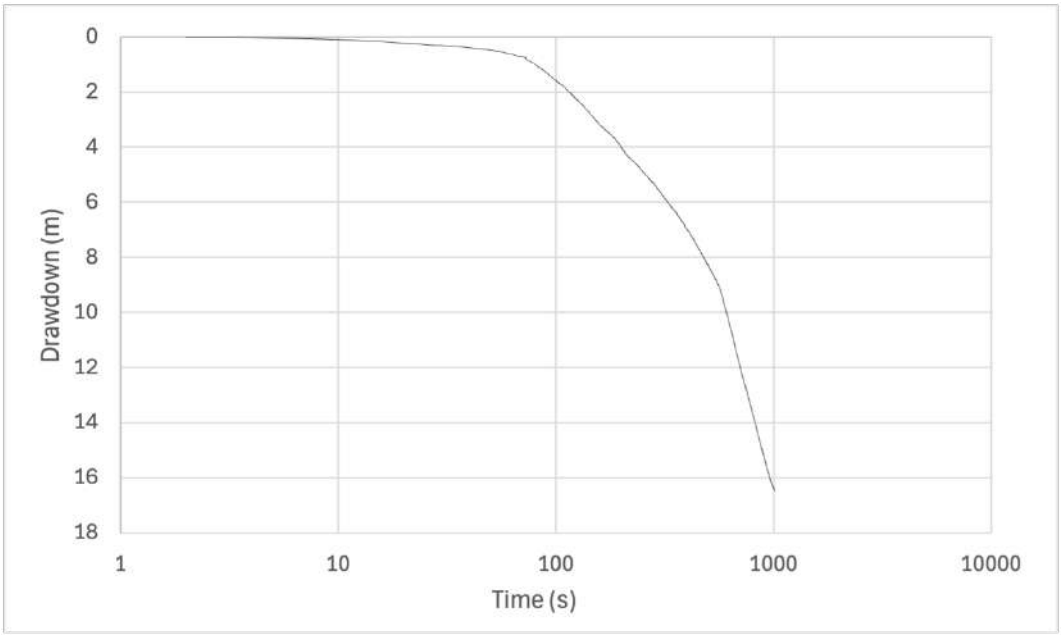
Given the saturated thickness exposed by the well screen of SP4 was 33 m at the start of testing. The hydraulic conductivity value of the well arrived at for the pumping period is obtained from:

$$K = \frac{T\ (m^2/d)}{\text{Saturated Thickness (m)}}$$

RECEIVED: 17/12/2025

$K = 5.9 \times 10^{-8}$ m/s

Graph 8 – SP4 small-scale pumping test drawdown plotted against time on a log scale

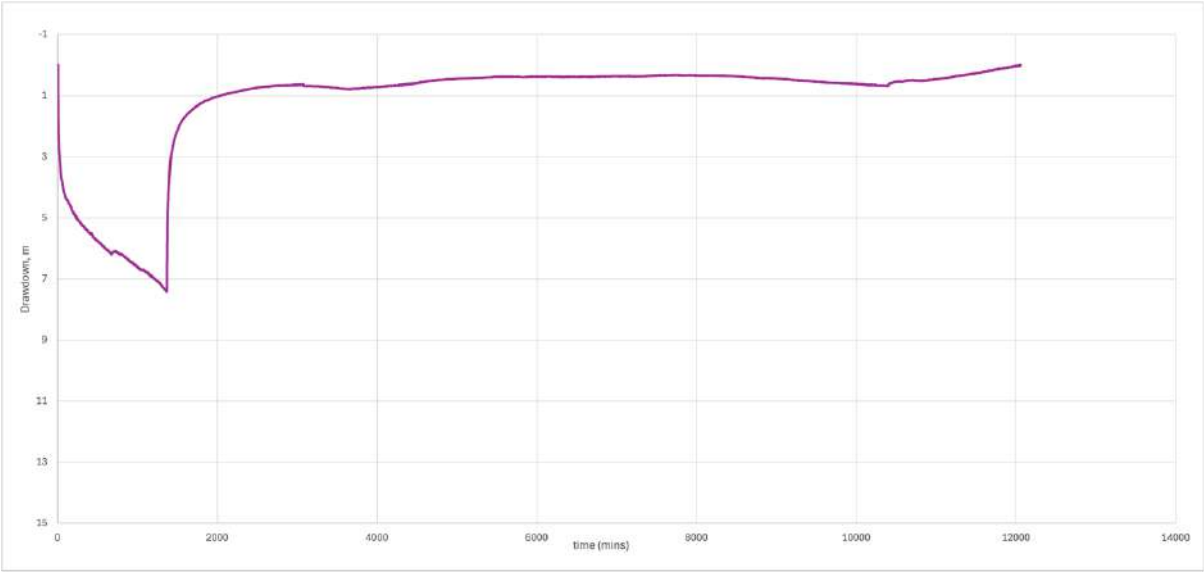


3 PRODUCTION WELL PERMEABILITY TESTING ANALYSIS

3.1 BBH1

Drawdown invoked during the pumping and recovery phase is shown in Graph 9.

Graph 9 – BBH1 pumping test drawdown and recovery over time



RECEIVED: 17/12/2025

3.1.1 Pumping Phase

Drawdown of 7.42 m was observed over a pumping period of 1,360 minutes. Drawdown was plotted against time on a log scale which showed drawdown over one log cycle as being, on average, 2.18 m (Graph 10). Transmissivity can be calculated using the Cooper Jacob's Method (Cooper & Jacob, 1946):

$$T = (2.30\ Q) / (4\ \pi\ \Delta s)$$

where: Q = discharge = 0.0167 m^3/s

Δs = drawdown over one log cycle = 10 - 100 secs = 2.08 m

= 100 – 1,000 secs = 2.27 m

$$T = \frac{2.3 \times 0.0167}{4 \times \pi\ (2.18)}$$

$$T = 0.0000234\ m^2/s$$

$$T = 2.02\ m^2/d$$

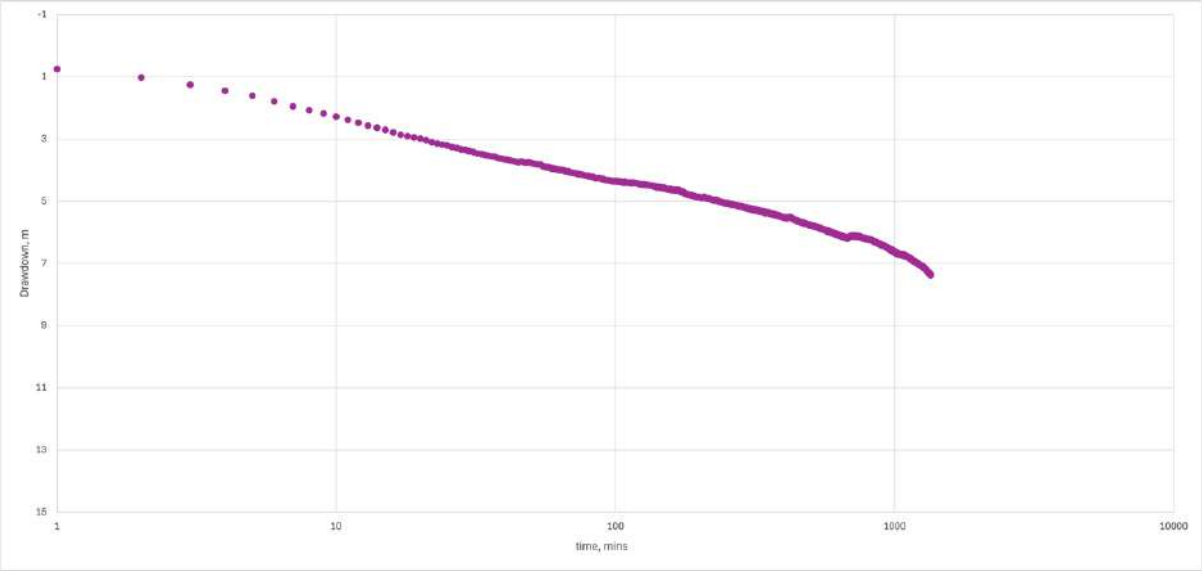
Given the saturated thickness of well BBH1 was 45.35 m at the start of testing. The hydraulic conductivity value of the well arrived at for the pumping period is obtained from:

$$K = \frac{T\ (m^2/d)}{\text{Saturated Thickness (m)}}$$

$$K = 0.0445\ m/d$$

$$K = 5.2 \times 10^{-7}\ m/s$$

Graph 10 – BBH1 pumping test drawdown plotted against time on a log scale

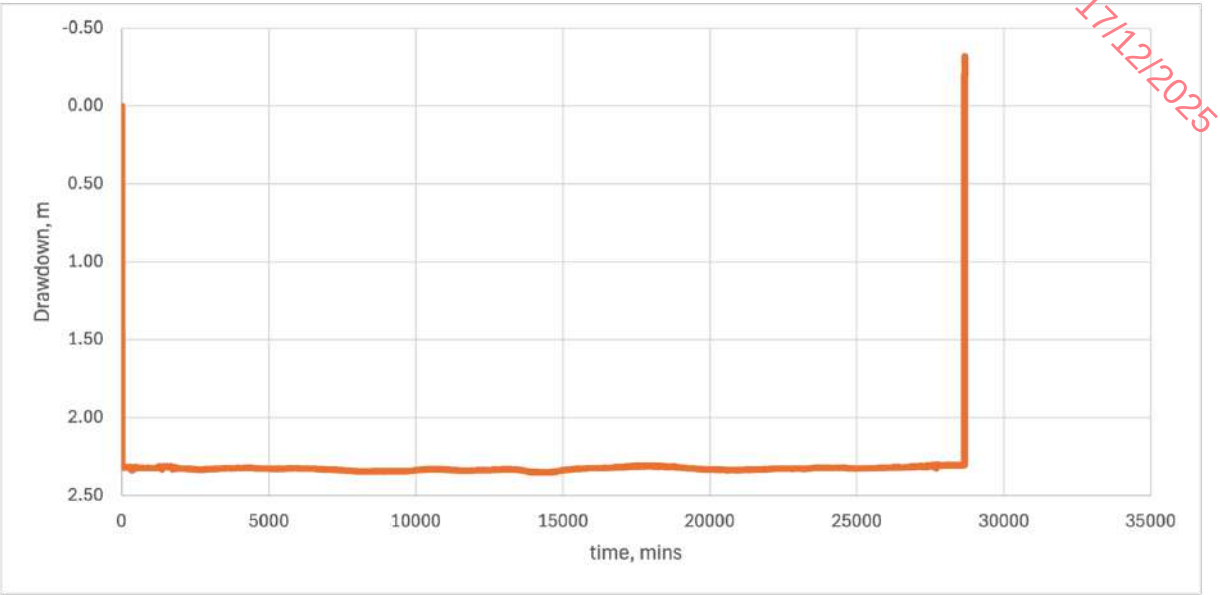


3.2 BBH2

RECEIVED: 17/12/2025

Drawdown invoked during the pumping and recovery phase is shown in Graph 11.

Graph 11 – BBH2 pumping test drawdown and recovery over time



3.2.1 Pumping Phase

Drawdown of 2.32 m was observed over a pumping period of 28,660 minutes (478 hours; 20 days). The groundwater level recording interval was not short enough to capture the log cycles during drawdown and recovery phases.

Transmissivity can also be calculated using the Logan Approximation, assuming steady-state drawdown at a pumping rate of 888 m^3/d is approximately 02.32 m:

$$T = 1.22\ Q / s$$

$$T = 1.22 \times 888\ m^3/d / 2.32\ m$$

$$T = 467\ m^2/d$$

Permeability is calculated by dividing the transmissivity by the saturated thickness of the aquifer. The saturated thickness exposed by the screened section is 58.42 m, hence the permeability is estimated to be 9.3×10^{-5} m/s.

RECEIVED: 17/12/2025

Appendix 7.13

Laboratory Certificates of Analysis

eurofins | Environment Testing

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 138T

RECEIVED: 17/12/2025

Client: Envirologic
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: AR-24-M3-006457-01
Page Number: Page 1 of 4
PO reference: 3040

Certificate of Analysis

Sample number	966-2024-00007175	Received on	15/03/2024
		Analysis started on	15/03/2024
Your sample reference	PW1		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	14/03/2024
Time Sampled	08:30		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Chemical Oxygen Demand (COD) [M3004]								
Chemical oxygen demand (COD)		19/03/24 13:15	EW094	8		<8	mg/l	C6
Total Nitrogen [M3007]								
Total Nitrogen		19/03/24 13:40	EW140	1		5.00	mg/l	C6
Turbidity [M3008]								
Turbidity		20/03/24 15:19 [7D]	EW136	0.1		0.370	NTU	
Sulphate mg/L - Gallery [M300N]								
Sulphate mg/L - Gallery		15/03/24 13:33	EW175	1		32.2	mg/l	C6
Phosphate (Ortho/MRP) as P - Gallery [M300P]								
Phosphate (Ortho/MRP) as P - Gallery		15/03/24 13:33	EW175	0.05		<0.05	mg/l	C6
Chloride mg/L - Gallery [M300S]								
Chloride mg/L - Gallery		15/03/24 13:33	EW175	5		56.2	mg/l	C6
Ammonia as N - Gallery [M300Z]								
Ammonia as N - Gallery		15/03/24 13:33	EW175	0.05		<0.05	mg/l	C6
Nitrite (as N) - Gallery [M3016]								
Nitrite (as N) - Gallery		15/03/24 13:33	EW175	0.01		<0.01	mg/l	C6
Nitrate (as N) - Gallery [M301A]								
Nitrate (as N) - Gallery		15/03/24 13:33	EW175	1		5.52	mg/l	C6
Total Organic Carbon (TOC) [M3022]								
TOC (total organic carbon)		19/03/24 10:13	EW123	1		<1	mg/l	C6

Signed: 25/03/2024
Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

eurofins | Environment Testing

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 138T

RECEIVED: 17/12/2025

Client: Envirologic
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: AR-24-M3-006457-01
Page Number: Page 2 of 4
PO reference: 3040

Sample number	966-2024-00007175	Received on	15/03/2024
		Analysis started on	15/03/2024
Your sample reference	PW1		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	14/03/2024
Time Sampled	08:30		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Total Phosphorus-TP [M3045]								
Total Phosphorus-TP		19/03/24 09:05	EW146	0.02		<0.02	mg/l	
Biochemical Oxygen Demand (BOD) Robotic Method [M304E]								
Biochemical oxygen demand (BOD) 5d by Robotic Method		15/03/24 16:07	Ew001R	1		<1	mg/l	C6
pH (Robotic Method) [M3051]								
pH		15/03/24 14:44 [7D]	EW152R	4		6.6		
Conductivity at 20°C (Robotic Method) [M3052]								
Conductivity at 20°C		15/03/24 14:44	EW152R	5		773	µS/cm	C6
Alkalinity as CaCO3 [M30D3]								
Alkalinity as CAC03		15/03/24 13:33	EW175	30		320	mg/l	
Arsenic - Dissolved [M3159]								
Arsenic		23/03/24 16:56	EW188			0.217	µg/l	C6
Cadmium - Dissolved [M3164]								
Cadmium (Cd)		23/03/24 16:56	EW188			0.120	µg/l	C6
Calcium - Dissolved [M3165]								
Calcium (Ca)		23/03/24 16:56	EW188	1.08		188	mg/l	
Chromium - Dissolved [M3166]								
Chromium (Cr)		23/03/24 16:56	EW188			<1	µg/l	C6
Copper - Dissolved [M3168]								
Copper (Cu)		23/03/24 16:56	EW188	0.003		<0.003	mg/l	C6
Iron - Dissolved [M3172]								
Iron (Fe)		23/03/24 16:56	EW188	5		60.9	µg/l	C6

Signed: 25/03/2024
Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

RECEIVED: 17/12/2025

Client: Envirologic
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: AR-24-M3-006457-01
Page Number: Page 3 of 4
PO reference: 3040

Sample number	966-2024-00007175	Received on	15/03/2024
		Analysis started on	15/03/2024
Your sample reference	PW1		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	14/03/2024
Time Sampled	08:30		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Lead - Dissolved [M3173]								
Lead (Pb)		23/03/24 16:56	EW188	0.51		<0.51	µg/l	C6
Magnesium - Dissolved [M3174]								
Magnesium (Mg)		23/03/24 16:56	EW188	1.11		7.00	mg/l	C6
Manganese - Dissolved [M3175]								
Manganese (Mn)		23/03/24 16:56	EW188			4.00	µg/l	C6
Mercury - Dissolved [M3176]								
Mercury		23/03/24 16:56	EW188	0.03		<0.03	µg/l	C6
Nickel - Dissolved [M3178]								
Nickel (Ni)		23/03/24 16:56	EW188			<0.5	µg/l	C6
Potassium - Dissolved [M3180]								
Potassium (K)		23/03/24 16:56	EW188	0.15		10.5	mg/l	C6
Sodium - Dissolved [M3184]								
Sodium (Na)		23/03/24 16:56	EW188	1.5		31.4	mg/l	C6
Zinc - Dissolved [M3194]								
Zinc (Zn)		23/03/24 16:56	EW188	1		3.12	µg/l	C6
TPH 3 Band (C6-10-21-40) in water [M502B]								
TPH >C10-C21	*	15/03/24 14:45		0.1		<0.1	µg/l	
TPH >C21-C40	*	15/03/24 14:45		0.1		<0.1	µg/l	
TPH >C6-C10	*	15/03/24 14:45		0.1		<0.1	µg/l	
TPH Total >C6-C40	*	15/03/24 14:45		10		<10	µg/l	YA

Signed: 25/03/2024
Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

RECEIVED: 17/12/2025

Client: Envirologic
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: AR-24-M3-006457-01
Page Number: Page 4 of 4
PO reference: 3040

[4] Accreditiation Information

C6: ISO/IEC 17025:2017 INAB 138-T
YA: Accredited (External Subcontractor)

Signed: _____ 25/03/2024

Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

eurofins | Environment Testing

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 138T

RECEIVED: 17/12/2025

Client: Envirologic
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: AR-24-M3-007114-01
Page Number: Page 1 of 4
PO reference: 3040

Certificate of Analysis

Sample number	966-2024-00007176	Received on	15/03/2024
		Analysis started on	15/03/2024
Your sample reference	SP3-R		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	14/03/2024
Time Sampled	17:45		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Chemical Oxygen Demand (COD) [M3004]								
Chemical oxygen demand (COD)		19/03/24 13:15	EW094	8		64.0	mg/l	C6
Total Nitrogen [M3007]								
Total Nitrogen		19/03/24 13:40	EW140	1		16.1	mg/l	C6
Turbidity [M3008]								
Turbidity		19/03/24 12:49 [7A]	EW136	0.1		768	NTU	
Sulphate mg/L - Gallery [M300N]								
Sulphate mg/L - Gallery		15/03/24 13:33	EW175	1		82.5	mg/l	C6
Phosphate (Ortho/MRP) as P - Gallery [M300P]								
Phosphate (Ortho/MRP) as P - Gallery		15/03/24 13:33	EW175	0.05		0.445	mg/l	C6
Chloride mg/L - Gallery [M300S]								
Chloride mg/L - Gallery		15/03/24 13:33	EW175	5		466	mg/l	
Ammonia as N - Gallery [M300Z]								
Ammonia as N - Gallery		15/03/24 13:33	EW175	0.05		<0.05	mg/l	C6
Nitrite (as N) - Gallery [M3016]								
Nitrite (as N) - Gallery		15/03/24 13:33	EW175	0.01		<0.01	mg/l	
Nitrate (as N) - Gallery [M301A]								
Nitrate (as N) - Gallery		15/03/24 13:33	EW175	1		11.156	mg/l	C6
Total Organic Carbon (TOC) [M3022]								
TOC (total organic carbon)		19/03/24 10:13	EW123	1		<1	mg/l	C6

Signed: 02/04/2024
Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

eurofins | Environment Testing

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 138T

RECEIVED: 17/12/2025

Client: Envirologic
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: AR-24-M3-007114-01
Page Number: Page 2 of 4
PO reference: 3040

Sample number	966-2024-00007176	Received on	15/03/2024
		Analysis started on	15/03/2024
Your sample reference	SP3-R		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	14/03/2024
Time Sampled	17:45		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Total Phosphorus-TP [M3045]								
Total Phosphorus-TP		20/03/24 12:50	EW146	0.02		0.830	mg/l	C6
Biochemical Oxygen Demand (BOD) Robotic Method [M304E]								
Biochemical oxygen demand (BOD) 5d by Robotic Method		15/03/24 16:07	Ew001R	1		<1	mg/l	C6
pH (Robotic Method) [M3051]								
pH		15/03/24 14:44	EW152R	4		7.0		C6
Conductivity at 20°C (Robotic Method) [M3052]								
Conductivity at 20°C		15/03/24 14:44	EW152R	5		1930	µS/cm	C6
Alkalinity as CaCO3 [M30D3]								
Alkalinity as CAC03		15/03/24 13:33	EW175	30		337	mg/l	
Arsenic - Dissolved [M3159]								
Arsenic		23/03/24 16:56	EW188			<0.2	µg/l	C6
Cadmium - Dissolved [M3164]								
Cadmium (Cd)		23/03/24 16:56	EW188			<0.1	µg/l	C6
Calcium - Dissolved [M3165]								
Calcium (Ca)		23/03/24 16:56	EW188	1.08		217	mg/l	
Chromium - Dissolved [M3166]								
Chromium (Cr)		23/03/24 16:56	EW188			<1	µg/l	C6
Copper - Dissolved [M3168]								
Copper (Cu)		23/03/24 16:56	EW188	0.003		<0.003	mg/l	C6
Iron - Dissolved [M3172]								
Iron (Fe)		23/03/24 16:56	EW188	5		10.3	µg/l	C6

Signed: 02/04/2024
Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

eurofins | Environment Testing

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 138T

RECEIVED: 17/12/2025

Client: Envirologic
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: AR-24-M3-007114-01
Page Number: Page 3 of 4
PO reference: 3040

Sample number	966-2024-00007176	Received on	15/03/2024
		Analysis started on	15/03/2024
Your sample reference	SP3-R		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	14/03/2024
Time Sampled	17:45		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Lead - Dissolved [M3173]								
Lead (Pb)		23/03/24 16:56	EW188	0.51		<0.51	µg/l	C6
Magnesium - Dissolved [M3174]								
Magnesium (Mg)		23/03/24 16:56	EW188	1.11		23.9	mg/l	C6
Manganese - Dissolved [M3175]								
Manganese (Mn)		23/03/24 16:56	EW188			3.05	µg/l	C6
Mercury - Dissolved [M3176]								
Mercury		23/03/24 16:56	EW188	0.03		<0.03	µg/l	C6
Nickel - Dissolved [M3178]								
Nickel (Ni)		23/03/24 16:56	EW188			2.42	µg/l	C6
Potassium - Dissolved [M3180]								
Potassium (K)		23/03/24 16:56	EW188	0.15		6.14	mg/l	C6
Sodium - Dissolved [M3184]								
Sodium (Na)		23/03/24 16:56	EW188	1.5		296	mg/l	
Zinc - Dissolved [M3194]								
Zinc (Zn)		23/03/24 16:56	EW188	1		<1	µg/l	C6
TPH 3 Band (C6-10-21-40) in water [M502B]								
TPH >C10-C21	*	15/03/24 14:45		0.1		<0.1	µg/l	
TPH >C21-C40	*	15/03/24 14:45		0.1		<0.1	µg/l	
TPH >C6-C10	*	15/03/24 14:45		0.1		<0.1	µg/l	
TPH Total >C6-C40	*	15/03/24 14:45		10		<10	µg/l	YA

Signed: 02/04/2024
Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

RECEIVED: 17/12/2025

Client: **Envirologic**
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: **AR-24-M3-007114-01**
Page Number: **Page 4 of 4**
PO reference: **3040**

[4] Accreditiation Information

C6: ISO/IEC 17025:2017 INAB 138-T
YA: Accredited (External Subcontractor)

Signed: 02/04/2024
Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

eurofins | Environment Testing

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 138T

RECEIVED: 17/12/2025

Client: Envirologic
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: AR-24-M3-006458-01
Page Number: Page 1 of 4
PO reference: 3040

Certificate of Analysis

Sample number	966-2024-00007177	Received on	15/03/2024
		Analysis started on	15/03/2024
Your sample reference	SP4-R		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	14/03/2024
Time Sampled	15:40		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Chemical Oxygen Demand (COD) [M3004]								
Chemical oxygen demand (COD)		19/03/24 13:15	EW094	8		8.00	mg/l	C6
Total Nitrogen [M3007]								
Total Nitrogen		19/03/24 13:40	EW140	1		26.3	mg/l	C6
Turbidity [M3008]								
Turbidity		19/03/24 12:49 [7A]	EW136	0.1		298	NTU	
Sulphate mg/L - Gallery [M300N]								
Sulphate mg/L - Gallery		15/03/24 13:33	EW175	1		31.8	mg/l	C6
Phosphate (Ortho/MRP) as P - Gallery [M300P]								
Phosphate (Ortho/MRP) as P - Gallery		15/03/24 13:33	EW175	0.05		<0.05	mg/l	C6
Chloride mg/L - Gallery [M300S]								
Chloride mg/L - Gallery		15/03/24 13:33	EW175	5		53.4	mg/l	C6
Ammonia as N - Gallery [M300Z]								
Ammonia as N - Gallery		15/03/24 13:33	EW175	0.05		<0.05	mg/l	C6
Nitrite (as N) - Gallery [M3016]								
Nitrite (as N) - Gallery		15/03/24 13:33	EW175	0.01		0.014	mg/l	C6
Nitrate (as N) - Gallery [M301A]								
Nitrate (as N) - Gallery		15/03/24 13:33	EW175	1		20.678	mg/l	
Total Organic Carbon (TOC) [M3022]								
TOC (total organic carbon)		19/03/24 10:13	EW123	1		<1	mg/l	C6

Signed: 25/03/2024
Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

eurofins | Environment Testing

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 138T

RECEIVED: 17/12/2025

Client: **Envirologic**
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: **AR-24-M3-006458-01**
Page Number: **Page 2 of 4**
PO reference: **3040**

Sample number	966-2024-00007177	Received on	15/03/2024
		Analysis started on	15/03/2024
Your sample reference	SP4-R		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	14/03/2024
Time Sampled	15:40		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Total Phosphorus-TP [M3045]								
Total Phosphorus-TP		20/03/24 12:50	EW146	0.02		0.160	mg/l	C6
Biochemical Oxygen Demand (BOD) Robotic Method [M304E]								
Biochemical oxygen demand (BOD) 5d by Robotic Method		15/03/24 16:07	Ew001R	1		<1	mg/l	C6
pH (Robotic Method) [M3051]								
pH		15/03/24 14:44	EW152R	4		6.8		C6
Conductivity at 20°C (Robotic Method) [M3052]								
Conductivity at 20°C		15/03/24 14:44	EW152R	5		704	µS/cm	C6
Alkalinity as CaCO3 [M30D3]								
Alkalinity as CAC03		15/03/24 13:33	EW175	30		214	mg/l	
Arsenic - Dissolved [M3159]								
Arsenic		23/03/24 16:56	EW188			<0.2	µg/l	C6
Cadmium - Dissolved [M3164]								
Cadmium (Cd)		23/03/24 16:56	EW188			<0.1	µg/l	C6
Calcium - Dissolved [M3165]								
Calcium (Ca)		23/03/24 16:56	EW188	1.08		143	mg/l	
Chromium - Dissolved [M3166]								
Chromium (Cr)		23/03/24 16:56	EW188			<1	µg/l	C6
Copper - Dissolved [M3168]								
Copper (Cu)		23/03/24 16:56	EW188	0.003		<0.003	mg/l	C6
Iron - Dissolved [M3172]								
Iron (Fe)		23/03/24 16:56	EW188	5		14.9	µg/l	C6

Signed: 25/03/2024

Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

eurofins | Environment Testing

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 138T

RECEIVED: 17/12/2025

Client: **Envirologic**
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: **AR-24-M3-006458-01**
Page Number: **Page 3 of 4**
PO reference: **3040**

Sample number	966-2024-00007177	Received on	15/03/2024
		Analysis started on	15/03/2024
Your sample reference	SP4-R		
Sample Matrix	Ground water		
Sample Condition on Arrival	Satisfactory	Sample Date	14/03/2024
Time Sampled	15:40		

Test Code / Analyte	SUB [5]	Analysis Started	Method	LOQ [3]	SPEC [2]	Result	Units	ACCRED [4]
Lead - Dissolved [M3173]								
Lead (Pb)		23/03/24 16:56	EW188	0.51		<0.51	µg/l	C6
Magnesium - Dissolved [M3174]								
Magnesium (Mg)		23/03/24 16:56	EW188	1.11		9.51	mg/l	C6
Manganese - Dissolved [M3175]								
Manganese (Mn)		23/03/24 16:56	EW188			4.94	µg/l	C6
Mercury - Dissolved [M3176]								
Mercury		23/03/24 16:56	EW188	0.03		<0.03	µg/l	C6
Nickel - Dissolved [M3178]								
Nickel (Ni)		23/03/24 16:56	EW188			1.26	µg/l	C6
Potassium - Dissolved [M3180]								
Potassium (K)		23/03/24 16:56	EW188	0.15		13.7	mg/l	C6
Sodium - Dissolved [M3184]								
Sodium (Na)		23/03/24 16:56	EW188	1.5		37.4	mg/l	C6
Zinc - Dissolved [M3194]								
Zinc (Zn)		23/03/24 16:56	EW188	1		<1	µg/l	C6
TPH 3 Band (C6-10-21-40) in water [M502B]								
TPH >C10-C21	*	15/03/24 14:45		0.1		<0.1	µg/l	
TPH >C21-C40	*	15/03/24 14:45		0.1		<0.1	µg/l	
TPH >C6-C10	*	15/03/24 14:45		0.1		<0.1	µg/l	
TPH Total >C6-C40	*	15/03/24 14:45		10		<10	µg/l	YA

Signed: 25/03/2024

Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

Eurofins Environment Testing Ireland
Hoffman Park, Inchera
Cork
T45 PC80
Ireland
T: 0818 252526
Web: www.eurofins.ie
Email: ASTsupport@etuki.eurofins.com

RECEIVED: 17/12/2025

Client: Envirologic
Robertson House
Unit 49 Baldolyle Ind Est
Dublin
IRELAND

Certificate Code: AR-24-M3-006458-01

PO reference: 3040

[4] Accreditiation Information

C6: ISO/IEC 17025:2017 INAB 138-T
YA: Accredited (External Subcontractor)

Signed: _____ 25/03/2024

Aoife De Barra - Organics & Instrumentation Team Lead

NOTES

1. This Report shall not be reproduced, except in full, without the permission of the Laboratory and only relates to the items tested.
2. SPEC = Allowable limit or parametric value.
3. LOQ = Limit of Quantification or lowest value that can be reported
4. ACCRED = Indicates accreditation for the test, a blank field indicates not accredited
5. "*" indicates the test was sub-contracted
6. No date of sampling was supplied, sample stability cannot be assessed, results may be compromised.
7A. This result is compromised as it was tested outside of stability times.
7C. Sample not received in appropriate containers, therefore results may be compromised.
7D. This result is comprised as the sample was received by the laboratory outside of the holding time.
8. This notification is based on the numerical result for the test without consideration of the uncertainty of measurement of the result, unless otherwise agreed in writing. Uncertainty of measurement has been calculated for all INAB accredited tests and is available upon request
9. Report is issued as per out standard T&C of sale.

FITZ SCIENTIFIC
MONITORING & TESTING

Unit 35,
Boyne Business Park,
Drogheda,
Co. Louth,
Ireland
Tel: +353 41 9845440
Fax: +353 41 9846171
Web: www.fitzsci.ie
Email: info@fitzsci.ie

RECEIVED: 27/12/2025

A copy of this certificate is available on www.fitzsci.ie.

Customer supplied information appear in italics.

Customer	*Pamela Bartley* *Hydro-G* *50 Henry Street* *Galway* *Co.Galway H91 FA4X*	Lab Report Ref. No.	2297/2410006/01
		Date of Receipt	18/10/2024
		Sampled On	*18/10/2024*
		Date Testing Commenced	18/10/2024
		Received or Collected	By Fitz: Pick up Derek
		Condition on Receipt	Acceptable
Customer PO	*Rossmore-18Oct24*	Date of Report	04/11/2024
Customer Ref	*BBH1 - Road*	*Sample Type*	*Ground Water*
Ref 2			
Ref 3			

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
Aluminium (Ground Water)	177	ICPMS	182	ug/L	INAB
Ammonia (Ground Water)	114	Colorimetry	0.03	mg/L as N	INAB
Arsenic (Ground Water)	177	ICPMS	<1	ug/L	INAB
Barium (Ground Water)	177	ICPMS	4	ug/L	INAB
[3]Benzene (Ground Water)	154	GCMS	<1	ug/l	INAB
Benzo(a)pyrene (Ground)	575	GCMS	<0.0025	ug/L	
[3]BTEX Total (Ground Water)	154	GCMS	<1	ug/l	
Cadmium (Ground Water)	177	ICPMS	<1	ug/L	INAB
Chloride (Ground Water)	100	Colorimetry	37	mg/L	INAB
Chromium (Ground Water)	177	ICPMS	<2	ug/L	INAB
Chromium (VI)	146	Colorimetry	<10	ug/L	
Conductivity (Ground Water at 20C)	112	Electrometry	555.0	µscm -1@20C	INAB
Copper (Ground Water)	177	ICPMS	<1	ug/L	INAB
Dissolved Organic Carbon	316	TOC Analyser	<1.0	mg/L	
[3]Ethylbenzene (Ground Water)	154	GCMS	<1	ug/l	INAB
Hardness Total (Ground Water)	111	Colorimetry	285.8	mg/L CaCO3	INAB
Iron (Ground Water)	177	ICPMS	74	ug/L	INAB
Lead (Ground Water)	177	ICPMS	<1	ug/L	INAB
[3]m- & p-Xylene (Ground Water)	154	GCMS	<1	ug/l	INAB
Manganese (Ground Water)	177	ICPMS	4	ug/L	INAB

Signed: A Harmon **Date: 04/11/2024**

Aoife Harmon - Laboratory Supervisor

Acc. : Accredited Parameters by ISO/IEC 17025:2017

For bacterial analysis a result of 0 means none detected in volume examined
All organic results are analysed as received and all results are corrected for dry weight at 104 C
Results shall not be reproduced, except in full, without the approval of Fitz Scientific
Results contained in this report relate only to the samples tested (P) : Presumptive Results

** : The test result for this parameter may be invalid as it has exceeded the recommended holding time (BS EN ISO 5667-3:2024)
This sample was identified as deviant (BS EN ISO 5667-3:2024) due to [HeadSpace[3]] and the test results may be invalid.

Final results will be issued without any estimated uncertainty of measurement being applied. This can be supplied on request.
Fitz Scientific maintain all customer information in the strictest confidence which is legally enforceable.

FITZ SCIENTIFIC
MONITORING & TESTING

Unit 35,
Boyne Business Park,
Drogheda,
Co. Louth,
Ireland
Tel: +353 41 9845440
Fax: +353 41 9846171
Web: www.fitzsci.ie
Email: info@fitzsci.ie

RECEIVED: 27/12/2025

A copy of this certificate is available on www.fitzsci.ie.

Customer supplied information appear in italics.

Customer	*Pamela Bartley* *Hydro-G* *50 Henry Street* *Galway* *Co.Galway H91 FA4X*	Lab Report Ref. No.	2297/2410006/01
		Date of Receipt	18/10/2024
		Sampled On	*18/10/2024*
		Date Testing Commenced	18/10/2024
		Received or Collected	By Fitz: Pick up Derek
		Condition on Receipt	Acceptable
Customer PO	*Rossmore-18Oct24*	Date of Report	04/11/2024
Customer Ref	*BBH1 - Road*	*Sample Type*	*Ground Water*
Ref 2			
Ref 3			

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
Mercury (Ground water)	178	ICPMS	<0.28	ug/L	INAB
Naphthalene (Ground Water)	154	GCMS	<1	ug/l	INAB
Nickel (Ground Water)	177	ICPMS	2	ug/L	INAB
Nitrate (Ground Water)	103	Colorimetry	7	mg/L as N	INAB
Nitrite (Ground Water)	118	Colorimetry	<0.01	mg/L as N	INAB
[3]o-Xylene (Ground Water)	154	GCMS	<1	ug/l	INAB
pH (Ground Water)	110	Electrometry	7.46	pH Units	INAB
Phenols (Total)	223	GCMS	<0.1	ug/L	
Phosphate (Ortho) Ground Water	117	Colorimetry	<0.01	mg/L as P	INAB
Potassium (Ground Water)	184	ICPMS	0.7	mg/L	INAB
Sodium (Ground water)	184	ICPMS	16.5	mg/L	INAB
Solids (Total Suspended)	106	Gravimetry	<5	mg/L	
TOC (Groundwater)	316	TOC Analyser	0.3	mg/L	INAB
[3]Toluene (Ground Water)	154	GCMS	<1.0	ug/l	INAB
TPH (>C10-40)	188	GC-FID	<1	ug/L	
[3]Xylene Total (Ground Water)	154	GCMS	<1	ug/l	
Zinc (Ground Water)	177	ICPMS	2	ug/L	INAB

Signed: A Harmon **Date: 04/11/2024**

Aoife Harmon - Laboratory Supervisor

Acc. : Accredited Parameters by ISO/IEC 17025:2017

For bacterial analysis a result of 0 means none detected in volume examined
All organic results are analysed as received and all results are corrected for dry weight at 104 C
Results shall not be reproduced, except in full, without the approval of Fitz Scientific
Results contained in this report relate only to the samples tested (P) : Presumptive Results

** : The test result for this parameter may be invalid as it has exceeded the recommended holding time (BS EN ISO 5667-3:2024)
This sample was identified as deviant (BS EN ISO 5667-3:2024) due to [HeadSpace[3]] and the test results may be invalid.

Final results will be issued without any estimated uncertainty of measurement being applied. This can be supplied on request.
Fitz Scientific maintain all customer information in the strictest confidence which is legally enforceable.

FITZ SCIENTIFIC
MONITORING & TESTING

Unit 35,
Boyne Business Park,
Drogheda,
Co. Louth,
Ireland
Tel: +353 41 9845440
Fax: +353 41 9846171
Web: www.fitzsci.ie
Email: info@fitzsci.ie

RECEIVED: 27/12/2025

A copy of this certificate is available on www.fitzsci.ie.

Customer supplied information appear in italics.

Customer	*Pamela Bartley* *Hydro-G* *50 Henry Street* *Galway* *Co.Galway H91 FA4X*	Lab Report Ref. No.	2297/2410005/01
		Date of Receipt	18/10/2024
		Sampled On	*17/10/2024*
		Date Testing Commenced	18/10/2024
		Received or Collected	By Fitz: Pick up Derek
		Condition on Receipt	Acceptable
Customer PO	*Rossmore-18Oct24*	Date of Report	04/11/2024
Customer Ref	*BBH2 - South*	*Sample Type*	*Ground Water*
Ref 2			
Ref 3			

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
Aluminium (Ground Water)	177	ICPMS	21	ug/L	INAB
Ammonia (Ground Water)	114	Colorimetry	0.03	mg/L as N	INAB
Arsenic (Ground Water)	177	ICPMS	<1	ug/L	INAB
Barium (Ground Water)	177	ICPMS	14	ug/L	INAB
Benzene (Ground Water)	154	GCMS	<1	ug/l	INAB
Benzo(a)pyrene (Ground)	575	GCMS	<0.0025	ug/L	
BTEX Total (Ground Water)	154	GCMS	<1	ug/l	
Cadmium (Ground Water)	177	ICPMS	<1	ug/L	INAB
Chloride (Ground Water)	100	Colorimetry	405	mg/L	INAB
Chromium (Ground Water)	177	ICPMS	<2	ug/L	INAB
Chromium (VI)	146	Colorimetry	<10	ug/L	
Conductivity (Ground Water at 20C)	112	Electrometry	1772.0	µscm -1@20C	INAB
Copper (Ground Water)	177	ICPMS	2	ug/L	INAB
Dissolved Organic Carbon	316	TOC Analyser	<1.0	mg/L	
Ethylbenzene (Ground Water)	154	GCMS	<1	ug/l	INAB
**Hardness Total (Ground Water)	111	Colorimetry	415.5	mg/L CaCO3	INAB
Iron (Ground Water)	177	ICPMS	15	ug/L	INAB
Lead (Ground Water)	177	ICPMS	<1	ug/L	INAB
m- & p-Xylene (Ground Water)	154	GCMS	<1	ug/l	INAB
Manganese (Ground Water)	177	ICPMS	1	ug/L	INAB

Signed: A Harmon **Date: 04/11/2024**

Aoife Harmon - Laboratory Supervisor

Acc. : Accredited Parameters by ISO/IEC 17025:2017

For bacterial analysis a result of 0 means none detected in volume examined
All organic results are analysed as received and all results are corrected for dry weight at 104 C
Results shall not be reproduced, except in full, without the approval of Fitz Scientific
Results contained in this report relate only to the samples tested (P) : Presumptive Results

** : The test result for this parameter may be invalid as it has exceeded the recommended holding time (BS EN ISO 5667-3:2024)
This sample was identified as deviant (BS EN ISO 5667-3:2024) due to [HoldingTime**] and the test results may be invalid.

Final results will be issued without any estimated uncertainty of measurement being applied. This can be supplied on request.
Fitz Scientific maintain all customer information in the strictest confidence which is legally enforceable.

FITZ SCIENTIFIC
MONITORING & TESTING

Unit 35,
Boyne Business Park,
Drogheda,
Co. Louth,
Ireland
Tel: +353 41 9845440
Fax: +353 41 9846171
Web: www.fitzsci.ie
Email: info@fitzsci.ie

RECEIVED: 27/12/2025

A copy of this certificate is available on www.fitzsci.ie.

Customer supplied information appear in italics.

Customer	*Pamela Bartley* *Hydro-G* *50 Henry Street* *Galway* *Co.Galway H91 FA4X*	Lab Report Ref. No.	2297/2410005/01
		Date of Receipt	18/10/2024
		Sampled On	*17/10/2024*
		Date Testing Commenced	18/10/2024
		Received or Collected	By Fitz: Pick up Derek
		Condition on Receipt	Acceptable
Customer PO	*Rossmore-18Oct24*	Date of Report	04/11/2024
Customer Ref	*BBH2 - South*	*Sample Type*	*Ground Water*
Ref 2			
Ref 3			

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
Mercury (Ground water)	178	ICPMS	<0.28	ug/L	INAB
Naphthalene (Ground Water)	154	GCMS	<1	ug/l	INAB
Nickel (Ground Water)	177	ICPMS	2	ug/L	INAB
Nitrate (Ground Water)	103	Colorimetry	15	mg/L as N	INAB
Nitrite (Ground Water)	118	Colorimetry	<0.01	mg/L as N	INAB
o-Xylene (Ground Water)	154	GCMS	<1	ug/l	INAB
pH (Ground Water)	110	Electrometry	7.29	pH Units	INAB
Phenols (Total)	223	GCMS	<0.1	ug/L	
Phosphate (Ortho) Ground Water	117	Colorimetry	<0.01	mg/L as P	INAB
Potassium (Ground Water)	184	ICPMS	5.7	mg/L	INAB
Sodium (Ground water)	184	ICPMS	20.1	mg/L	INAB
Solids (Total Suspended)	106	Gravimetry	<5	mg/L	
TOC (Groundwater)	316	TOC Analyser	0.4	mg/L	INAB
Toluene (Ground Water)	154	GCMS	<1.0	ug/l	INAB
TPH (>C10-40)	188	GC-FID	<1	ug/L	
Xylene Total (Ground Water)	154	GCMS	<1	ug/l	
Zinc (Ground Water)	177	ICPMS	27	ug/L	INAB

Signed: A Harmon **Date: 04/11/2024**

Aoife Harmon - Laboratory Supervisor

Acc. : Accredited Parameters by ISO/IEC 17025:2017

For bacterial analysis a result of 0 means none detected in volume examined
All organic results are analysed as received and all results are corrected for dry weight at 104 C
Results shall not be reproduced, except in full, without the approval of Fitz Scientific
Results contained in this report relate only to the samples tested (P) : Presumptive Results

** : The test result for this parameter may be invalid as it has exceeded the recommended holding time (BS EN ISO 5667-3:2024)
This sample was identified as deviant (BS EN ISO 5667-3:2024) due to [HoldingTime**] and the test results may be invalid.

Final results will be issued without any estimated uncertainty of measurement being applied. This can be supplied on request.
Fitz Scientific maintain all customer information in the strictest confidence which is legally enforceable.

FITZ SCIENTIFIC
MONITORING & TESTING

Unit 35,
Boyne Business Park,
Drogheda,
Co. Louth,
Ireland
Tel: +353 41 9845440
Fax: +353 41 9846171
Web: www.fitzsci.ie
Email: info@fitzsci.ie

RECEIVED: 27/12/2025

A copy of this certificate is available on www.fitzsci.ie.

Customer supplied information appear in italics.

Customer	*Pamela Bartley* *Hydro-G* *50 Henry Street* *Galway* *Co.Galway H91 FA4X*	Lab Report Ref. No.	2297/2410006/02
		Date of Receipt	18/10/2024
		Sampled On	*18/10/2024*
		Date Testing Commenced	18/10/2024
		Received or Collected	By Fitz: Pick up Derek
		Condition on Receipt	Acceptable
Customer PO	*Rossmore-18Oct24*	Date of Report	04/11/2024
Customer Ref	*R.PROD.BH*	*Sample Type*	*Ground Water*
Ref 2			
Ref 3			

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
Aluminium (Ground Water)	177	ICPMS	<8	ug/L	INAB
Ammonia (Ground Water)	114	Colorimetry	0.05	mg/L as N	INAB
Arsenic (Ground Water)	177	ICPMS	<1	ug/L	INAB
Barium (Ground Water)	177	ICPMS	7	ug/L	INAB
[3]Benzene (Ground Water)	154	GCMS	<1	ug/l	INAB
Benzo(a)pyrene (Ground)	575	GCMS	<0.0025	ug/L	
[3]BTEX Total (Ground Water)	154	GCMS	<1	ug/l	
Cadmium (Ground Water)	177	ICPMS	<1	ug/L	INAB
Chloride (Ground Water)	100	Colorimetry	40	mg/L	INAB
Chromium (Ground Water)	177	ICPMS	<2	ug/L	INAB
Chromium (VI)	146	Colorimetry	<10	ug/L	
Conductivity (Ground Water at 20C)	112	Electrometry	660.0	µscm -1@20C	INAB
Copper (Ground Water)	177	ICPMS	1	ug/L	INAB
Dissolved Organic Carbon	316	TOC Analyser	<1.0	mg/L	
[3]Ethylbenzene (Ground Water)	154	GCMS	<1	ug/l	INAB
Hardness Total (Ground Water)	111	Colorimetry	340.7	mg/L CaCO3	INAB
Iron (Ground Water)	177	ICPMS	<8	ug/L	INAB
Lead (Ground Water)	177	ICPMS	<1	ug/L	INAB
[3]m- & p-Xylene (Ground Water)	154	GCMS	<1	ug/l	INAB
Manganese (Ground Water)	177	ICPMS	<1	ug/L	INAB

Signed: A Harmon **Date: 04/11/2024**

Aoife Harmon - Laboratory Supervisor

Acc. : Accredited Parameters by ISO/IEC 17025:2017

For bacterial analysis a result of 0 means none detected in volume examined
All organic results are analysed as received and all results are corrected for dry weight at 104 C
Results shall not be reproduced, except in full, without the approval of Fitz Scientific
Results contained in this report relate only to the samples tested (P) : Presumptive Results

** : The test result for this parameter may be invalid as it has exceeded the recommended holding time (BS EN ISO 5667-3:2024)
This sample was identified as deviant (BS EN ISO 5667-3:2024) due to [HeadSpace[3]] and the test results may be invalid.

Final results will be issued without any estimated uncertainty of measurement being applied. This can be supplied on request.
Fitz Scientific maintain all customer information in the strictest confidence which is legally enforceable.

FITZ SCIENTIFIC
MONITORING & TESTING

Unit 35,
Boyne Business Park,
Drogheda,
Co. Louth,
Ireland
Tel: +353 41 9845440
Fax: +353 41 9846171
Web: www.fitzsci.ie
Email: info@fitzsci.ie

RECEIVED: 27/12/2025

A copy of this certificate is available on www.fitzsci.ie.

Customer supplied information appear in italics.

Customer	*Pamela Bartley* *Hydro-G* *50 Henry Street* *Galway* *Co.Galway H91 FA4X*	Lab Report Ref. No.	2297/2410006/02
		Date of Receipt	18/10/2024
		Sampled On	*18/10/2024*
		Date Testing Commenced	18/10/2024
		Received or Collected	By Fitz: Pick up Derek
		Condition on Receipt	Acceptable
Customer PO	*Rossmore-18Oct24*	Date of Report	04/11/2024
Customer Ref	*R.PROD.BH*	*Sample Type*	*Ground Water*
Ref 2			
Ref 3			

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
Mercury (Ground water)	178	ICPMS	<0.28	ug/L	INAB
Naphthalene (Ground Water)	154	GCMS	<1	ug/l	INAB
Nickel (Ground Water)	177	ICPMS	<1	ug/L	INAB
Nitrate (Ground Water)	103	Colorimetry	12	mg/L as N	INAB
Nitrite (Ground Water)	118	Colorimetry	<0.01	mg/L as N	INAB
[3]o-Xylene (Ground Water)	154	GCMS	<1	ug/l	INAB
pH (Ground Water)	110	Electrometry	7.22	pH Units	INAB
Phenols (Total)	223	GCMS	<0.1	ug/L	
Phosphate (Ortho) Ground Water	117	Colorimetry	<0.01	mg/L as P	INAB
Potassium (Ground Water)	184	ICPMS	1.8	mg/L	INAB
Sodium (Ground water)	184	ICPMS	17.6	mg/L	INAB
Solids (Total Suspended)	106	Gravimetry	<5	mg/L	
TOC (Groundwater)	316	TOC Analyser	0.4	mg/L	INAB
[3]Toluene (Ground Water)	154	GCMS	<1.0	ug/l	INAB
TPH (>C10-40)	188	GC-FID	<1	ug/L	
[3]Xylene Total (Ground Water)	154	GCMS	<1	ug/l	
Zinc (Ground Water)	177	ICPMS	10	ug/L	INAB

Signed: A Harmon **Date: 04/11/2024**

Aoife Harmon - Laboratory Supervisor

Acc. : Accredited Parameters by ISO/IEC 17025:2017

For bacterial analysis a result of 0 means none detected in volume examined
All organic results are analysed as received and all results are corrected for dry weight at 104 C
Results shall not be reproduced, except in full, without the approval of Fitz Scientific
Results contained in this report relate only to the samples tested (P) : Presumptive Results

** : The test result for this parameter may be invalid as it has exceeded the recommended holding time (BS EN ISO 5667-3:2024)
This sample was identified as deviant (BS EN ISO 5667-3:2024) due to [HeadSpace[3]] and the test results may be invalid.

Final results will be issued without any estimated uncertainty of measurement being applied. This can be supplied on request.
Fitz Scientific maintain all customer information in the strictest confidence which is legally enforceable.

TEST REPORT NO: 311327 .1

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 25/04/0655
Quote Ref: QM020006
Order No: Not Required
Sales Order: 248043
Date Received: 02/04/2025
Date Sampled: 01/04/2025
Date Completed: 29/04/2025
Sample Type: Bore

FTAO: Pamela Bartley
Site: Water Testing
BHP Ref: On Demand_Bore
Client Ref: Rossmore Breedon R Prod BH

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2025

Test		Units	Results	Customer Limits	Date Analysed	Method
Total Ammonia (as N)	Acc.	mg/L	<0.05	Not Given	07/04/2025	BHP AC 095
Ionised Ammonium (as NH_4)	Acc.	mg/L	<0.064	Not Given	07/04/2025	BHP AC 095
Chloride (as Cl^-)	Acc.	mg/L	35	Not Given	04/04/2025	BHP AC 095
Total Hardness (as CaCO3)	Acc.	mg/L	318	Not Given	04/04/2025	BHP AC 095
Nitrate (as NO_3)		mg/L	50	Not Given	09/04/2025	BHP AC 019
Nitrite (as NO_2)		mg/L	<0.1	Not Given	04/04/2025	BHP AC 019
OrthoPhosphate (as P)	Acc. **	mg/L	<0.01	Not Given	09/04/2025	BHP AC 095
Sulphate (as $SO4^{2-}$)	Acc.	mg/L	17	Not Given	04/04/2025	BHP AC 095
Total Suspended Solids		mg/L	<25	Not Given	07/04/2025	BHP AC 012
Total Petroleum Hydrocarbons (>C_6-C_{40})	*	mg/L	<0.01	Not Given	11/04/2025	1670
Mineral Oils (>C_{10}-C_{40})	*	mg/L	<0.01	Not Given	11/04/2025	1670
Aluminium (Total as Al)		mg/L	<0.05	Not Given	10/04/2025	BHP AC 224
Calcium (Total as Ca)		mg/L	139	Not Given	10/04/2025	BHP AC 224
Chromium (Total as Cr)		mg/L	<0.005	Not Given	10/04/2025	BHP AC 224

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 06/05/2025

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 311327 .1

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 25/04/0655
Quote Ref: QM020006
Order No: Not Required
Sales Order: 248043
Date Received: 02/04/2025
Date Sampled: 01/04/2025
Date Completed: 29/04/2025
Sample Type: Bore

FTAO: Pamela Bartley
Site: Water Testing
BHP Ref: On Demand_Bore
Client Ref: Rossmore Breedon R Prod BH

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2025

Test		Units	Results	Customer Limits	Date Analysed	Method
Copper (Total as Cu)		mg/L	<0.025	Not Given	10/04/2025	BHP AC 224
Iron (Total as Fe)		mg/L	<0.05	Not Given	10/04/2025	BHP AC 224
Magnesium (Total as Mg)		mg/L	5.3	Not Given	10/04/2025	BHP AC 224
Manganese (Total as Mn)		mg/L	<0.01	Not Given	10/04/2025	BHP AC 224
Lead (Total as Pb)		mg/L	<0.025	Not Given	10/04/2025	BHP AC 224
Nickel (Total as Ni)		mg/L	<0.01	Not Given	10/04/2025	BHP AC 224
Potassium (Total as K)		mg/L	<5	Not Given	10/04/2025	BHP AC 224
Sodium (Total as Na)		mg/L	14	Not Given	10/04/2025	BHP AC 224
Zinc (Total as Zn)		mg/L	0.048	Not Given	10/04/2025	BHP AC 224
Arsenic (Total as As)		mg/L	<0.0025	Not Given	17/04/2025	BHP AC 136
Total Organic Carbon		mg/L	<2	Not Given	07/04/2025	BHP AC 215
Naphthalene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Acenaphthylene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Acenaphthene	*	mg/L	<0.0001	Not Given	08/04/2025	1700

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 06/05/2025

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 311327 .1

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 25/04/0655
Quote Ref: QM020006
Order No: Not Required
Sales Order: 248043
Date Received: 02/04/2025
Date Sampled: 01/04/2025
Date Completed: 29/04/2025
Sample Type: Bore

FTAO: Pamela Bartley
Site: Water Testing
BHP Ref: On Demand_Bore
Client Ref: Rossmore Breedon R Prod BH

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2025

Test		Units	Results	Customer Limits	Date Analysed	Method
Fluorene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Phenanthrene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Anthracene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Fluoranthene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Pyrene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Benzo[a]anthracene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Chrysene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Benzo[b]fluoranthene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Benzo[k]fluoranthene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Benzo[a]pyrene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Indeno(1,2,3-c,d)Pyrene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Dibenz(a,h)Anthracene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Benzo[g,h,i]perylene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Coronene	*	mg/L	<0.0001	Not Given	08/04/2025	1700

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 06/05/2025

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 311327 .1

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 25/04/0655
Quote Ref: QM020006
Order No: Not Required
Sales Order: 248043
Date Received: 02/04/2025
Date Sampled: 01/04/2025
Date Completed: 29/04/2025
Sample Type: Bore

FTAO: Pamela Bartley
Site: Water Testing
BHP Ref: On Demand_Bore
Client Ref: Rossmore Breedon R Prod BH

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2025

Test		Units	Results	Customer Limits	Date Analysed	Method
Total of 17 PAHs	*	mg/L	<0.002	Not Given	08/04/2025	1700
Benzene	*	mg/L	<0.001	Not Given	29/04/2025	1760
Toluene	*	mg/L	<0.001	Not Given	29/04/2025	1760
Ethyl Benzene	*	mg/L	<0.001	Not Given	29/04/2025	1760
m & p-Xylene	*	mg/L	<0.001	Not Given	29/04/2025	1760
o-Xylene	*	mg/L	<0.001	Not Given	29/04/2025	1760
pH	Acc.	-	7.14	Not Given	02/04/2025	BHP AC 217
Conductivity (25°C)	Acc.	µS/cm	75	Not Given	02/04/2025	BHP AC 217
C.O.D.		mg/L	<15	Not Given	08/04/2025	BHP AC 006
B.O.D.	Acc.	mg/L	0.4	Not Given	03/04/2025	BHP AC 005
Chromium VI	Acc.	mg/L	<0.003	Not Given	04/04/2025	BHP AC 095
Dissolved Inorganic Nitrogen (as N)		mg/L	11	Not Given	07/04/2025	BHP AC 070
Barium (Total as Ba)		mg/L	<0.01	Not Given	10/04/2025	BHP AC 224
Cadmium (Total as Cd)		mg/L	<0.005	Not Given	10/04/2025	BHP AC 224

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 06/05/2025

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 311327 .1

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 25/04/0655
Quote Ref: QM020006
Order No: Not Required
Sales Order: 248043
Date Received: 02/04/2025
Date Sampled: 01/04/2025
Date Completed: 29/04/2025
Sample Type: Bore

FTAO: Pamela Bartley
Site: Water Testing
BHP Ref: On Demand_Bore
Client Ref: Rossmore Breedon R Prod BH

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2025

Test	Units	Results	Customer Limits	Date Analysed	Method
Mercury (Total as Hg)	mg/L	<0.00025	Not Given	17/04/2025	BHP AC 136

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 06/05/2025

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
* Subcontracted to an approved accredited laboratory
** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 299317 .2

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 24/10/4637
Quote Ref: QM018321
Order No: HGR24
Sales Order: 232513
Date Received: 21/10/2024
Date Sampled: 18/10/2024
Date Completed: 06/11/2024
Sample Type: Bore

FTAO: Pamela Bartley
Site: Rossmore
BHP Ref: Monthly Bore
Client Ref: R. Discharge

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2024

Test	Units	Results	Customer Limits	Date Analysed	Method
Alkalinity (as $CaCO_3$)	mg/L	177	Not Given	24/10/2024	BHP AC 095
Total Ammonia (as N)	mg/L	<0.05	Not Given	29/10/2024	BHP AC 095
Ionised Ammonium (as NH_4)	mg/L	<0.064	Not Given	29/10/2024	BHP AC 095
Chloride (as Cl^-)	mg/L	2576	Not Given	24/10/2024	BHP AC 095
Total Hardness (as $CaCO_3$)	mg/L	1102	Not Given	25/10/2024	BHP AC 095
Hexavalent Chromium	mg/L	<0.003	Not Given	22/10/2024	BHP AC 095
Nitrate (as NO_3)	mg/L	22	Not Given	21/10/2024	BHP AC 019
Nitrite (as NO_2)	mg/L	0.065	Not Given	21/10/2024	BHP AC 019
OrthoPhosphate (as P)	mg/L	<0.01	Not Given	22/10/2024	BHP AC 095
Total Phenols	mg/L	<0.001	Not Given	23/10/2024	BHP AC 044
Total Suspended Solids	mg/L	10	Not Given	23/10/2024	BHP AC 012
Total Petroleum Hydrocarbons (>C_6-C_{40}) *	mg/L	<0.01	Not Given	28/10/2024	1670
Aluminium (Total as Al)	mg/L	0.057	Not Given	30/10/2024	BHP AC 129
Barium (Total as Ba)	mg/L	0.040	Not Given	30/10/2024	BHP AC 129

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 18/11/2024

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 299317 .2

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 24/10/4637
Quote Ref: QM018321
Order No: HGR24
Sales Order: 232513
Date Received: 21/10/2024
Date Sampled: 18/10/2024
Date Completed: 06/11/2024
Sample Type: Bore

FTAO: Pamela Bartley
Site: Rossmore
BHP Ref: Monthly Bore
Client Ref: R. Discharge

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2024

Test	Units	Results	Customer Limits	Date Analysed	Method
Cadmium (Total as Cd)	mg/L	<0.005	Not Given	30/10/2024	BHP AC 129
Chromium (Total as Cr)	mg/L	<0.005	Not Given	30/10/2024	BHP AC 129
Copper (Total as Cu)	mg/L	<0.025	Not Given	30/10/2024	BHP AC 129
Iron (Total as Fe)	mg/L	<0.05	Not Given	30/10/2024	BHP AC 129
Manganese (Total as Mn)	mg/L	<0.01	Not Given	30/10/2024	BHP AC 129
Lead (Total as Pb)	mg/L	<0.025	Not Given	30/10/2024	BHP AC 129
Nickel (Total as Ni)	mg/L	<0.01	Not Given	30/10/2024	BHP AC 129
Potassium (Total as K)	mg/L	54	Not Given	31/10/2024	BHP AC 129
Sodium (Total as Na)	mg/L	1286	Not Given	06/11/2024	BHP AC 129
Zinc (Total as Zn)	mg/L	<0.025	Not Given	30/10/2024	BHP AC 129
Arsenic (Total as As)	mg/L	<0.0025	Not Given	23/10/2024	BHP AC 136
Mercury (Total as Hg)	mg/L	<0.00025	Not Given	23/10/2024	BHP AC 136
Total Organic Carbon	mg/L	2.2	Not Given	23/10/2024	BHP AC 153
Dissolved Organic Carbon Combustion	mg/L	<2	Not Given	23/10/2024	BHP AC 153

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 18/11/2024

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 299317 .2

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 24/10/4637
Quote Ref: QM018321
Order No: HGR24
Sales Order: 232513
Date Received: 21/10/2024
Date Sampled: 18/10/2024
Date Completed: 06/11/2024
Sample Type: Bore

FTAO: Pamela Bartley
Site: Rossmore
BHP Ref: Monthly Bore
Client Ref: R. Discharge

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2024

Test		Units	Results	Customer Limits	Date Analysed	Method
pH	Acc. **	-	8.12	Not Given	22/10/2024	BHP AC 217
Conductivity (25°C)	Acc.	µS/cm	8980	Not Given	22/10/2024	BHP AC 217
Benzene	*	mg/L	<0.001	Not Given	25/10/2024	1760
Toluene	*	mg/L	<0.001	Not Given	25/10/2024	1760
Ethyl Benzene	*	mg/L	<0.001	Not Given	25/10/2024	1760
m & p-Xylene	*	mg/L	<0.001	Not Given	25/10/2024	1760
o-Xylene	*	mg/L	<0.001	Not Given	25/10/2024	1760
Naphthalene	*	mg/L	<0.0001	Not Given	29/10/2024	1700
Acenaphthylene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Acenaphthene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Fluorene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Phenanthrene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Anthracene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Fluoranthene	*	mg/L	<0.0001	Not Given	30/10/2024	1700

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 18/11/2024

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 299317 .2

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No:	24/10/4637
Quote Ref:	QM018321
Order No:	HGR24
Sales Order:	232513
Date Received:	21/10/2024
Date Sampled:	18/10/2024
Date Completed:	06/11/2024
Sample Type:	Bore

FTAO: Pamela Bartley
Site: Rossmore
BHP Ref: Monthly Bore
Client Ref: R. Discharge

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2024

Test		Units	Results	Customer Limits	Date Analysed	Method
Pyrene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Benzo[a]anthracene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Chrysene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Benzo[b]fluoranthene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Benzo[k]fluoranthene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Benzo[a]pyrene	*	mg/L	<0.0001	Not Given	29/10/2024	1700
Indeno(1,2,3-c,d)Pyrene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Dibenz(a,h)Anthracene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Benzo[g,h,i]perylene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Coronene	*	mg/L	<0.0001	Not Given	30/10/2024	1700
Total of 17 PAHs	*	mg/L	<0.002	Not Given	30/10/2024	1700

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 18/11/2024

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 311327 .2

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 25/04/0656
Quote Ref: QM020006
Order No: Not Required
Sales Order: 248043
Date Received: 02/04/2025
Date Sampled: 01/04/2025
Date Completed: 29/04/2025
Sample Type: Bore

FTAO: Pamela Bartley
Site: Water Testing
BHP Ref: On Demand_Bore
Client Ref: Rossmore Breedon R Discharge

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2025

Test		Units	Results	Customer Limits	Date Analysed	Method
Total Ammonia (as N)	Acc.	mg/L	0.30	Not Given	07/04/2025	BHP AC 095
Ionised Ammonium (as NH_4)	Acc.	mg/L	0.36	Not Given	07/04/2025	BHP AC 095
Chloride (as Cl^-)	Acc.	mg/L	18	Not Given	04/04/2025	BHP AC 095
Total Hardness (as CaCO3)	Acc.	mg/L	112	Not Given	04/04/2025	BHP AC 095
Nitrate (as NO_3)		mg/L	32	Not Given	09/04/2025	BHP AC 019
Nitrite (as NO_2)		mg/L	0.32	Not Given	04/04/2025	BHP AC 019
OrthoPhosphate (as P)	Acc. **	mg/L	<0.01	Not Given	09/04/2025	BHP AC 095
Sulphate (as $SO4^{2-}$)	Acc.	mg/L	37	Not Given	04/04/2025	BHP AC 095
Total Suspended Solids		mg/L	<10	Not Given	07/04/2025	BHP AC 012
Total Petroleum Hydrocarbons (>C_6-C_{40})	*	mg/L	<0.01	Not Given	11/04/2025	1670
Mineral Oils (>C_{10}-C_{40})	*	mg/L	<0.01	Not Given	11/04/2025	1670
Aluminium (Total as Al)		mg/L	<0.05	Not Given	10/04/2025	BHP AC 224
Calcium (Total as Ca)		mg/L	169	Not Given	10/04/2025	BHP AC 224
Chromium (Total as Cr)		mg/L	<0.005	Not Given	10/04/2025	BHP AC 224

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 06/05/2025

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 311327 .2

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 25/04/0656
Quote Ref: QM020006
Order No: Not Required
Sales Order: 248043
Date Received: 02/04/2025
Date Sampled: 01/04/2025
Date Completed: 29/04/2025
Sample Type: Bore

FTAO: Pamela Bartley
Site: Water Testing
BHP Ref: On Demand_Bore
Client Ref: Rossmore Breedon R Discharge

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2025

Test		Units	Results	Customer Limits	Date Analysed	Method
Copper (Total as Cu)		mg/L	<0.025	Not Given	10/04/2025	BHP AC 224
Iron (Total as Fe)		mg/L	<0.05	Not Given	10/04/2025	BHP AC 224
Magnesium (Total as Mg)		mg/L	131	Not Given	10/04/2025	BHP AC 224
Manganese (Total as Mn)		mg/L	<0.01	Not Given	10/04/2025	BHP AC 224
Lead (Total as Pb)		mg/L	<0.025	Not Given	10/04/2025	BHP AC 224
Nickel (Total as Ni)		mg/L	<0.01	Not Given	10/04/2025	BHP AC 224
Potassium (Total as K)		mg/L	44	Not Given	10/04/2025	BHP AC 224
Sodium (Total as Na)		mg/L	1015	Not Given	10/04/2025	BHP AC 224
Zinc (Total as Zn)		mg/L	<0.025	Not Given	10/04/2025	BHP AC 224
Arsenic (Total as As)		mg/L	<0.0025	Not Given	17/04/2025	BHP AC 136
Total Organic Carbon		mg/L	3.5	Not Given	07/04/2025	BHP AC 215
Naphthalene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Acenaphthylene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Acenaphthene	*	mg/L	<0.0001	Not Given	08/04/2025	1700

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 06/05/2025

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 311327 .2

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 25/04/0656
Quote Ref: QM020006
Order No: Not Required
Sales Order: 248043
Date Received: 02/04/2025
Date Sampled: 01/04/2025
Date Completed: 29/04/2025
Sample Type: Bore

FTAO: Pamela Bartley
Site: Water Testing
BHP Ref: On Demand_Bore
Client Ref: Rossmore Breedon R Discharge

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2025

Test		Units	Results	Customer Limits	Date Analysed	Method
Fluorene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Phenanthrene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Anthracene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Fluoranthene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Pyrene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Benzo[a]anthracene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Chrysene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Benzo[b]fluoranthene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Benzo[k]fluoranthene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Benzo[a]pyrene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Indeno(1,2,3-c,d)Pyrene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Dibenz(a,h)Anthracene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Benzo[g,h,i]perylene	*	mg/L	<0.0001	Not Given	08/04/2025	1700
Coronene	*	mg/L	<0.0001	Not Given	08/04/2025	1700

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 06/05/2025

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 311327 .2

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 25/04/0656
Quote Ref: QM020006
Order No: Not Required
Sales Order: 248043
Date Received: 02/04/2025
Date Sampled: 01/04/2025
Date Completed: 29/04/2025
Sample Type: Bore

FTAO: Pamela Bartley
Site: Water Testing
BHP Ref: On Demand_Bore
Client Ref: Rossmore Breedon R Discharge

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2025

Test		Units	Results	Customer Limits	Date Analysed	Method
Total of 17 PAHs	*	mg/L	<0.002	Not Given	08/04/2025	1700
Benzene	*	mg/L	<0.001	Not Given	29/04/2025	1760
Toluene	*	mg/L	<0.001	Not Given	29/04/2025	1760
Ethyl Benzene	*	mg/L	<0.001	Not Given	29/04/2025	1760
m & p-Xylene	*	mg/L	<0.001	Not Given	29/04/2025	1760
o-Xylene	*	mg/L	<0.001	Not Given	29/04/2025	1760
pH	Acc.	-	8.20	Not Given	02/04/2025	BHP AC 217
Conductivity (25°C)	Acc.	µS/cm	7760	Not Given	02/04/2025	BHP AC 217
C.O.D.		mg/L	<15	Not Given	08/04/2025	BHP AC 006
B.O.D.	Acc.	mg/L	1.4	Not Given	03/04/2025	BHP AC 005
Chromium VI	Acc.	mg/L	0.0066	Not Given	04/04/2025	BHP AC 095
Total Phenols		mg/L	0.0060	Not Given	25/04/2025	BHP AC 044
Dissolved Inorganic Nitrogen (as N)		mg/L	7.6	Not Given	07/04/2025	BHP AC 070
Barium (Total as Ba)		mg/L	0.022	Not Given	10/04/2025	BHP AC 224

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 06/05/2025

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty

TEST REPORT NO: 311327 .2

Client: Hydro-G
50 Henry St
Galway
Co. Galway

BHP Ref. No: 25/04/0656
Quote Ref: QM020006
Order No: Not Required
Sales Order: 248043
Date Received: 02/04/2025
Date Sampled: 01/04/2025
Date Completed: 29/04/2025
Sample Type: Bore

FTAO: Pamela Bartley
Site: Water Testing
BHP Ref: On Demand_Bore
Client Ref: Rossmore Breedon R Discharge

Testing
Analysing
Consulting

BHP Laboratories
New Road
Thomondgate
Limerick
Tel: +353 61 455399
EMail:dervlapurcell@bhp.ie

RECEIVED: 17/12/2025

Test	Units	Results	Customer Limits	Date Analysed	Method
Cadmium (Total as Cd)	mg/L	<0.005	Not Given	10/04/2025	BHP AC 224
Mercury (Total as Hg)	mg/L	<0.00025	Not Given	17/04/2025	BHP AC 136

Authorised by: Dervla Purcell
Laboratory Manager

Date Authorised: 06/05/2025

Additional Information:(Opinions, where stated, are not covered by accreditation)
Acc.: INAB Accredited
ND: None detected in volume analysed
***** Subcontracted to an approved accredited laboratory
****** This sample has been analysed outside recommended stability times. It is therefore possible that the results provided may be compromised

~ : Sample Condition : ACCEPTABLE

This test report shall not be duplicated except in full and then only with the permission of the test laboratory.
Results apply only to the sample tested and where the laboratory is not responsible for sampling, result apply to the sample as received.
Information identifying the 'Client', 'FTAO', 'Site', 'Client Ref', 'Order No' and 'Date Sampled' where BHP have not taken the sample has been supplied by the customer.
Sampling is outside the scope of accreditation
BHP Laboratory's decision rule: When we report a statement of compliance, we base it on the actual result of the test compared to the standard being used, regardless of the uncertainty